NWU®

Faculty of Natural and Agricultural Sciences Undergraduate

Fakulteit Natuur-en Landbouwetenskappe Voorgraads

2022 YEARBOOK

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TABLE OF CONTENTS

NAS.1.1 AUTHORITY OF THE GENERAL ACADEMIC RULES (A-RULES) / *GESAG VAN DIE ALGEMENE AKADEMIESE REËLS (A-REËLS)* 1

NAS.1.1.1 RECOGNITION OF PRIOR LEARNING (A-RULE 1.6 & 1.7) / *ERKENNING VAN VORIGE LEER (A-REËL 1.6 & 1.7)*..... 1

NAS.1.1.2 REGISTRATION/ *REGISTRASIE* 2

NAS.1.1.2.1 Registration of additional modules/ *Registrasie van bykomende modules* 2

NAS.1.1.3 DURATION OF STUDIES / *DUUR VAN STUDIES* 2

NAS.1.1.3.1 For full-time contact students, the maximum duration of study is as follows/ *Vir voltydse studente is die maksimum duur van studie soos volg:* 2

NAS.1.1.3.2 For part-time contact and distance students, the maximum duration of study is as follows / *Vir deeltydse kontak- en afstandstudente, is die maksimum duur van studie soos volg:* 3

NAS.1.1.3.3 For contact students in extended programmes, the maximum duration of study is as follows */Vir voltydse student in verlengde programme, is die maksimum duur van studie soos volg:*..... 3

NAS.1.1.3.4 Phasing in and out or amendment of programmes and curricula / *Uitfasering of wysiging van programme en kurrikulums*..... 3

NAS.1.2 FACULTY-SPECIFIC RULES / *FAKULTEITSPESIFIEKE REËLS* 3

NAS.1.2.1 AMENDMENT OF PROGRAMMES */ WYSIGING VAN PROGRAMME* 4

NAS.1.2.2 EXAMINATIONS / *EKSAMINERING* 4

NAS.1.2.2.1 Examination opportunities / *Eksamengeleenthede*..... 4

NAS.1.2.2.2 Composition of the participation mark / *Samestelling van die deelnamepunt*..... 4

NAS.1.2.2.3 Admission to examinations / *Toelating tot die eksamen* 4

NAS.1.2.2.4 Relation between credits and examination papers / Verhouding tussen kredietpunte en eksamenvraestelle 5

NAS.1.2.2.5 Relation between credits and teaching periods / Verhouding tussen krediete en onderrigperiodes 5

NAS.1.2.2.6 Number of examination opportunities / *Aantal eksamengeleenthede*..... 5

NAS.1.2.2.7 Module mark */ Modulepunt* 6

NAS.1.2.2.8 Pass requirements of a module */ Slaagvereistes van 'n module* 6

NAS.1.2.2.9 Access to and review of marked examination work (General Rule 1.13.7) / *Toegang tot en hersiening van gemerkte eksamenwerk (Algemene Reël 1.13.7)* 6

NAS.1.2.2.10 Exemption from practical work or class attendance in a module / *Vrystelling van praktiese werk of klasbywoning van 'n module* 7

NAS.1.2.3 REGISTRATION FOR FINAL YEAR MODULES/ *REGISTRASIE VAN FINALE JAAR MODULE* 8

NAS.1.2.4 PROGRESS IN A PROGRAMME BASED ON PREREQUISITES / *VORDERING IN 'N PROGRAM GEBASEER OP VOORVEREISTES*..... 8

NAS.1.2.4.1 Linked and concurrent modules (A-Rule 1.8) 8

NAS.1.2.5 TERMINATION OF STUDIES / *BEËINDIGING VAN STUDIES:* 9

NAS.1.2.6 ATTAINMENT OF QUALIFICATION: (GENERAL RULE 2.6) / *VERWERWING VAN KWALIFIKASIE: (ALGEMENE REËL 2.6)* ... 9

NAS.1.2.6.1 Qualification with distinction/ *Kwalifikasie met onderskeiding* ... 9

NAS.1.3 PROFESSIONAL STATUS / *PROFESSIONELE STATUS* ... 10

NAS.1.4 MODULES LACKING TO COMPLETE DEGREE/ *UITSTAANDE MODULES OM GRAAD TE VOLTOOI* ... 11

NAS.1.5 WARNING AGAINST PLAGIARISM / *WAARSKUWING TEEN PLAGIAAT* ... 11

NAS.1.6 CAPACITY STIPULATION / *KAPASITEITSBEPERKINGS* ... 11

NAS.1.7 LANGUAGE MEDIUM / *TAALMEDIUM* ... 12

NAS.1.8 PROTECTION OF PERSONAL AND EDUCATION-RELATED INFORMATION / *BESKERMING VAN PERSOONLIKE EN OPVOEDKUNDIG-VERWANTE INLIGTING* ... 12

NAS.1.9 ACADEMIC LITERACY / *AKADEMIESE GELETTERDHEID* ... 13

NAS.1.9.1 TESTING / *TOETSING* ... 13

NAS.1.9.1.1 Module(s): Academic Literacy Development (ALDE111) / *Ontwikkeling Van Akademiese Geletterdheid (ALDA111)* ... 13

NAS.1.9.1.2 Academic Literacy Development (ALDE122) / *Ontwikkeling van Akademiese Geletterdheid (ALDA112 of 122)* ... 16

NAS.1.10 PROVISIONAL ADMISSION REQUIREMENTS FOR UNDERGRADUATE STUDIES / *VOORLOPIGE TOELATINGSVEREISTES VIR VOORGRAADSE STUDIES* ... 20

NAS.1.10.1 GENERAL ADMISSION REQUIREMENTS/ *ALGEMENE TOELATINGSVEREISTES* ... 20

NAS.1.10.1.1 Applicant score (AS) system ... 20

NAS.1.10.1.2 Applicant Score (AS) and National Senior Certificate (NSC) Requirements ... 20

NAS.1.10.2 TECHNOLOGY REQUIREMENTS FOR ADMISSION TO THE ACADEMIC PROGRAMME / *TEGNOLOGIESE VEREISTES VIR TOELATING TOT DIE AKADEMIESE PROGRAM* ... 21

NAS.1.10.3 LANGUAGE REQUIREMENT / *TAALVEREISTE* ... 21

NAS.1.10.4 FACULTY SPECIFIC ADMISSION REQUIREMENTS / *FAKULTEITSPESIFIEKE TOELATINGSVEREISTES* ... 22

NAS.1.10.4.1 Mathematics Requirement / *Wiskundevereiste* ... 22

NAS.1.10.4.2 Comments / *Opmerkings* ... 22

NAS.1.10.4.3 Request to change from an Extended programme to a Main stream programme / *Versoek om vanaf ʼn Verlengde program oor te skakel na ʼn Hoofstroom program* ... 23

NAS.1.10.5 ADMISSION REQUIREMENTS FOR PROGRAMMES/ *TOELATINGSVEREISTES VIR PROGRAMME* ... 25

NAS.1.10.5.1 Diplomas ... 25

NAS.1.10.5.2 Extended: Bachelor of Science Degree ... 26

NAS.1.10.5.3 Bachelor of Science Degree/ *Baccalaureus Scientiae Graad* ... 30

NAS.1.10.5.4 Training of Teachers: Postgraduate Certificate in Education (PGCE) / *Onderwyser opleiding: Nagraadse Onderwyssertifikaat in Onderwys (NGOS)* ... 40

NAS.1.10.5.5 The following curricula comply with the entry requirements of the PGCE: / ... 41

Die volgende kurrikulums voldoen aan die vereistes vir toelating tot die NGOS: ... 41

NAS.1.10.5.6 Nature and aims of the PGCE / *Die aard en doel van die NGOS* ... 45

NAS.1.10.5.7 Duration of studies / *Duur van studie* 45
NAS.1.10.5.8 Method of delivery / Metode van aflewering 45
NAS.1.10.5.9 Admission requirements / *Toelatingsvereistes* 45
NAS.1.10.5.10 Exceptions / Uitsonderings 46
NAS.1.11 SCHOOLS AND CENTRES OF THE FACULTY / *SKOLE EN SENTRUMS IN DIE FAKULTEIT* 47
NAS.1.12 RE-CURRICULATION OF QUALIFICATIONS AND PROGRAMMES TO ADHERE TO HEQSF REQUIREMENTS / *HERKURRIKULERING VAN KWALIFIKASIES EN PROGRAMME OM TE VOLDOEN AAN HEQSF- VEREISTES* 48
NAS.1.13 LIST OF MODULES ALL CAMPUSES/ *LYS VAN MODULES ALLE KAMPUSSE* 48
NAS.1.13.1 CONTACT (CAMPUS) STUDENTS / *KONTAK- (KAMPUS-) STUDENTE* 48
NAS.1.13.2 BSC IT PROGRAMME: DISTANCE LEARNING STUDENTS (UODL) / *BSC IT PROGRAM: AFSTANDSLEER STUDENT (EOAL)* 49
NAS.1.13.3 LIST OF ALL MODULES WITH PREREQUISITES AT ALL CAMPUSES / *LYS VAN ALLE MODULES MET VOORVEREISTES OP ALLE KAMPUSSE* 50
NAS.1.14 PROGRAMMES NOT IN 2021 YEARBOOK/ *PROGRAMME NIE IN 2021 JAARBOEK*.113
NAS.1.15 RULES FOR DIPLOMAS.....115
NAS.1.15.1 PROGRAMME: DIPLOMA IN ANIMAL HEALTH 116
NAS.1.15.1.1 Specific programme outcomes 116
NAS.1.15.1.2 Articulation Pathways 116
NAS.1.15.1.3 Diploma in Animal Health 118
NAS.1.15.2 DIPLOMA IN ANIMAL SCIENCE 119
NAS.1.15.2.1 Specific programme outcomes 119
NAS.1.15.2.2 Articulation Pathways 119
NAS.1.15.2.3 Diploma in Animal Science 121
NAS.1.15.3 DIPLOMA IN PLANT SCIENCE WITH CROP PRODUCTION 122
NAS.1.15.3.1 Articulation Pathways 122
NAS.1.15.3.1 Diploma in Plant Science with Crop Production 123
NAS.1.16 EXTENDED PROGRAMMES: BACHELOR OF SCIENCE.....125
NAS.1.16.1 FACULTY-SPECIFIC RULES FOR THE PROGRAMME 125
NAS.1.16.2 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND CHEMISTRY 125
NAS.1.16.3 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND ELECTRONICS 126
NAS.1.16.4 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND MATHEMATICS 127
NAS.1.16.5 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND COMPUTER SCIENCE 128
NAS.1.16.6 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND MATHEMATICS 129

NAS.1.16.7 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND APPLIED MATHEMATICS 130

NAS.1.16.8 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND MATHEMATICS 131

NAS.1.16.9 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH BIOCHEMISTRY AND CHEMISTRY 132

NAS.1.16.10 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND PHYSICS 133

NAS.1.16.11 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND COMPUTER SCIENCE 134

NAS.1.16.12 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ELECTRONICS 135

NAS.1.16.13 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH ELECTRONICS AND PHYSICS 136

NAS.1.16.14 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH ELECTRONICS AND MATHEMATICS 137

NAS.1.16.15 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH APPLIED MATHEMATICS AND MATHEMATICS 138

NAS.1.16.16 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS / *BACCALAUREUS SCIENTIAE IN FINANSIËLE WISKUNDE* 139

NAS.1.16.17 EXTENDED/ *VERLENGDE* PROGRAMME*:* BACHELOR OF SCIENCE IN QUANTITIVE RISK MANAGEMENT / *BACCALAUREUS SCIENTIAE IN KWANTITATIEWE RISIKOBESTUUR* 140

NAS.1.16.18 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN BUSINESS ANALYTICS / *BACCALAUREUS SCIENTIAE IN BESIGHEIDSANALISE* 141

NAS.1.16.19 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE* 142

NAS.1.16.20 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH BOTANY AND CHEMISTRY 143

NAS.1.16.21 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND BOTANY 144

NAS.1.16.22 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND COMPUTER SCIENCE 145

NAS.1.16.23 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH MICROBIOLOGY AND CHEMISTRY 146

NAS.1.16.24 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOGRAPHY 147

NAS.1.16.25 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND BIOCHEMISTRY 148

NAS.1.16.26 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND MICROBIOLOGY 149

NAS.1.16.27 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BIOCHEMISTRY 150

NAS.1.17 RULES FOR THE DEGREE BACHELOR OF SCIENCE (BSC) / *REËLS VIR DIE GRAAD BACCALAUREUS SCIENTIAE (BSC)* 151

NAS.1.17.1 DURATION (MINIMUM AND MAXIMUM DURATION) / *DUUR (MINIMUM EN MAKSIMUM DUUR)* 151

NAS.1.17.2 FACULTY-SPECIFIC REQUIREMENTS / *FAKULTEITSPESIFIEKE TOELATINGSVEREISTES* 151

NAS.1.17.3 STRUCTURE OF A GENERIC BACHELOR OF SCIENCE DEGREE / *STRUKTUUR VAN 'N GENERIESE BACCALAUREUS SCIENTIAE GRAAD* 151

NAS.1.17.4 OUTCOMES OF A GENERIC BACHELOR OF SCIENCE DEGREE / *UITKOMSTE VIR 'N GENERIESE BACCALAUREUS SCIENTIAE GRAAD* 152

NAS.1.17.4.1 Programmes / *Programme* 154

NAS.1.17.4.2 Articulation possibilities / *Artikulasiemoontlikhede* 155

NAS.1.17.5 BACHELOR OF SCIENCE WITH CHEMISTRY AND PHYSICS/ 156

NAS.1.17.5.1 Programme outcomes / *Programuitkomste* 156

NAS.1.17.6 BACHELOR OF SCIENCE WITH CHEMISTRY, MATHEMATICS AND APPLIED MATHEMATICS/ *BACCALAUREUS SCIENTIAE MET CHEMIE, WISKUNDE EN TOEGEPASTE WISKUNDE* 157

NOTE: STUDENTS ENROLLED FOR THIS DEGREE, NEED TO TAKE APPM311 & APPM321 AS ADDITIONAL MODULES IF THEY WISH TO DO AN HONOURS DEGREE IN APPLIED MATHEMATICS, AND MTHS311 & MTHS321 AS ADDITIONAL MODULES IF THEY WISH TO DO AN HONOURS DEGREE IN MATHEMATICS. 157

NAS.1.17.7 BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND CHEMISTRY 158

NAS.1.17.8 BACHELOR OF SCIENCE WITH CHEMISTRY AND MATHEMATICS 159

NAS.1.17.9 BACHELOR OF SCIENCE WITH BIOCHEMISTRY AND CHEMISTRY / *BACCALAUREUS SCIENTIAE MET BIOCHEMIE EN CHEMIE* 160

NAS.1.17.10 BACHELOR OF SCIENCE WITH PHYSICS AND MATHEMATICS / *BACCALAUREUS SCIENTIAE MET FISIKA EN WISKUNDE* 161

NAS.1.17.11 BACHELOR OF SCIENCE WITH PHYSICS AND APPLIED MATHEMATICS/ 162

NAS.1.17.11.1 Programme outcomes/ *Programuitkomste* 162

NAS.1.17.11.2 Bachelor of Science with Physics and Applied Mathematics / *Baccalaureus Scientiae met Fisika en Toegepaste Wiskunde* 163

NAS.1.17.12 BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND ELECTRONICS 164

NAS.1.17.13 BACHELOR OF SCIENCE WITH ELECTRONICS AND MATHEMATICS 165

NAS.1.17.14 BACHELOR OF SCIENCE WITH ELECTRONICS AND PHYSICS 166

NAS.1.17.15 BACHELOR OF SCIENCE WITH PHYSICS AND COMPUTER SCIENCE / *BACCALAUREUS SCIENTIAE MET FISIKA EN REKENAARWETENSKAP* 167

NAS.1.17.15.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program* 167

NAS.1.17.16 BACHELOR OF SCIENCE WITH CHEMISTRY AND COMPUTER SCIENCE 168

NAS.1.17.17 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ELECTRONICS 169

NAS.1.17.18 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND STATISTICS/ *BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN STATISTIEK* 170

NAS.1.17.19 A: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND MATHEMATICS/ *A: BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN WISKUNDE* 171

NAS.1.17.19.1 B: Bachelor of Science with Computer Science and Mathematics/ B: *Baccalaureus Scientiae met Rekenaarwetenskap en Wiskunde* 172

NAS.1.17.20 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ECONOMICS/ *BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN EKONOMIE* 173

NAS.1.17.21 BACHELOR OF SCIENCE WITH MATHEMATICS AND ECONOMY/ *BACCALAUREUS SCIENTIAE MET WISKUNDE EN EKONOMIE* 174

NAS.1.17.22 BACHELOR OF SCIENCE WITH GEOGRAPHY AND APPLIED MATHEMATICS/ *BACCALAUREUS SCIENTIAE MET GEOGRAFIE EN TOEGEPASTE WISKUNDE* 175

NAS.1.18 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / 176

NAS.1.18.1 PROGRAMME OUTCOMES / PROGRAMUITKOMSTE 176

NAS.1.18.2 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH STATISTICS AND MATHEMATICS/ *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE MET STATISTIEK EN WISKUNDE* 177

NAS.1.18.3 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE* 178

NAS.1.18.3.1 Programme outcomes: Mathematics / *Programuitkomste: Wiskunde* 178

NAS.1.18.4 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE* 179

NAS.1.18.5 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH APPLIED MATHEMATICS AND MATHEMATICS 180

NAS.1.19 BACHELOR OF SCIENCE IN THE CENTRE FOR BUSINESS MATHEMATICS AND INFORMATICS / 181

NAS.1.19.1 ARTICULATION POSSIBILITIES / *ARTIKULASIEMOONTLIKHEDE* 181

NAS.1.19.2 ADMISSION REQUIREMENTS OF THE QUALIFICATION/ *TOELATINGSVEREISTES VIR DIE KWALIFIKASIE* 182

NAS.1.19.3 BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS / *BACCALAUREUS SCIENTIAE IN FINANSIËLE WISKUNDE* 184

NAS.1.19.4 BACHELOR OF SCIENCE IN QUANTITATIVE RISK MANAGEMENT / 185

NAS.1.19.5 BACHELOR OF SCIENCE IN BUSINESS ANALYTICS / *BACCALAUREUS SCIENTIAE IN BESIGHEIDSANALISE* 186

NAS.1.19.6 BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE/ 187

NAS.1.19.6.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program (see / sien 1.21.1)* 187

NAS.1.20 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY / 188

NAS.1.20.1 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY - CONTACT/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE – KONTAK* 188

NAS.1.20.2 DISTANCE LEARNING 189

NAS.1.20.2.1 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY – DISTANCE/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE – AFSTAND* 191

NAS.1.21 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES / 192

***BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE* 192**

NAS.1.21.1 FACULTY-SPECIFIC RULES FOR THE PROGRAMME / *FAKULTEITSPESIFIEKE REËLS VIR DIE PROGRAM* 192

NAS.1.21.2 FACULTY SPECIFIC ADMISSION REQUIREMENTS/ *FAKULTEITSPESIFIEKE TOELATINGSVEREISTES* 192

NAS.1.21.3 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH BOTANY AND CHEMISTRY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET PLANTKUNDE EN CHEMIE* 192

NAS.1.21.3.1 Specific programme outcomes/ *Spesifieke programuitkomste*..... 192

NAS.1.21.3.2 Bachelor of Science in Environmental Sciences with Botany and Chemistry/ *Baccalaureus Scientiae in Omgewingswetenskappe met Plantkunde en Chemie* 193

NAS.1.21.3.3 Bachelor of Science in Environmental Sciences with Microbiology and Chemistry / *Baccalaureus Scientiae in Omgewingswetenskappe met Mikrobiologie en Chemie* 194

NAS.1.21.3.4 Bachelor of Science in Environmental Sciences with Zoology and Chemistry / *Baccalaureus Scientiae in Omgewingswetenskappe met Dierkunde en Chemie*..... 195

NAS.1.21.4 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET CHEMIE EN GEOLOGIE* 196

NAS.1.21.4.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program* 196

NAS.1.21.4.2 Bachelor of Science in Environmental Sciences with Chemistry and Geology/ *Baccalaureus Scientiae in Omgewingswetenskappe met Chemie en Geologie*..... 197

NAS.1.21.5 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND GEOGRAPHY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN GEOGRAFIE* 198

NAS.1.21.5.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program (See also/ Sien ook NAS1.20.8.1)* 198

NAS.1.21.6 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND BOTANY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN PLANTKUNDE*..... 199

NAS.1.21.7 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND MICROBIOLOGY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN MIKROBIOLOGIE* 200

NAS.1.21.8 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH ZOOLOGY AND GEOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET DIERKUNDE EN GEOLOGIE* 201

NAS.1.21.9 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH ZOOLOGY AND GEOGRAPHY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET DIERKUNDE EN GEOGRAFIE* 202

NAS.1.21.10 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND BOTANY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOGRAFIE EN PLANTKUNDE* 203

NAS.1.21.11 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOGRAPHY..... 204

NAS.1.21.12 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND COMPUTER SCIENCE / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOGRAFIE EN REKENAARWETENSKAP* 205

NAS.1.21.13 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND ZOOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN DIERKUNDE* 206

NAS.1.21.14 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND GEOGRAPHY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN GEOGRAFIE* 207

NAS.1.21.15 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND BOTANY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN PLANTKUNDE* 208

NAS.1.22 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES/ BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE 209

NAS.1.22.1 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BIOCHEMISTRY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN BIOCHEMIE* 209

NAS.1.22.2 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BOTANY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN PLANTKUNDE* 210

NAS.1.22.3 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND MICROBIOLOGY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN MIKROBIOLOGIE* 212

NAS.1.22.4 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN FISIOLOGIE* 213

NAS.1.22.5 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND BIOCHEMISTRY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN BIOCHEMIE* 214

NAS.1.22.6 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND BIOCHEMISTRY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET PLANTKUNDE EN BIOCHEMIE* 215

NAS.1.22.7 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN FISIOLOGIE* 216

NAS.1.22.8 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH CHEMISTRY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET CHEMIE EN FISIOLOGIE* 217

NAS.1.22.9 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND BOTANY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN PLANTKUNDE* 218

NAS.1.23 RULES FOR THE DEGREE BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING / *REËLS VIR DIE BACCALAUREUS SCIENTIAE IN STADS- EN STREEKBEPLANNING GRAAD* 219

NAS.1.23.1 PROGRAMME OUTCOMES / *PROGRAMUITKOMSTE* 219

NAS.1.23.2 ADMISSION REQUIREMENTS OF THE QUALIFICATION/ *TOELATINGSVEREISTES VAN DIE PROGRAM* 220
NAS.1.23.3 LANGUAGE MEDIUM / *TAALMEDIUM* 220
NAS.1.23.4 COMPLETION OF RESEARCH PROJECT / *VOLTOOIING VAN NAVORSINGSPROJEK* ... 220
NAS.1.23.5 BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING/ *BACCALAUREUS SCIENTIAE IN STADS- EN STREEKBEPLANNING* 222
NAS.1.24 BACHELOR OF SCIENCE IN AGRICULTURE 223
NAS.1.24.1 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRICULTURAL ECONOMICS..... 223
NAS.1.24.1.1 Programme outcomes 223
NAS.1.24.1.2 Articulation Pathways 223
NAS.1.24.1.3 Bachelor of Science in Agriculture with Agricultural Economics 224
NAS.1.24.2 BACHELOR OF SCIENCE IN AGRICULTURE WITH ANIMAL HEALTH 225
NAS.1.24.2.1 Programme outcomes 225
NAS.1.24.2.2 Articulation Pathways 225
NAS.1.24.2.3 New Programme (Phasing In) 226
NAS.1.24.2.4 Old Programme (Phasing Out) 227
NAS.1.24.3 BACHELOR OF SCIENCE IN AGRICULTURE WITH ANIMAL SCIENCE 228
NAS.1.24.3.1 Articulation Pathways 228
NAS.1.24.3.2 BSc in Agriculture with Animal Science 229
NAS.1.24.4 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRONOMY AND HORTICULTURE 230
NAS.1.24.5 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRICULTURAL ECONOMICS AND AGRONOMY/ *BACCALAUREUS SCIENTIAE IN LANDBOU MET LANDBOU-EKONOMIE EN AGRONOMIE* 231
NAS.1.24.6 BACHELOR OF SCIENCE IN AGRICULTURE WITH SOIL SCIENCES AND AGRONOMY/ *BACCALAUREUS SCIENTIAE IN LANDBOU MET GRONDKUNDE EN AGRONOMIE* 232
NAS.1.25 BACHELOR OF INDIGENOUS KNOWLEDGE SYSTEMS 233
NAS.1.25.1 PROGRAMME OUTCOMES 233
NAS.1.25.2 BACHELOR OF INDIGENOUS KNOWLEDGE SYSTEMS (BIKS) 234
NAS.2.1 DIPLOMA IN ANIMAL HEALTH 236
NAS.2.2 BSC AGRICULTURE - ANIMAL HEALTH 250
NAS.2.3 DIPLOMA IN ANIMAL SCIENCE 272
NAS.2.4 BSC AGRICULTURE IN ANIMAL SCIENCE 276
NAS.2.5 AGRICULTURE – AGRONOMY AND HORTICULTURE SCIENCE 290
NAS.2.6 AGRICULTURAL ECONOMICS 304
NAS.2.7 AGRICULTURAL EXTENSION 311
NAS.2.8 EXTENDED PROGRAMMES: MODULE OUTCOMES – VANDERBIJLPARK CAMPUS .313
NAS.2.9 MAINSTREAM MODULES / *HOOFSTROOM MODULES* 324
NAS.2.9.1 ACCOUNTING / REKENINGKUNDE 324
NAS.2.9.2 ACADEMIC LITERACY / AKADEMIESE GELETTERDHEID 324

NAS.2.9.3 BIOCHEMISTRY / *BIOCHEMIE* 324
NAS.2.9.4 BUSINESS MATHEMATICS AND INFORMATICS / *BEDRYFSWISKUNDE EN INFORMATIKA* 340
NAS.2.9.5 CHEMISTRY/ *CHEMIE* 349
NAS.2.9.6 ZOOLOGY / *DIERKUNDE* 361
NAS.2.9.7 ECONOMICS / *EKONOMIE* 368
NAS.2.9.8 ELECTRONICS 368
NAS.2.9.9 PHYSIOLOGY / *FISIOLOGIE* 377
NAS.2.9.10 PHYSICS / *FISIKA* 378
NAS.2.9.11 GEOGRAPHY / *GEOGRAFIE* 393
NAS.2.9.12 GEOLOGY / *GEOLOGIE* 401
NAS.2.9.13 SOIL SCIENCE / *GRONDKUNDE* 410
NAS.2.9.14 INFORMATION TECHNOLOGY / *INLIGTINGSTEGNOLOGIE* 417
NAS.2.9.15 INDIGENOUS KNOWLEDGE 445
NAS.2.9.16 MICROBIOLOGY / *MIKROBIOLOGIE* 458
NAS.2.9.17 BOTANY / PLANTKUNDE 468
NAS.2.9.18 URBAN AND REGIONAL PLANNING / *STADS- EN STREEK-BEPLANNING* 474
NAS.2.9.19 STATISTICS / *STATISTIEK* 493
NAS.2.9.20 APPLIED MATHEMATICS / *TOEGEPASTE WISKUNDE* 503
NAS.2.9.21 MATHEMATICS / *WISKUNDE* 515
NAS.2.9.22 UNDERSTANDING THE ECONOMIC AND NATURAL WORLDS/ *VERSTAAN DIE EKONOMIESE EN NATUURLIKE WÊRELD* 536

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Mahikeng: Deputy / *Adjunk*: Prof O (Ozniel) Ruzvidzo, BScHons (National University of Science and Technology, Zimbabwe), MSc (University of Zimbabwe, Zimbabwe), PhD (University of the Western Cape, South Africa)

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Africa Centre for Disaster Studies / *Afrika Sentrum vir Rampstudies*

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Centre for Applied Radiation Science and Technology / *Sentrum vir Toegepaste Stralingswetenskap en –tegnologie*

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Centre for Business Mathematics and Informatics / *Sentrum vir Bedryfswiskunde en Informatika*

Potchefstroom: Vacant/ *Vakant*

Centre for Human Metabolomics / *Sentrum vir Menslike Metabolomika*

Potchefstroom: Prof BC (Chris) Vorster, MMed (Chem Paths) (UP), FCPath (SA) College of Medicine, MBA (UP)

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Mahikeng: Prof M (Mulunda) Mwanza, DVM (University of Lubumbashi) MSc, (UJ) PhD (UJ)

ANIMAL SCIENCE / *DIEREWETENSKAP*

Mahikeng: Prof HK (Hilda Kwena) Mokoboki BSc. Agric, BSc Agric (Hons), (University of the North), MSc Agric, PhD Agric (UL)

BIOCHEMISTRY / *BIOCHEMIE*

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Potchefstroom: Deputy/*Adjunk*: Dr R (Rencia) van der Sluis, Hons BSc (UP), MSc (UP), PhD (NWU)

BOTANY / *PLANTKUNDE*

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Mahikeng: Deputy/*Adjunk*: Dr M (Madeleen) Struwig, BSc, BSc Hons, MSc, PhD (NWU Potchefstroom)

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Actuarial Science / *Aktuariële Wetenskap*

Quantitative Risk Management / *Kwantitatiewe Risikobestuur*

Financial Mathematics / *Finansiële Wiskunde*

Business Analytics / *Besigheidsanalise*

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MSc in Business Mathematics and Informatics with specialisation in above fields / *MSc in Bedryfswiskunde en Informatika met spesialisering in bogenoemde velde*

Prof H (Helgaard) Raubenheimer, BSc, MSc, PhD (NWU)

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Mahikeng: Deputy / *Adjunk:* Dr Z (Zimbili) Mkhize, BSc, BScHons, MSc (University of Natal), PhD (UKZN)

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ZOOLOGY / *DIERKUNDE*

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- Senior Faculty Administrator (*per appointment contract*) */ Senior Fakulteit Administrateur (per kontrakaanstelling).*
- Student representation by means of a representative of formally constituted substructures of the Student Representative Council (SRC) and designated annually by the SRC. (One-year term) / *Studenteverteenwoordiging, deur middel van 'n verteenwoordiger van die formeel saamgestelde sub-strukture van die Verteenwoordigende Studenteraad (VSR) soos jaarliks deur die VSR aangewys word. (Een jaar termyn).*
- The Faculty Management Committee is a standing subcommittee of the Faculty Board and serves as Executive Committee of the Faculty Board. It handles Faculty matters between meetings of the Faculty Board and reports all activities to the next meeting of the Faculty Board. / *Die Fakulteit Bestuurskomitee is ’n staande subkomitee van die Fakulteitsraad en dien as die Uitvoerende Komitee van die Fakulteitsraad. Dit hanteer Fakulteitsaangeleenthede tussen die vergaderings van die Fakulteitsraad en rapporteer alle aktiwiteite aan die volgende Fakulteitsraadvergadering.*

MEMBERSHIP / LIDMAATSKAP

The membership of the Faculty Management Committee is as follows / *Die lidmaatskap van die Fakulteit Bestuurskomitee is as volg:*

- The Executive Dean (Chair) / *Die Uitvoerende Dekaan (Voorsitter).*
- The Deputy Dean for Teaching and Learning / *Die Adjunk Dekaan vir Onderrig en Leer.*
- The Deputy Dean for Research and Innovation / *Die Adjunk Dekaan vir Navorsing en Innovasie.*
- The Deputy Dean for Community Engagement and Stakeholder Relations/ *Die Adjunk Dekaan vir Gemeenskapsbetrokkenheid en Belanghebbende Verhoudinge.*
- The directors of schools and research entities and directors of centres as determined by the Dean */ Die direkteure van skole en navorsingsentiteite en direkteure van sentrums soos deur die dekaan bepaal.*
- The Faculty Administrator(s) / *Die Fakulteit Administrateur(s).*

- The Quality Coordinator / *Die Kwaliteitskoördineerder.*
- Representatives of the Academic Student Societies / *Verteenwoordigers van die Akademiese Studente Verenigings.*
- Secretariat services are provided by Corporate Information and Governance Services / *Sekretariaatdienste soos voorsien deur die Korporatiewe en Inligtingsbestuursdienste.*

The Executive Dean and the deputy deans determine the final composition of the Faculty Management Committee / *Die Uitvoerende Dekaan en die adjunk dekane bepaal die finale samestelling van die Fakulteit Bestuurskomitee.*

POSITIONING AND STRUCTURE OF FACULTY / *POSISIONERING EN STRUKTUUR VAN FAKULTEIT*

ORGANOGRAM INDICATING THE ORGANISATIONAL STRUCTURE / *ORGANOGRAM WAT DIE ORGANISATORIESE STRUKTUUR AANDUI*

NWU®

Faculty of Natural and Agricultural Sciences

Executive Dean

Deputy Dean Research & Innovation

Deputy Dean Teaching-Learning

Deputy Dean Community Engagement and Stakeholder Relations

SCHOOLS

School of Agricultural Sciences
Agriculture Economics and Extension - Animal Health Sciences - Animal Science - Crop Sciences

School of Biological Sciences
Botany - Microbiology - Zoology

School of Computer Science and Information Systems
Computer Science and Information Systems

School of Geo- and Spatial Sciences
Geography - Geology - Urban and Regional Planning

School of Mathematical and Statistical Sciences
Mathematics and Applied Mathematics - Statistics

School of Physical and Chemical Sciences
Biochemistry - Chemistry - Physics

RESEARCH ENTITIES

Centre for Space Research
(Centre of Excellence)

Focus Area for Human Metabolomics

Focus Area for Chemical Resource Beneficiation

Unit for Business Mathematics and Informatics

Unit for Environmental Sciences and Management
African Centre for Disaster Studies

Focus Area for Pure and Applied Analytics

Focus Area for Material Science Innovation and Modelling

Niche Area for Food Security and Safety

CENTRES

Centre for Human Metabolomics

Centre for Applied Radiation Science and Technology

Centre for Indigenous Knowledge Systems

Centre for Water Sciences and Management

Centre for Business and Mathematics and Informatics

ACADEMIC SUPPORT SERVICES

Instrument Making

NWU®

Fakulteit Natuur- en Landbouwetenskappe

Uitvoerende Dekaan

- Adjunk Dekaan Navorsing en Innovasie
- Adjunk Dekaan Onderrig-Leer
- Adjunk Dekaan Gemeenskaps-betrokkenheid en Belangegroepverhoudings

SKOLE

- Skool vir Landbouwetenskappe
  Landbouekonomie en Verleng-ing - Dieregesondheid - Diere Wetenskap - Gewas Wetenskap
- Skool vir Biologiese Wetenskappe
  Plankunde - Dierkunde - Mikrobiologie
- Skool vir Rekenaarwetenskap en Inligtingstelsels
  Rekenaarwetenskap en Inligtingstelsels
- Skool vir Geo- en Ruimtelike Wetenskappe
  Geografie - Geologie - Stads- en Streekbeplanning
- Skool vir Wiskundige en Statistiese Wetenskappe
  Wiskunde en Toegepaste Wiskunde - Satistiek
- Skool vir Fisiese en Chemiese Wetenskappe
  Biochemie - Chemie - Fisika

NAVORSINGS ENTITEITE

- Sentrum vir Ruimte Navorsings
  (Centre of Excellence)
- Fokusarea vir Menslike Metabolomika
- Fokusarea vir Chemiese Hulbronveredeling
- Eenheid vir Bedryfswiskunde en Informatika
- Eenheid vir Omgewingswetenskappe
  Afrika Sentrum vir Rampstudies
- Fokusarea vir Suiwer- en Toege-paste Analitika
- Fokusarea vir Materiaal Wetenskap Innovasie en Modellering
- Nisarea vir Sekuriteit en Voedselveiligheid

SENTRUMS

- Sentrum vir Menslike Metabolomika
- Sentrum vir Toegepaste Stralingswetenskap en -tegnologie
- Sentrum vir Inheemse Kennissisteme
- Sentrum vir Waterwetenskappe en Bestuur
- Sentrum vir Bedryfswiskunde en Informatika

AKADEMIESE ONDERSTEUNDINGSDIENSTE

- Instrumentmakery

NAS.1.1 AUTHORITY OF THE GENERAL ACADEMIC RULES (A-RULES) / *GESAG VAN DIE ALGEMENE AKADEMIESE REËLS (A-REËLS)*

The faculty rules valid for the different qualifications, programmes and curricula of this faculty and contained in this faculty calendar are subject to the General Rules of the University, as determined from time to time by the Council of the University on recommendation by the Senate. The faculty rules should therefore be read in conjunction with the General Academic Rules.

The General Academic Rules (A-Rules) are available on the University's web page at:

http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/i-governance-management/policy/2019.06.20_A-Rules_e.pdf

Die Fakulteitsreëls, wat ten aansien van die verskillende kwalifikasies, programme en kurrikulums van hierdie Fakulteit geld en in hierdie Fakulteitsjaarboek opgeneem is, is onderhewig aan die Algemene Akademiese Reëls van die Universiteit, soos dit van tyd tot tyd deur die Raad van die Universiteit op aanbeveling van die Senaat vasgestel word, en moet dus met daardie Algemene Reëls saamgelees word.

Die Algemene Akademiese Reëls (A-Reëls) verskyn op die Universiteit se Tuisblad by: http://www.nwu.ac.za/content/policy_rules

http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/i-governance-management/policy/2019.06.20_A-Rules_e.pdf

NAS.1.1.1 RECOGNITION OF PRIOR LEARNING (A-RULE 1.6 & 1.7) / *ERKENNING VAN VORIGE LEER (A-REËL 1.6 & 1.7)*

The North-West University accepts the principle underlying outcomes-based, source-based and lifelong learning, in which considerations of articulation and mobility play a significant role, and subscribes to the view that recognition of prior learning, whether acquired by formal education programmes at this or another institution, or informally (from experience), is an indispensable element in deciding on admission to and awarding credits with a view to placement in an explicitly selected teaching-learning programme of the University. /

Die Noordwes-Universiteit aanvaar die beginsel onderliggend aan uitkomsgerigte, brongebaseerde en lewenslange leer, waarin artikulasie en mobiliteit 'n betekenisvolle rol speel, en onderskryf die siening dat erkenning van vorige leer, hetsy dit in formele onderrigprogramme by hierdie of 'n ander instelling, of informeel (deur ervaring) opgedoen is, 'n onontbeerlike element by die besluit oor toelating tot en kredietverlening met die oog op plasing binne 'n uitdruklik gekose onderrigleerprogram van die Universiteit uitmaak.

Recognition of prior learning concerns the provable knowledge and learning that an applicant has acquired, whether by having completed formal education programmes, or from experience. At all times the question will be what the level of the skills is, and skills will be assessed in the context of the exit level skills required by the intended teaching-learning programme or modules in the programme, or the status for which the applicant applies, and not merely by virtue of the experience recorded by the applicant. Recognition of prior learning will therefore take place in terms of applied competencies demonstrated by the applicant in his/her application, taking into consideration the exit level outcomes that have to be obtained by means of the selected teaching-learning programme. /

By die erkenning van vorige leer, handel dit oor die bewysbare kennis en leer wat 'n aansoeker opgedoen het, hetsy deur formele onderrigprogramme, of deur ervaring. Ten alle tye sal die vraag wees watter vlak van vaardigheid, beoordeel in die konteks van die uittreevlakvaardighede wat vereis word vir die beoogde onderrigleerprogram of modules daarbinne, of status waarvoor die aansoeker aansoek doen, en nie bloot om die ervaring wat 'n aansoeker kan boekstaaf nie. Erkenning van vorige leer geskied dus in terme van die toegepaste bevoegdhede wat die aansoeker in die aansoek gedemonstreer het, met inagneming van die uittreeuitkomste wat met die gekose onderrigleerprogram bereik moet word.

The North-West University accepts that recognition of prior learning can and must take place in a valid, trustworthy and fair way, within the normal existing policy on awarding credits to prospective and existing students, whether they are from this or another institution. /

Die Noordwes-Universiteit aanvaar dat die erkenning van vorige leer binne die normale, bestaande beleid oor die toelating van kredietverlening aan voornemende of bestaande studente – hetsy van hierdie of 'n ander instelling – op 'n geldige, betroubare en billike wyse kan en moet geskied.

NAS.1.1.2 REGISTRATION/ *REGISTRASIE*

Registration is the prescribed completed process a student has to follow to register as a student of the North-West University (see General Rule 1.10). /

Registrasie is die voorgeskrewe voltooide proses wat 'n student deurloop het om as student van die Universiteit te registreer (Kyk Algemene Reëls 1.10).

NAS.1.1.2.1 Registration of additional modules/ *Registrasie van bykomende modules*

Apart from the required modules of the relevant programme, a student may take additional modules in terms of the provision in the General Rule 2.3. This must be requested by means of a Student request form and is subject to the approval of the Executive Dean. /

'n Student kan in enige studiejaar, benewens die vereiste modules van die betrokke kurrikulum, bykomende modules neem ooreenkomstig die bepalings in Algemene Reël 2.3. Dit moet aangevra word deur middel van 'n Studenteversoekvorm en is onderworpe aan goedkeuring deur die Uitvoerende Dekaan.

NAS.1.1.3 DURATION OF STUDIES / *DUUR VAN STUDIES*

General Rule 1.14 set the maximum duration of study. / *Algemene Reël 1.14 stel die maksimum duur van studie:*

NAS.1.1.3.1 For full-time contact students, the maximum duration of study is as follows/ *Vir voltydse studente is die maksimum duur van studie soos volg:*

- One-year qualifications: two years; / *Eenjaar-kwalifikasie: twee jaar*
- Two-year qualifications: four years; / *Tweejaar-kwalifikasie: vier jaar*
- Three-year qualifications: five years; */ Driejaar-kwalifikasie: vyf jaar*
- Four-year qualifications: six years; / *Vierjaar-kwalifikasie: ses jaar*
- Master's degrees: three years; / *Meestersgraad: drie jaar*
- Doctoral degrees: four years. / *Doktorsgraad: vier jaar*

NAS.1.1.3.2 For part-time contact and distance students, the maximum duration of study is as follows / *Vir deeltydse kontak- en afstandstudente, is die maksimum duur van studie soos volg:*

- One-year qualifications: three years; / *Eenjaar-kwalifikasie: drie jaar*
- Two-year qualifications: four years; / *Tweejaar-kwalifikasie: vier jaar*
- Three-year qualifications: six years; / *Driejaar-kwalifikasie: ses jaar*
- Four-year qualifications: eight years; / *Vierjaar-kwalifikasie: agt jaar*
- Master's degrees: Four years; / *Meestersgraad: vier jaar*
- Doctoral degrees: Five years. / *Doktorsgraad: vyf jaar*

NAS.1.1.3.3 For contact students in extended programmes, the maximum duration of study is as follows */Vir voltydse student in verlengde programme, is die maksimum duur van studie soos volg:*

- Three-year qualifications: six years; / *Driejaar-kwalifikasie: ses jaar*
- Four-year qualifications: seven years. / *Vierjaar-kwalifikasie: sewe jaar*

NAS.1.1.3.4 Phasing in and out or amendment of programmes and curricula / *Uitfasering of wysiging van programme en kurrikulums*

- The directors of all schools concerned, in consultation with the subject chairs or programme leaders, issue transitional rules where necessary, in order to facilitate the transition from existing programmes to new programmes where amendments were made (A-Rule 1.3.5).
- If the curriculum for which a student registered in the previous year was amended in this yearbook, the student's curriculum will be adjusted to correspond with the version in this yearbook. If at all possible, adjustments will be made in such a manner that a student's study load is not increased (A-Rules 1.2 and 2.1). /
- *Die direkteure van alle betrokke skole, in oorleg met die vakvoorsitters of programleiers, bepaal waar nodig oorgangsreëls, om die oorgang van bestaande programme na nuwe programme te vergemaklik, waar wysiginge aangebring is (A-Reël 1.3.5).*
- *As die kurrikulum waarvoor 'n student wat in die vorige jaar geregistreer was, in hierdie jaarboek gewysig is, sal die student se kurrikulum aangepas word om ooreen te stem met die weergawe in hierdie jaarboek. Indien enigsins moontlik, sal aanpassings op so 'n manier aangebring word, dat die student se studie las nie verhoog word nie (A-Reëls 1.2 en 2.1).*

NAS.1.2 FACULTY-SPECIFIC RULES / *FAKULTEITSPESIFIEKE REËLS*

Programme specific requirements, procedures and structures will be presented in the Yearbook and students are referred to the faculty rules where applicable. The structure, method of delivery and presentation mode of each programme in this Yearbook which are subject to the policy laid down by the Institutional Committee for Academic Standards (ICAS) of the NWU and consistent with the requirements of the Higher Education Act (101 of 1997), the Higher Education Qualifications Sub-framework (HEQSF), the Department of Higher Education and Training (DoHET) and the South African Qualifications Authority (SAQA) (A-Rules 1.1, 1.2 and 2.1). /

Programspesifieke vereistes, prosedures en strukture word elke jaar in die jaarboeke van die fakulteit opgeneem. Die struktuur, metode van aflewering en aanbiedingswyse van elke program is onderhewig aan die beleid wat deur die Institusionele Komitee vir Akademiese Standaarde (IKAS) van die NWU opgestel is en in ooreenstemming is met die vereistes van die Wet op Hoër Onderwys (101 van 1997), die Hoër Onderwys Kwalifikasies Sub-Raamwerk (HOKSR), die Departement van Hoër Onderwys en Opleiding (DHOO) en die Suid-Afrikaanse Kwalifikasies Owerheid (SAKO) (A-Reëls 1.1, 1.2 en 2.1).

NAS.1.2.1 AMENDMENT OF PROGRAMMES */ WYSIGING VAN PROGRAMME*

Converting from one programme to another (including amendment of qualification or programme) is by way of a student request form. The full transcript of the student along with the maximum period of the study, are hereby considered. Admission is subject to the approval of the Executive Dean. /

Omskakeling van een kurrikulum na 'n ander (insluitende wysiging van kwalifikasie of program) geskied by wyse van 'n studenteversoekvorm. Die volle akademiese rekord van die student tesame met die toegelate maksimum duur van die studie, word hierby in ag geneem. Toelating is onderhewig aan die goedkeuring van die Uitvoerende Dekaan.

NAS.1.2.2 EXAMINATIONS / *EKSAMINERING*

NAS.1.2.2.1 Examination opportunities / *Eksamengeleenthede*

Examination opportunities and relevant rules are in accordance with the General Rule 1.13.4 and 1.13.6

Die eksamengeleenthede en verbandhoudende reëls geskied in ooreenstemming met Algemene Reël 1.13.4 en 1.13.6.

NAS.1.2.2.2 Composition of the participation mark / *Samestelling van die deelnamepunt*

The participation mark for a module (General Rule 1.13.1) is compiled from tests, assignments and practical work. For every teaching-learning task (class tests, assignments, exercises etc.) that is carried out by means of formative assessment in a module, a mark is allocated. A student's participation mark is the weighted mean of all these marks.

The relationship between theory and practical work for the calculation of the participation mark for the modules, is stated in the relevant study guides. /

Die deelnamepunt vir 'n module (Kyk Algemene Reël 1.13.1) word saamgestel uit toetse, werkstukke en praktiese werk. Vir elke onderrigleeropdrag (klastoetse, werkstukke, opgawes, ensovoorts) wat uitgevoer word by wyse van formatiewe assessering in 'n module, word 'n punt toegeken. 'n Student se deelnamepunt is die geweegde gemiddelde van hierdie punte.

Die verhouding tussen teorie en praktiese werk vir die berekening van die deelnamepunt vir die modules, word in die betrokke studiegidse uiteengesit.

NAS.1.2.2.3 Admission to examinations / *Toelating tot die eksamen*

Admission to examinations in any module is granted by acquiring a proof of participation (see General Rule 1.13.2).

In terms of the General Rule 1.13.2, a proof of participation will only be issued to a student in the Faculty of Natural and Agricultural Sciences if he-

- has complied with the specific requirements of the module as set out in the relevant study guide;
- where applicable, has completed the practical work required for a module; and

- has obtained a participation mark of at least 35% for first semester first year modules- only applicable to bona fide first year students. Each successive module requires a participation mark of 40% (see also General Rule 2.5.2).

Proof of participation obtained for a module for the first examination opportunity is transferred without any change to the second examination opportunity (see General Rule 1.13.2.2). /

Toelating tot die eksamen in enige module geskied deur die verwerwing van ’n deelnamebewys (Kyk Algemene Reël 1.13.2).

In terme van Algemene Reël 1.13.2.3 sal 'n deelnamebewys in die Fakulteit Natuur- en Landbouwetenskappe slegs aan 'n student uitgereik word indien die student:

- *voldoen het aan die besondere vereistes daarvoor wat in die studiegids vir die betrokke module uiteengesit is;*
- *waar van toepassing, die praktiese werk wat vir 'n module vereis word, voltooi het; en*
- *'n deelnamepunt van minstens 35% vir eerste semester, eerstejaar modules, slegs van toepassing op ’n bona-fide eerstejaar student. Vir elke opeenvolgende module moet ’n deelnamepunt van 40% behaal word. (Kyk ook Algemene Reël 2.5.2).*

Die deelnamebewys wat vir ’n module verwerf is vir die eerste eksamengeleentheid, word net so oorgedra na die tweede eksamengeleentheid (Kyk Algemene Reël 1.13.2.2).

NAS.1.2.2.4 Relation between credits and examination papers / Verhouding tussen kredietpunte en eksamenvraestelle

The duration of an examination paper of an 8 and 12-credit module, is usually two hours and the duration of examination papers that count for 16, 24 or 32 credits is usually three hours. /

Die eksamenvraestel vir 'n 8 en 12 kredietpunt module duur gewoonlik twee uur en die eksamenvraestelle van modules wat 16, 24 of 32 kredietpunte tel, duur gewoonlik drie uur.

NAS.1.2.2.5 Relation between credits and teaching periods / Verhouding tussen krediete en onderrigperiodes

With regard to practical work (for example Chemistry, Physics, Zoology, Urban and Regional Planning, etc.): four continuous periods every second week are allocated for practical work at the first year level and four continuous periods per week at the second and third year level. Depending on the nature of the different subjects, deviations from this guideline might be found./

Met betrekking tot praktiese werk (byvoorbeeld Chemie, Fisika, Dierkunde, Stad- en Streeksbeplanning, ens): vier aaneenlopende periodes elke tweede week word toegeken vir praktiese werk by die eerstejaarvlak en vier aaneenlopende periodes per week aan die tweede en derde jaarvlak. Afhangende van die aard van die verskillende vakke, kan afwykings van hierdie riglyn gevind word.

NAS.1.2.2.6 Number of examination opportunities / *Aantal eksamengeleenthede*

The General Rule 2.5.3 regulates the number of examination opportunities. An implication of these rules is that a student who has not passed a module with the second examination opportunity will not be entitled to exemption from classes.

See General Rule 1.13.6: Dean’s concession examination (third examination opportunity).

Students in Actuarial Science, who would like to be considered for actuarial exemption, must write their examinations during the first examination opportunity. Complete requirements for students in Actuarial Science may be obtained from the Director of the Centre for Business Mathematics and Informatics. /

Die aantal eksamengeleenthede word bepaal deur Algemene Reël 2.5.3 'n Implikasie van hierdie reëls is dat 'n student wat 'n module na die tweede eksamengeleentheid nog nie geslaag het nie, nie op klasvrystelling geregtig sal wees nie.

Sien Algemene Reël 1.13.6: Dekaan se finale konsessiegeleentheid (3de eksamengeleentheid).

Studente in Aktuariële Wetenskap, wat in aanmerking wil kom vir aktuariële vrystelling, moet hulle eksamen tydens die eerste eksamengeleentheid skryf. Volledige voorskrifte vir studente in Aktuariële Wetenskap is by die direkteur van die Sentrum vir Bedryfswiskunde en Informatika beskikbaar.

NAS.1.2.2.7 Module mark */ Modulepunt*

Applies only to full-time contact study: The module mark for every module is calculated (see General Rule 1.13.1) from the participation mark and the examination mark at a 1:1 ratio. Calculation of final module marks for distance students are indicated in the study guide. The weight of the participation mark may be between 30% and 70% of the final module mark.

Slegs van toepassing op voltydse kontakstudie: Die modulepunt (Kyk Algemene Reël 1.13.1) word bereken uit die deelnamepunt en die eksamenpunt in die verhouding 1:1. Berekening van finale modulepunte vir afstandstudente word in die studiegids aangedui. Die gewig van die deelnamepunt kan tussen 30% en 70% van die finale modulepunt wees.

NAS.1.2.2.8 Pass requirements of a module */ Slaagvereistes van 'n module*

The terms and conditions for passing modules are set out in the General Rule 1.13.3. The subminimum for all modules in the examination is 40%. /

Die bepalings ten opsigte van die slaag van modules is in die Algemene Reël 1.13.3 uiteengesit. Die subminimum in die eksamen vir alle modules is 40%.

NAS.1.2.2.9 Access to and review of marked examination work (General Rule 1.13.7) / *Toegang tot en hersiening van gemerkte eksamenwerk (Algemene Reël 1.13.7)*

All students have the right to view their examination scripts and associated memoranda in accordance with faculty rules.

To view a marked script, the student must submit an application on the relevant form to the Faculty Administrator. The distance students may apply via the UODL call centre. The students apply officially to the relevant School Director.

In the case of contact programmes, the application to view the examination script must be submitted **within five working days** after the module examination results have been published in the case of the **first** examination opportunity, and **within two working days** in the case of the second examination opportunity. In the case of **distance** programmes, the application must be lodged within **ten working days**.

Faculty rules must provide procedures for, and the management of the manner in which students may be given access to their examination work.

If approved the student may view the answer paper and memorandum in the presence of the lecturer and subject group chairperson concerned. Any bona fide errors can be corrected.

On the basis of the review of the examination script, a student may request that administrative errors in the calculation of the examination mark be corrected, or that the examination script be remarked on payment of an additional examination fee as per the provisions of Rule 1.13.7.7.

Where the remarking of the examination work leads to a change in the assessment result, **the original mark is replaced by the changed mark**.

Scripts and the associated memoranda must be viewed and/or remarked after each examination period and before the date as indicated in the annual University calendar for finalising the examination results. /

Alle student het die reg om insae in hul eksamenskrifte en geassosieerde memorandums te kry in ooreenstemming met fakulteitsreëls. Die student moet betyds daarvoor op die relevante vorm by die bepaalde Fakulteit Administrateur, aansoek doen. Die afstandstudente moet deur die EOAL inbelsentrum, die versoek rig. Die versoek word aan die betrokke Skooldirekteur gerig.

*In die geval van kontak programme, moet aansoek om insae in eksamenskrifte te hê binne vyf dae ingedien word nadat die eksamenresultate bekend gemaak is in die geval van die eerste eksamengeleentheid en **binne twee dae** in geval van **tweede** eksamengeleentheid. In die geval van **afstandsprogramme** moet aansoek binne **tien werksdae** gedoen word.*

Fakulteitsreëls moet prosedures voorsien vir, en bestuur van die wyse hoe studente insae kan kry in hulle eksamenwerk.

Indien goedgekeur, kan die student die antwoordskrif en memorandum in die teenwoordigheid van die betrokke dosent en vakgroep voorsitter besigtig. Enige bona fide foute kan reggestel word.

Op die basis van hersiening van eksamenskrifte kan die student versoek dat administratiewe foute reggemaak word, maar indien 'n hermerk versoek word, kan dit teen 'n betaling gedoen word. (Reël A.1.13.7.7)

*Indien die hermerk van die eksamenskrif 'n wysiging van die uitslag tot gevolg het, **word die oorspronklike punt vervang deur die gewysigde punt**.*

Skrifte en geassosieerde memorandums moet hersien word na elke eksamen en binne die datums soos aangedui op die Universiteit se jaarkalender vir finalisering van eksamenpunte.

NAS.1.2.2.10 Exemption from practical work or class attendance in a module / *Vrystelling van praktiese werk of klasbywoning van 'n module*

See General Rule 1.12 / *Sien Algemene Reël 1.12*

NAS.1.2.3 REGISTRATION FOR FINAL YEAR MODULES/ *REGISTRASIE VAN FINALE JAAR MODULE*

See General Rule 2.4 / *Sien Algemene Reël 2.4*

NAS.1.2.4 PROGRESS IN A PROGRAMME BASED ON PREREQUISITES / *VORDERING IN 'N PROGRAM GEBASEER OP VOORVEREISTES*

In compiling each programme care has been taken that assumed learning, i.e. the necessary prior knowledge and the general level of insight and experience needed to complete the modules prescribed with ease in a specific semester of a programme, has been acquired in the preceding semesters. A student having failed one or more modules in a preceding semester will therefore probably not be adequately equipped to take the modules of the following semester. Such students are URGENTLY advised to consult the director of the relevant school BEFOREHAND to find out which modules of the semester concerned they may take with a reasonable expectancy of success.

The aim of the rules is to make sure that a student in any semester will only take those modules of which he has the minimum prior knowledge.

A module in any subject may only be taken if it conforms to the requirements regarding the assumed learning, as indicated in the list of modules of the relevant subject. (A-Rule 1.8)

When students change from one programme to another, the entrance level in the new programme will have to be determined in consultation with the director of the school under which the relevant programme falls. /

By die saamstel van elke program, is sorg gedra dat die veronderstelde leer, dit wil sê die nodige voorkennis en algemene vlak van insig en ervaring, wat nodig is om die modules wat in 'n bepaalde semester van 'n program voorgeskryf is, met gemak te kan volg, reeds in die voorafgaande semesters verwerf is. 'n Student wat een of meer modules in die voorafgaande semesters gesak het, sal dus waarskynlik nie voldoende toegerus wees om die modules van die volgende semester te neem nie. Sulke studente word DRINGEND aangeraai om VOORAF die direkteur van die betrokke skool te raadpleeg om vas te stel watter modules van die betrokke semester hulle wel met 'n redelike verwagting op sukses sal kan loop.

Die reëls het ten doel om te verseker dat 'n student in enige semester slegs daardie modules neem waarvoor die student wel oor die minimum voorkennis beskik.

'n Module van enige vak kan slegs geneem word indien aan die eise ten opsigte van veronderstelde leer, soos in die modulelys van die betrokke vak aangedui is, voldoen is. (A-Reël 1.8)

Studente wat van een program na 'n ander program omskakel se intreevlak in die nuwe program sal in oorleg met die direkteur van die skool waaronder die betrokke program ressorteer, bepaal word.

NAS.1.2.4.1 Linked and concurrent modules (A-Rule 1.8)

- Linked modules, being modules identified as assumed learning for a subsequent module or modules, must be specified in faculty rules (see NAS.1.13.3).
- Linked modules must have been passed, before a student may register for a successive module.
- The passing of modules may be specified in faculty rules as a concurrent requirement for the recognition of the passing of another module, in which case such modules may be taken in a semester prior to, or in the same semester as the module for which it is a concurrent requirement.

In terms of the General Rule 1.8.3, apply in the Faculty of Natural Sciences (see also NAS.1.13.1 [contact students] and NAS.1.13.2 [distance students])

NAS.1.2.5 TERMINATION OF STUDIES / *BEËINDIGING VAN STUDIES:*

See General Rule 1.18 / *Sien Algemene Reël 1.18*

NAS.1.2.6 ATTAINMENT OF QUALIFICATION: (GENERAL RULE 2.6) / *VERWERWING VAN KWALIFIKASIE: (ALGEMENE REËL 2.6)*

A degree is obtained when a student has passed in the examination of all the modules prescribed in the curriculum concerned. /

'n Graad word verwerf wanneer 'n student in die eksamen van al die voorgeskrewe modules wat in die betrokke kurrikulum voorgeskryf word, geslaag het.

NAS.1.2.6.1 Qualification with distinction/ *Kwalifikasie met onderskeiding*

With reference to General Rule 2.6.2, a B-degree is conferred with distinction and has achieved a weighted average of at least 75% in the modules of the major subjects, designated by H, in each curriculum (core modules) and-

- where a full-time student enrolled in a contact programme, completes the programme in the minimum period of study, except if failure to comply with the minimum time requirements is due to the interruption of the study on medical grounds, in which case the executive dean concerned, may approve the award of the degree with distinction (A-Rule 2.6.2.2).

A part-time student or a student enrolled in a distance programme, must complete the programme within the maximum time specified in the faculty rules in order to qualify for the award of the qualification with distinction (A-Rule 2.6.2.3).

For purposes of calculating the average, modules completed at other institutions and that are recognised as such by the NWU, must be taken into account (A-Rule 2.6.2.4). /

Met verwysing na Algemene reël 2.6.2 word 'n B-graad met lof toegeken indien 'n geweegde gemiddeld van minstens 75% in die kernmodules behaal word, aangewys deur H, in elke kurrikulum/program en-

- *waar 'n voltydse student vir 'n kontakprogram ingeskryf is, moet die program in die minimum studietydperk voltooi word, behalwe as die versuim om aan die minimum tydsvereistes te voldoen, te wyte is aan die onderbreking van die studie, op grond van mediese redes is, in welke geval die uitvoerende dekaan betrokke, die toekenning van die graad met lof kan goedkeur (A-Reël 2.6.2.2).*

'n Deeltydse student of student wat vir 'n afstandprogram ingeskryf is, moet die program voltooi binne die maksimum tyd gespesifiseer in die fakulteitsreëls, ten einde vir die toekenning van die kwalifikasie met lof te kwalifiseer (A-Reël 2.6.2.3).

Vir die berekening van die gemiddelde moet modules wat aan ander instellings voltooi is en wat deur die NWU as sodanig erken word, in aanmerking geneem word (A-Reël 2.6.2.4).

NAS.1.3 PROFESSIONAL STATUS / *PROFESSIONELE STATUS*

Any person who has obtained one of the following qualifications in a natural science field at a university in South Africa and has acquired experience as indicated below, may register as a Professional Natural Scientist (Pr.Sci.Nat.) with the South African Council for Natural Scientific Professions:

- 4-year BSc or Hons BSc (that preferentially includes a research module), plus three years of experience in a natural science profession.
- MSc and two years of experience in a natural science profession.
- DSc or PhD plus one year of experience in a natural science profession.

First year of study: 70% of the modules passed, should be in natural sciences, namely Biology I (Botany I and Zoology I), Chemistry I, Mathematics I, Physics I or another natural science subject such as Geology I.

Second and third year of study: 80% of the modules passed should be in the natural sciences of which 50% should be in the respective discipline or directly supportive of the discipline. (Exit level for registration as a Certified Natural Scientist).

Fourth year of study (Honours level): Preferably, 100% of the modules passed should be in the natural sciences of which 80% should be in the respective discipline or directly supportive to the discipline. (Exit level for registration as Candidate and Professional Natural Scientist).

Students who have obtained an honours qualification or higher, in Biochemistry may apply to the Health Professions Council of South Africa for registration as an intern medical scientist through an institution that offers such internships. Upon completion of the internship the candidate will be eligible for registration as a medical scientist.

Students who have registered for the BSc in Urban and Regional Planning qualification may apply for registration as a Candidate Planner, according to the regulations (Planning Professions Act, 36 of 2002) of the South African Council for Planners (SACPLAN). After a minimum of two years in practice and completion of the instructions for registration, such a student will be able to register as a Professional Planner [Pr. Pln]. /

Enige persoon wat ’n toepaslike vierjarige kwalifikasie in ’n natuurwetenskaplike rigting aan 'n universiteit in Suid-Afrika verwerf het en oor die dienooreenkomstige jare ervaring beskik, kan as Professionele Natuurwetenskaplikes (Pr.Sci.Nat) by die Suid-Afrikaanse Raad vir Natuurwetenskaplike Professies registreer:

- *'n 4-jarige BSc of 'n HonsBSc (wat verkieslik ’n navorsingsmodule insluit), plus drie jaar ervaring in 'n natuurwetenskaplike professie;*
- *’n MSc en twee jaar ervaring in 'n natuurwetenskaplike professie;*
- *'n DSc of PhD plus een jaar ervaring in 'n natuurwetenskaplike professie;*

Eerstejaar van studie: 70% van die modules wat geslaag word, moet in die natuurwetenskappe wees, naamlik Biologie I (Plantkunde I en Dierkunde I), Chemie I, Fisika I, Wiskunde I, of ’n ander natuurwetenskap vak, bv. Geologie I.

Tweede- en derdejaar van studie: 80% van die modules wat geslaag word moet in die natuurwetenskappe wees, waarvan 50% in die onderskeie dissipline is of direk ondersteunend tot die dissipline. (Uittreevlak vir registrasie as Gesertifiseerde Natuurwetenskaplike).

Vierdejaar van studie (Honneursvlak): Verkieslik 100% van die modules wat geslaag word, moet in die natuurwetenskappe wees, waarvan 80% in die onderskeie dissipline is of direk ondersteunend tot die dissipline. (Uittreevlak vir registrasie as Kandidaat en Professionele Natuurwetenskaplike).

Studente wat 'n honneurskwalifikasie of hoër in Biochemie verwerf het, kan aansoek doen by die Raad vir Gesondheidsberoepe van Suid-Afrika om geregistreer te word as 'n intern mediese wetenskaplike deur 'n instansie wat so 'n internskap aanbied. Na voltooiing van die internskap sal die kandidaat in aanmerking kom vir registrasie as 'n mediese wetenskaplike.

Studente wat vir die BSc in Stad- en Streeksbeplanning graad geregistreer is, kan ingevolge die voorskrifte van die Suid Afrikaanse Raad vir Beplanners in terme van die "Planning Professions Act (36 of 2002)" aansoek doen vir registrasie as'n Kandidaat Beplanner. Na verloop van 'n minimum van twee jaar in die praktyk en nadat aan die voorskrifte vir Registrasie voldoen is, kan sodanige persoon as 'n Professionele Beplanner registreer word [Pr. Pln].

NAS.1.4 MODULES LACKING TO COMPLETE DEGREE/ *UITSTAANDE MODULES OM GRAAD TE VOLTOOI*

If a student lacks five modules at the most to complete his/her degree, these modules may be completed at UNISA, subject to the following conditions:

- The degree must be completed within five years. If it takes longer, a written application must be made for extension of the studies.
- At least one core module on third year level must be completed at NWU.
- The student must register at both NWU and UNISA. /

Indien 'n student hoogstens vyf modules kort om sy/haar graad te voltooi, kan hierdie modules by UNISA geneem word, onderhewig aan die volgende voorwaardes:

- *Die graad moet binne vyf jaar voltooi word. Indien dit langer neem moet skriftelik aansoek gedoen word vir verlenging van studie.*
- *Minstens een kernmodule moet op derdejaarvlak by die NWU voltooi word.*
- *Die student moet by beide instellings, die NWU en UNISA registreer.*

NAS.1.5 WARNING AGAINST PLAGIARISM / *WAARSKUWING TEEN PLAGIAAT*

Assignments are individual tasks and not group activities (unless explicitly indicated as group activities). For further details, see: http://www.nwu.ac.za/gov_man/policy/index.html

Werkstukke is individuele take en nie groepsaktiwiteite nie (tensy dit uitdruklik aangedui word as 'n groepsaktiwiteit). Vir meer besonderhede gaan na: http://www.nwu.ac.za/af/content/beleide-en-reels.

NAS.1.6 CAPACITY STIPULATION / *KAPASITEITSBEPERKINGS*

Please take note of the fact that, owing to specific capacity constraints, the University reserves the right to select candidates for admission to certain fields of study. This means that prospective students who comply with the minimum requirements may not necessarily be admitted to the relevant courses. As a result of capacity restrictions and the oversupply of students in certain disciplines, students will be selected for these fields on grounds of their scholastic achievements. (Refer to A-Rule 1.5.2.1) /

Neem asb. kennis dat die Universiteit a.g.v. spesifieke kapasiteitsbeperkings hom die reg voorbehou om kandidate vir toelating tot bepaalde studierigtings te keur. Dit beteken dat voornemende studente wat aan die minimum toelatingsvereistes voldoen, nie noodwendig tot die betrokke kursusse toegelaat sal word nie. A.g.v. kapasiteitsbeperkinge en die ooraanbod van studente in bepaalde studierigtings, sal studente o.g.v. hulle skolastiese prestasie gekeur word vir toelating tot hierdie rigtings (Verwys na A-Reël 1.5.2.1).

NAS.1.7 LANGUAGE MEDIUM / *TAALMEDIUM*

Mahikeng: The language of instruction in all undergraduate contact sessions is English. / *Die onderrigtaal in alle voorgraadse kontaksessies is Engels.*

Vanderbijlpark: The language of instruction in all undergraduate contact sessions is English, but some modules are presented in both English and Afrikaans. / *Die onderrigtaal in alle voorgraadse kontaksessies is Engels, maar sommige modules word in Engels en Afrikaans aangebied.*

Potchefstroom: The language of instruction in all undergraduate contact sessions is Afrikaans, unless otherwise indicated. Educational interpreting to English will be available in all modules (where requested). All study guides, tests and examination papers are made available to students in both Afrikaans and English. Students may answer any written or oral test or examination in either Afrikaans or English. / *Die onderrigtaal in alle voorgraadse kontaksessies is Afrikaans, tensy anders aangedui. Opvoedkundige tolking na Engels is in alle modules beskikbaar (waar versoek). Alle studiegidse, toetse en eksamenvraestelle word egter in beide Afrikaans en Engels aan studente beskikbaar gestel. Dit staan studente in alle modules vry om enige skriftelike of mondelinge toets of eksamen in Afrikaans of Engels af te lê.*

Distance Learning IT programme: The language of instruction is English. /

Afstandsleer IT program: Die onderrigtaal is in Engels.

NAS.1.8 PROTECTION OF PERSONAL AND EDUCATION-RELATED INFORMATION / *BESKERMING VAN PERSOONLIKE EN OPVOEDKUNDIG-VERWANTE INLIGTING*

A-Rule 1.11 stipulates the following:

In the course of the registration process, the extent to which the student's personal or education-related information may be disclosed to a third party is determined, but the student may withdraw or amend permission granted to disclose such information by means of a request in writing submitted to the registrar. The university may disclose personal or education-related information regarding a student to a third party only after the law applicable to the protection of and access to information has duly been complied with. /

A-Reël 1.11 bepaal die volgende:

In die loop van die registrasieproses word die mate waarin die student se persoonlike of opvoedingsverwante inligting aan 'n derde party openbaar gemaak mag word bepaal, maar die student mag toestemming onttrek of wysig om sodanige inligting bekend te maak deur middel van 'n skriftelike versoek aan die registrateur. Die universiteit kan slegs persoonlike of opvoedingsverwante inligting rakende 'n student aan 'n derde party bekend maak nadat die wet wat op die beskerming van en toegang tot inligting van toepassing is, behoorlik nagekom is.

NAS.1.9 ACADEMIC LITERACY / *AKADEMIESE GELETTERDHEID*

All undergraduate students who register at the North-West University for the first time, are required to register for a module / modules in academic literacy. They have to pass this module / modules before they can graduate. /

Alle voorgraadse studente wat vir die eerste keer aan die Noordwes Universiteit registreer, is verplig om vir 'n module / modules in akademiese geletterdheid te registreer. Hulle moet dit slaag, alvorens hulle kan gradueer.

NAS.1.9.1 TESTING / *TOETSING*

Students have to write a compulsory proficiency test (TALL or TAG) in academic literacy, at a time and place determined by the University, in order to determine their ability to function within the academic environment. The purpose of this test is to identify students who, due to inadequate academic literacy skills, may not complete their study programme within the stipulated period in order to empower them with the necessary knowledge and skills. /

Studente moet 'n verpligte vaardigheidstoets (TAG of TALL) in akademiese geletterdheid skryf op 'n gegewe tyd en plek, soos deur die Universiteit bepaal. Die doel van die toets is om studente te identifiseer wat, a.g.v. onvoldoende akademiesegeletterdheidsvaardighede die risiko loop om hulle studieprogram nie suksesvol binne die toegelate tydperk te voltooi nie, sodat hulle met die nodige kennis en vaardighede bemagtig kan word.

Students have the option of writing the compulsory skills test in either English or Afrikaans. With the exception of students who are identified as borderline cases by the test, each student has only one opportunity to write the test. Students who are regarded as borderline cases, will be granted a second opportunity to write the test. It is the student's responsibility to check and verify his/her result within 14 days of writing the test and to register for the correct module in the correct semester (see below). /

Studente besluit self of hulle die verpligte vaardigheidstoets in Afrikaans of in Engels wil aflê. Met die uitsondering van studente wat deur die toets as grensgevalle uitgewys word, kry elke student slegs een geleentheid om die toets af te lê. Studente wat as grensgevalle beskou word, kry 'n tweede geleentheid. Dit is die student se verantwoordelikheid om hom-/haarself binne 14 dae na aflegging van die toets van sy/haar uitslag te vergewis en vir die korrekte module in die korrekte semester te registreer (sien hieronder).

NAS.1.9.1.1 Module(s): Academic Literacy Development (ALDE111) / *Ontwikkeling Van Akademiese Geletterdheid (ALDA111)*

All students in the Faculty of Natural and Agricultural Sciences are required to register for the module ALDE111 [English] or ALDA111 [Afrikaans], depending on the language of the compulsory proficiency test. The only exception is students who are enrolled for the following programmes: Quantitative Risk Management, Financial Mathematics, Business Analytics, Actuarial Science, Information Technology, Urban and Regional Planning. This exception is not applicable if a student has been identified as being at risk by the aforementioned test or if the student did not take the test. He/she is then also required to take ALDE111 or ALDA111. /

Alle studente in die Fakulteit Natuur- en Landbouwetenskappe is verplig om vir die module ALDA111 [Afrikaans] óf ALDE111 [Engels] te registreer, afhangend van die taal waarin hulle die verpligte vaardigheidstoets afgelê het. Die enigste uitsondering is studente wat ingeskryf is vir die volgende programme: Kwantitatiewe Risikobestuur, Finansiële Wiskunde, Bedryfsanalise, Aktuariële Wetenskap, Inligtingstegnologie, Stad- en Streeksbeplanning. Hierdie uitsondering is egter nie van toepassing op bogenoemde programme nie, indien die student as 'n risiko kandidaat aangemerk word deur bogenoemde toets of indien die student nie die toets afgeneem het nie. Die student is dan verplig om ook ALDA111 óf ALDE111 te volg.

i. Level and credits / *Vlak van krediete*

This module is on NQF level 5 and worth 12 credits (additional credits). In exceptional cases it will be calculated in terms of curriculum credits. It therefore carries a weight of 12 credits in the first-year curriculum in these cases. /

Hierdie module is op NKR-vlak 5 en het 'n waarde van 12 krediete (addisionele krediete). In uitsonderlike gevalle word dit wel vir kredietdoeleindes van die kurrikulum in berekening gebring. Krediete hiermee verdien, kan dus 'n gewig dra van 12 krediete in die eerstejaar kurrikulum.

ii. Composition of module and calculation of module marks / *Samestelling van module en punteberekening*

ALDE111 / ALDA111 comprises one component only, which includes two periods per week. Class attendance is compulsory. The module is only presented in Semester 1. /

ALDA111 / ALDE111 bestaan uit slegs een komponent wat minstens twee periodes per week behels en klasbywoning is verpligtend. Die module word slegs in Semester 1 aangebied.

A system of continuous assessment is followed. The final module mark is calculated as follows: Exam mark = 40% and Participation mark = 60%. For admission to the exam in ALDE111 / ALDA111, a participation mark of 40% is required. /

'n Stelsel van deurlopende assessering word gebruik. Die finale modulepunt word soos volg bereken: Eksamenpunt = 40% en Deelnamepunt = 60%. Vir toelating tot die eksamen in ALDA111 / ALDE111 word 'n deelnamepunt van 40% vereis.

Note that for conditional admission to ALDE122 / ALDA122, a student who is required to follow ALDE111 / ALDA111 should obtain a module mark of 40% minimum for ALDE111 / ALDA111. /

Let daarop dat vir voorwaardelike toelating tot die module ALDA122 / ALDE122, moet 'n student wat verplig is om eers ALDA111 / ALDE111 te volg, 'n modulepunt van minstens 40% in ALDA111 / ALDE111 verwerf.

A final module mark of 50% is required to pass the module. / *'n Finale modulepunt van 50% is nodig om die module te slaag.*

iii. Important additional information / *Belangrike addisionele inligting*

Specific faculty rules in terms of termination of studies might apply if a student fails ALDE111 / ALDA111. /

Spesifieke fakulteitsreëls i.t.v. terminering van studies kan van toepassing wees indien 'n student ALDA111 / ALDE111 nie slaag nie.

Students who have already successfully completed a module similar to ALDE111 / ALDA111 at another tertiary institution and can provide proof of this, may apply in writing on the prescribed form for formal recognition for the module. This application should be submitted to the subject chair responsible for Academic Literacy. Recognition is only granted in cases where the modules are on the same NQF level (NQF5), where the credit values are of the same value (12), and where content is comparable. /

Studente wat reeds 'n module soortgelyk aan ALDA111 / ALDE111 suksesvol aan 'n ander tersiêre instelling voltooi het en bewys daarvan kan lewer, kan skriftelik op die voorgeskrewe vorm by die betrokke entiteit verantwoordelik vir Akademiese Geletterdheid om erkenning aansoek doen. Erkenning word slegs toegestaan in gevalle waar die modules op dieselfde NKR-vlak is (NKR5), die kredietwaarde minstens dieselfde is (12) en die inhoude vergelykbaar is.

iv. Language and mode of delivery / *Taal en modus van aanbieding*

ALDE111 is presented in English and ALDA111 in Afrikaans. The module is presented in both contact and open distance learning mode. Note that only students who are formally registered for open distance learning may follow the module in this mode. Moreover, open distance learning is presented in English only. /

ALDA111 word in Afrikaans aangebied en ALDE111 in Engels. Die module word in beide kontak- en afstandsmodusse aangebied, maar let daarop dat slegs studente wat formeel vir afstandsonderrig geregistreer is, dit in die afstandsmodus mag volg. Afstandsmodules word verder slegs in Engels aangebied.

v. Outcomes / *Uitkomste*

On completion of this module students should be able to:

- bridge the gap between secondary school and university education;
- access academic information effectively in order to understand academic texts;
- process academic information successfully; and
- produce academic information responsibly and appropriately. /

By afhandeling van hierdie module behoort die student in staat te wees om:

- die gaping tussen hoërskool en universiteit te oorbrug;
- op effektiewe wyse toegang tot akademiese inligting te verkry met die doel om akademiese tekste te verstaan;
- akademiese inligting suksesvol te prosesseer; en
- akademiese inligting gepas en verantwoordelik te produseer.

NAS.1.9.1.2 Academic Literacy Development (ALDE122) / *Ontwikkeling van Akademiese Geletterdheid (ALDA112 of 122)*

All students in the Faculty of Natural and Agricultural Sciences, regardless of the result obtained for the compulsory proficiency test in academic literacy, must register for the module ALDE122 [English] / ALDA112 or ALDA122 [both in Afrikaans]. /

Alle studente in die Fakulteit Natuur- en Landbouwetenskappe, ongeag die uitslag van die verpligte vaardigheidstoets in akademiese geletterdheid, moet die module ALDA112 of ALDA122 [beide in Afrikaans] / ALDE122 [Engels] neem.

Students whose preferred teaching and learning language is Afrikaans, and who do not need to complete ALDA111, register for ALDA112 in Semester 1. This arrangement is only applicable to students registered for the following programmes:

- Quantitative Risk Management
- Financial Mathematics
- Business Analytics
- Actuarial Science
- Information Technology
- Urban and Regional Planning

Students who are required to enrol for ALDA111, register for ALDA122 in Semester 2, regardless of the programme they are registered for. All other students with Afrikaans as language of teaching and learning, register for ALDA122 in Semester 2.

Note that ALDA112 and ALDA122 are exactly the same module presented in both semesters. The module codes, however, differ in order to distinguish between the semesters. /

Studente met Afrikaans as onderrigtaal en wat nie ALDA111 hoef te volg nie, registreer vir ALDA112 in Semester 1. Hierdie reëling is slegs van toepassing op studente wat in die volgende programme geregistreer is:

- *Kwantitatiewe Risikobestuur*
- *Finansiële Wiskunde*
- *Besigheidsanalise*
- *Aktuariële Wetenskap*
- *Inligtingstegnologie*
- *Stad- en Streeksbeplanning*

Studente wat ALDA111 moes volg, registreer vir ALDA122 in Semester 2, ongeag die program waarvoor hulle geregistreer is. Alle ander studente met Afrikaans as onderrigtaal, registreer vir ALDA122 in Semester 2.

Let daarop dat ALDA112 of ALDA122 dieselfde module is wat in beide semesters aangebied word, maar waarvan die modulekode verskil om die onderskeid in semester te tref.

Students with English as language of teaching and learning, regardless of the programme they are registered for, register in all cases for ALDE122 in Semester 2. /

Studente met Engels as onderrigtaal, ongeag die program waarvoor hulle geregistreer is, registreer in alle gevalle vir ALDE122 in Semester 2.

i. Level and credits / *Vlak en krediete*

This module is on NQF level 5 and worth 12 credits. Note that it is calculated in terms of curriculum credits. It therefore carries a weight of 12 credits in the first-year curriculum. /

Hierdie module is op NKR-vlak 5 en het 'n waarde van 12 krediete. Let daarop dat dit wel vir kredietdoeleindes van die kurrikulum in berekening gebring word. Krediete hiermee verdien, dra dus 'n gewig van 12 krediete in die eerstejaar kurrikulum.

ii. Composition of module and calculation of module marks */ Samestelling van module en punteberekening*

For admission to the module ALDE122 / ALDA122, a student must first pass ALDE111 / ALDA111. In all other cases students have immediate access to ALDE122 [Semester 2] / ALDA112 [Semester 1] or ALDA122 [Semester 2]. /

Vir toelating tot die module ALDA112 of ALDA122 / ALDE122 moet 'n student wat verplig is om ALDA111 / ALDE111 te neem, eers laasgenoemde slaag. In alle ander gevalle het studente onmiddellik toegang tot ALDA112 [Semester 1] of ALDA122 [Semester 2] / ALDE122 [Semester 2].

A final mark of at least 40% in ALDE111 / ALDA111 only grants students' conditional entry to ALDE122 or ALDA122. Students who were allowed to continue with ALDE122 / ALDA122 and who passed the examination in this module, may have the result for ALDE111 / ALDA111 condoned to a pass by the entity concerned with Academic Literacy. /

''n Finale punt van ten minste 40% in die module ALDA111 / ALDE111 verleen voorwaardelik toelating tot ALDA122 / ALDE122.Indien die eksamen daarin geslaag word, kan die uitslag van ALDA111 / ALDE111 deur die betrokke entiteit verantwoordelik vir Akademiese Geletterdheid tot 'n slaagpunt gekondoneer word.

The module ALDE122 / ALDA112 or ALDA122 comprises three compulsory components: An Academic Literacy component, a Computer and Information Literacy component and a Reading component. For the academic literacy component, class attendance of two periods per week is compulsory. Computer and Information Literacy requires that students learn autonomously, but they will have access to contact sessions should they wish to make use thereof. Students are also required to attend a number of sessions in the Reading laboratory. Depending on a student's reading speed and comprehension, he/she could be required to attend more sessions. A student must pass all three components to pass the module. /

Die module ALDA112 of ALDA122 / ALDE122 bestaan uit drie verpligte komponente: Akademiese Geletterdheid, Rekenaar- en Inligtingsvaardighede en ’n Leeskomponent. Akademiese Geletterdheid behels twee lesings per week en klasbywoning is verpligtend. Rekenaar- en Inligtingsvaardighede word op outonome wyse bemeester, maar daar is ook verskeie geleenthede tot kontaksessies tot studente se beskikking indien hul daarvan gebruik wil maak. Studente word ook verplig om vir ’n aantal sessies die dienste van die Leeslaboratorium te gebruik. Afhangend van die student se leesspoed en -begrip kan hy/sy verplig word om meer of minder sessies by te woon. Al drie komponente moet geslaag word om die module te kan slaag.

A system of continuous assessment is followed. The final module mark is calculated as follows: Exam mark = 40% and Participation mark = 60%. For admission to the exam in ALDE122 / ALDA112 / ALDA122, a participation mark of 40% is required. /

’n Stelsel van deurlopende assessering word gebruik. Die finale modulepunt word soos volg bereken: Eksamenpunt = 40% en Deelnamepunt = 60%. Vir toelating tot die eksamen in ALDA112 of ALDA122 / ALDE122 word ’n deelnamepunt van 40% vereis.

The exam consists of two papers, namely Academic Literacy and Computer and Information Literacy. The subminimum required to pass the Academic Literacy component, is 40%. The subminimum required to pass the Computer and Information Literacy component, is 50%. These components are dealt with in an 80:20 ratio when calculating the final mark (80% for the academic literacy and 20% for the computer and information literacy component). For the Reading component, a code for sufficient or insufficient is issued. A final module mark of 50% is required to pass the module. /

Die eksamen bestaan uit twee vraestelle, naamlik Akademiese Geletterdheid en Rekenaar- en Inligtingsvaardighede. Die subminimum wat vir eersgenoemde komponent behaal moet word om die module te kan slaag, is 40%. Die subminimum wat vir laasgenoemde komponent behaal moet word om die module te kan slaag, is 50%. Hierdie twee komponente word in ’n 80:20-verhouding hanteer vir die berekening van die finale punt – 80% vir die eerste komponent (Akademiese Geletterdheid) en 20% vir die tweede komponent (Rekenaar- en Inligtingsvaardighede). Vir die Leeslaboratorium word slegs ’n kode vir voldoende of onvoldoende uitgereik. ’n Finale modulepunt van 50% is nodig om die module te slaag.

iii. Important additional information / *Belangrike addisionele inligting*

Specific faculty rules in terms of termination of studies might apply if a student fails ALDE122 / ALDA112 / 122.

Students who have already successfully completed a similar module to ALDE122 / ALDA112 or ALDA122 at another institution and can provide proof of this, may apply in writing on the prescribed form for formal recognition of the module. This application should be submitted to the subject chair responsible for Academic Literacy. Recognition is only granted in cases where the modules are on the same NQF level (NQF5), where the credit values are the same value (12), and where content is comparable. /

Spesifieke fakulteitsreëls i.t.v. terminering van studies kan van toepassing wees indien ’n student ALDA112 OF ALDA122 / ALDE122 nie slaag nie.

Studente wat reeds ’n module soortgelyk aan ALDA112 of ALDA122 / ALDE122 suksesvol aan ’n ander tersiêre instelling voltooi het en bewys daarvan kan lewer, kan skriftelik op die voorgeskrewe vorm by die betrokke entiteit verantwoordelik vir Akademiese Geletterdheid om erkenning aansoek doen. Erkenning word slegs toegestaan in gevalle waar die modules op dieselfde NKR-vlak is (NKR5), die kredietwaarde minstens dieselfde is (12) en die inhoude vergelykbaar is.

iv. Language and mode of delivery / *Taal en modus van aanbieding*

ALDE122 is presented in English and ALDA112 or ALDA122 in Afrikaans. The module is presented in both contact and open distance learning mode. Note that only students who are formally registered for open distance learning may follow the module in this mode. Moreover, open distance learning is presented in English only. /

ALDA112 of ALDA122 word in Afrikaans aangebied en ALDE122 in Engels. Die module word in beide kontak- en afstandsmodusse aangebied, maar let daarop dat slegs studente wat formeel vir afstandsonderrig geregistreer is, dit in die afstandsmodus mag volg. Afstandsmodules word verder slegs in Engels aangebied.

v. Outcomes / *Uitkomste*

On completion of this module students should be able to:

- successfully become part of the academic learning community and participate in this community;
- access information in a responsible and ethical way in order to write an academic text;
- process information strategically in order to write an academic text;
- produce an academic text;
- read at an acceptable speed accompanied by acceptable level of comprehension; and
- demonstrate a fundamental level of computer and information literacy. /

By afhandeling van hierdie module behoort die student in staat te wees om:

- suksesvol in te skakel by die akademiese leeromgewing en daaraan deel te neem;
- op eties-verantwoordelike wyse te soek vir inligting wat nodig is vir die skryf van ’n akademiese teks;
- inligting op ’n strategiese manier te verwerk met die doel om ’n akademiese teks te kan skryf;
- ’n akademiese teks te produseer;
- teen ’n aanvaarbare spoed en begripsvlak te lees; en
- ’n fundamentele vlak van rekenaar- en inligtingsgeletterdheid te demonstreer.

NAS.1.10 PROVISIONAL ADMISSION REQUIREMENTS FOR UNDERGRADUATE STUDIES / *VOORLOPIGE TOELATINGSVEREISTES VIR VOORGRAADSE STUDIES*

NAS.1.10.1 GENERAL ADMISSION REQUIREMENTS/ *ALGEMENE TOELATINGSVEREISTES*

Taking due cognizance of the General Rules and Faculty rules as contained in the relevant yearbooks and with specific reference to the A-rule that determines a National Senior Certificate has been obtained and that the minimum statutory requirements for admission to Diploma and/or B-degree studies at a university in the RSA have been complied with, the University reserves the right to consider candidates' applications on the basis or their results. /

Met inagneming van die Algemene Reëls en Fakulteitsreëls soos vervat in die betrokke jaarboeke en met spesifieke verwysing na die A-Reël wat bepaal dat 'n Nasionale Seniorsertifikaat verwerf is en dat daar voldoen is aan die minimum statutêre vereistes vir toelating tot Diploma en/of B-graadstudie aan 'n universiteit in die RSA, behou die Universiteit hom die reg voor om aan die hand van resultate oorweging aan kandidate se aansoeke te verleen.

NAS.1.10.1.1 Applicant score (AS) system

For refinement of the application process, the Applicant Score (AS) system that assigns points to performance is utilised.

The purpose of the AS is to determine a base score in regard to calculating the three compulsory 20-credit NSC subjects and the performance in the next best three 20-credit NCS subjects.

NAS.1.10.1.2 Applicant Score (AS) and National Senior Certificate (NSC) Requirements

(With reference to the Admissions Policy of the NWU)
http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/i-governance-management/policy/7P-7.1_Admissions%20Policy_e2019.pdf

***Table 1*: Calculating the Applicant Score (AS)**

NSC rating	*AS Score*
8 (90-100%)	AS = sum of the decimal of the three compulsory 20-credit NSC subjects PLUS the next best three 20-credit NSC subjects. Decimal of the actual performance in the relevant subject, e.g. 77% performance to be indicated as 7.7 for purposes of the AS Total = 60
7 (80-89%)	
6 (70-79%)	
5 (60-69%)	
4 (50-59%)	
3 (40-49%)	
2 (30-39%)	
1 (0-29%)	

The calculation of the Applicant Score takes place in the following way:

The results of six (6) 20-credit NSC subjects are used to determine the AS.

While achievement in Life Orientation (LO) – a 10- credit NSC subject - is not utilised in calculating the ASS, a minimum achievement at Level 3 in LO is required to obtain an NSC. An achievement at level 5 and higher in LO will be regarded as a recommendation for admission in boundary cases and to certain programmes.

A prospective student who achieves two AS points less than required for admission to a specific qualification may, at the discretion of Senate and in line with Paragraph 31 of GG 31674 (2008), be admitted conditionally to study at the NWU.

A prospective student who obtains discretionary exemption may be admitted to certain qualifications or related programmes on certain conditions.

***Table 2*: Minimum admission requirements as per NSC requirements**

NSC requirements:
An achievement of "3" (40-49%) in three subjects (one of which is an official language at Home Language level) and a "2" (30-39%) in three other subjects, provided that a portfolio of evidence in the school-based assessment (CASS) component is submitted in the (seventh) subject failed.
Higher Certificate requirements:
An NSC certified by Umalusi with an achievement of at least "2" (30-39%) in the language of learning and teaching of the HEI concerned, in addition to requirements particular to the specific programme.
Diploma requirements:
An NSC certified by Umalusi with an achievement of at least "3" (40-49%) in at least four recognised 20-credit subjects.
B degree requirements:
A National Senior Certificate (NSC) certified by Umalusi with an achievement of "4" (50-59%) or better in at least four 20-credit subjects.

NAS.1.10.2 Technology requirements for admission to the academic programme / *Tegnologiese vereistes vir toelating tot die akademiese program*

All new enrolments must have access to a laptop for study purposes from 2021 onwards. It is compulsory, as part of the equipment a student needs to participate in learning and assessment activities of the academic programme. /

Alle nuwe inskrywings moet vanaf 2021 toegang hê tot 'n skootrekenaar vir studie doeleindes. 'n Skootrekenaar, as deel van die toerusting om deel te neem in leer-en assesseringsaktiwiteite van die akademiese program, is verpligtend.

Follow the link below for specifications regarding proposed specifications for laptops: /

Volg die onderstaande skakel vir die voorgestelde spesifikasies rakende skootrekenaars:

http://services.nwu.ac.za/sites/services.nwu.ac.za/files/files/information-technology/LaptopsforStudents2021.pdf

NAS.1.10.3 Language Requirement / *Taalvereiste*

A pass at level 4 (50-59%) in two languages, including the language of instruction on either the Home or First Additional Language level. /

'n Slaagsyfer van 50-59% (vlak 4) in twee tale, insluitend die taal van leer en onderrig op Huistaal- of Eerste Addisionele taalvlak.

NAS.1.10.4 Faculty Specific Admission Requirements / *Fakulteitspesifieke Toelatingsvereistes*

The rules of the Faculty must be read in conjunction with the general academic rules of the University. A student wishing to enrol for any module offered in the Faculty must meet all the requirements stipulated for that module. To be admitted to a degree or a diploma programme in the Faculty an applicant must comply with the requirements of the general academic rule 1.1 and any additional requirements stipulated for that programme. /

Die reëls van die Fakulteit moet tesame met die algemene akademiese reëls van die Universiteit gelees word. ’n Student wat wil inskryf vir enige module wat in die Fakulteit aangebied word, moet voldoen aan al die vereistes wat vir die betrokke module gestel word. Om tot 'n graad- of 'n diploma-program in die Fakulteit toegelaat te word, moet 'n aansoeker voldoen aan die vereistes van die algemene akademiese reël 1.1 en enige bykomende vereistes wat vir daardie program gestel word.

NAS.1.10.4.1 Mathematics Requirement / *Wiskundevereiste*

A student who wishes to follow any module in Mathematics, with the exception of Mathematical Techniques (MTHS112, MTHS113 or MTHS123) and Applied Calculus I (MTHS114), must have obtained a mark of at least 60% (level 5) in the grade 12 Mathematics exam or at least 70% (level 6) in another Mathematics exam considered by the Senate as equivalent to the above. /

'n Student wat enige module in Wiskunde wil volg, uitgesonderd Wiskundige Tegnieke (MTHS112, MTHS113 of MTHS123) en Toegepaste Calculus I (MTHS114), moet in die graad 12 eksamen in Wiskunde 'n punt van minstens 60% (vlak 5) of minstens 70% (vlak 6) in 'n ander eksamen in Wiskunde wat die Senaat as gelykwaardig aan bogenoemde ag, behaal het.

NAS.1.10.4.2 Comments / *Opmerkings*

Students who do not meet these requirements, but who managed to obtain a Mathematics mark of at least 50% (level 4) or at least 60% (level 5) in another Mathematics exam considered by the Senate as equivalent to the above, are admitted to a Mathematics refresher course presented in January by the School of Mathematical and Statistical Sciences, on the Potchefstroom and Mahikeng Campuses. If such students perform satisfactorily in the tests taken during this course, they may be considered for admission to Mathematics modules. /

Studente wat nie aan hierdie vereistes voldoen nie, maar in Wiskunde wel 'n punt van minstens 50% (vlak 4) of minstens 60% (vlak 5) in 'n ander eksamen in Wiskunde wat die Senaat as gelykwaardig aan bogenoemde ag, behaal het, word toegelaat tot 'n Wiskunde opknappingskursus wat in Januarie deur die Skool vir Wiskundige en Statistiese Wetenskappe aangebied word, op die Potchefstroom- en Mahikeng-kampus. Indien sodanige studente voldoende presteer in die toetse wat tydens hierdie kursus afgeneem word, kan hulle in aanmerking kom vir toelating tot Wiskundemodules.

All bona fide first year students enrolled for programs/curriculums which include the module(s) MTHS111/114 must attend the Mathematics refresher course. /

Alle bona fide eerstejaars wat vir programme/kurrikulums registreer wat die module(s) MTHS111/114 bevat, moet die Wiskunde opknappingskursus doen.

Prospective students who do not meet the grade 12 requirement for enrolling in MTHS111 and also cannot attend the refresher course, can gain admission to MTHS111 in the second year of study, by passing the module Mathematical Techniques (MTHS112, MTHS113 or MTHS123) with at least 60% or Applied Calculus I (MTHS114) with at least 50% in the first year of study, provided that persons seeking to follow this route to obtain admission to programmes that would otherwise have been inaccessible to them, should take into consideration that they may not be able to complete their studies in the minimum period./

Voornemende studente wat nie aan die graad 12-vereiste voldoen om vir MTHS111 in te skryf nie, en ook nie die opknappingskursus bygewoon het nie, kan in die tweede studiejaar toelating tot MTHS111 verkry deur in die eerste studiejaar die module in Wiskundige Tegnieke (MTHS112, MTHS113 of MTHS123) met ten minste 60% of Toegepaste Calculus I (MTHS114) met ten minste 50% te slaag, met dien verstande dat persone wat langs hierdie weg toelating wil kry tot programme wat andersins vir hulle ontoeganklik sou wees, in ag moet neem dat hulle moontlik nie hulle studie in die minimum tydperk sal kan afhandel nie.

A student who wishes to follow Mathematical Techniques (MTHS112, MTHS113 or MTHS123) has to comply with prerequisites of the programme the student intends to study. If a student wishes to take Mathematical Techniques (MTHS112, MTHS113 or MTHS123) in order to qualify for MTHS111 in the next year, or for non-degree purposes, the student must have obtained a mark of at least 40% (level 3) in the grade 12 Mathematics exam, or at least 50% (level 4) in another Mathematics exam considered by the Senate as equivalent to the above. /

'n Student wat Wiskundige Tegnieke (MTHS112, MTHS113 of MTHS123) wil neem, moet aan die programvereistes van die program waarvoor die student wil inskryf, voldoen. Indien 'n student Wiskundige Tegnieke (MTHS112, MTHS113 of MTHS123) wil neem om toelating tot MTHS111 in die volgende jaar te verkry, of vir nie-graad doeleindes, moet die student óf in die graad 12-eksamen in Wiskunde 'n punt van minstens 40% (vlak 3), óf minstens 50% (vlak 4) in 'n ander eksamen in Wiskunde behaal het, wat die Senaat as gelykwaardig aan voorgenoemde ag.

A student who wishes to follow Applied Calculus I (MTHS114) has to comply with prerequisites of the program the student intends to study. If a student wishes to take Applied Calculus I (MTHS114) in order to qualify for MTHS111 in the next year, or for non-degree purposes, the student must have obtained a mark of at least 50% (level 4) in the grade 12 Mathematics exam, or at least 60% (level 5) in another Mathematics exam considered by the Senate as equivalent to the above. /

'n Student wat Toegepaste Calculus I (MTHS114) wil neem, moet aan die programvereistes van die program waarvoor die student wil inskryf, voldoen. Indien 'n student Toegepaste Calculus I (MTHS114) wil neem om toelating tot MTHS111 in die volgende jaar te verkry, of vir nie-graad doeleindes, moet die student óf in die graad 12-eksamen in Wiskunde 'n punt van minstens 50% (vlak 4), óf minstens 60% (vlak 5) in 'n ander eksamen in Wiskunde behaal het, wat die Senaat as gelykwaardig aan voorgenoemde ag.

NAS.1.10.4.3 Request to change from an Extended programme to a Main stream programme / *Versoek om vanaf 'n Verlengde program oor te skakel na 'n Hoofstroom program*

In the instance that a student would request a transfer from an extended curriculum programme (ECP), to a mainstream programme, the following applies:

- The faculty has the prerogative to decide on whether the transfer would be allowed.
- The first two years of the extended programme, must be successfully completed (all the foundation modules).
- The student must complete a Student Request form and submit it at the Dean's office, for consideration.

The request will only be considered, if the student wishes to change campus and the programme in question, is not offered as an extended programme, on the other campus.

In die geval waar ʼn student ʼn oorplasing van ʼn verlengde program na ʼn hoofstroom program versoek, is die volgende van toepassing:

- *Die fakulteit het die prerogatief om te besluit of die oorplasing toegelaat sal word.*
- *Die eerste twee jaar van die verlengde program, moet suksesvol voltooi wees (al die grondslag modules).*
- *Die student moet ʼn Studenteversoekvorm voltooi en by die Dekaanskantoor indien, vir oorweging.*

Die versoek sal slegs oorweeg word, indien die student van voorneme is om van kampus te wysig en die gemelde program, nie as ʼn verlengde program op die ander kampus aangebied word nie.

NAS.1.10.5 ADMISSION REQUIREMENTS FOR PROGRAMMES/ *TOELATINGSVEREISTES VIR PROGRAMME*

NAS.1.10.5.1 Diplomas

Students who have not achieved the required points for entry into BSc Agriculture may be admitted into any of the three Agriculture Diploma Programmes (Students need a "Diploma" matric pass). Available at Mahikeng campus only.

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Diploma in Animal Health (3 Years)		2DY B01 N302M	3	3		Physical Science Level 3 **OR** Life Science Level 3			19	6	MC
Diploma in Animal Science (3 Years)		2FH B01 N301M	3	Mathematics Level 3 **OR** Mathematic Literacy Level 5		Physical Science Level 3 **OR** Life Science Level 3 **OR** Agricultural Science Level 4			19	6	MC
Diploma in Plant Science (3 Years)	Crop Production	2FJ B01 N301M	3	Mathematics Level 3 **OR** Mathematic Literacy Level 5		Physical Science Level 3 **OR** Life Science Level 3 **OR** Agricultural Science Level 4			19	6	MC

NAS.1.10.5.2 Extended: Bachelor of Science Degree

Students who have not achieved the required points for entry into BSc may be admitted into the, BSc (Extended (BSc-e) Programme. (Students need a "Bachelors" matric pass.).

Available at Mahikeng and Vanderbijlpark campus only.

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Extended: Bachelor of Science	Applied Mathematics and Chemistry	2XF H13 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Applied Mathematics and Electronics	2XF H14 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Computer Science and Mathematics	2XF H09 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Chemistry and Computer Science	2XF H31 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Chemistry and Mathematics	2XF H11 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Physics and Applied Mathematics	2XF H24 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Physics and Mathematics	2XF H23 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Biochemistry and Chemistry	2XF H06 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Chemistry and Physics	2XF H05 N301M	4	3		**3**			22	7	MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Extended: Bachelor of Science	Physics and Computer Science	2XF H25 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Computer Science and Electronics	2XF H17 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Electronics and Physics	2XF H20 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science	Electronics and Mathematics	2XF H19 N301M	4	3		**3**			22	7	MC
EXTENDED: BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES											
Extended: Bachelor of Science in Mathematical Sciences	Applied Mathematics and Mathematics	2XG H03 N301M	4	3		**3**			22	7	MC
EXTENDED: BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS											
Extended: Bachelor of Science In Financial Mathematics		2XS H01 N301V		4					28	7	VC
EXTENDED: BACHELOR OF SCIENCE IN QUANTITATIVE RISK MANAGEMENT											
Extended: Bachelor of Science In Quantitative Risk Management		2XT H01 N301V		4					28	7	VC
EXTENDED: BACHELOR OF SCIENCE IN BUSINESS ANALYTICS											
Extended: Bachelor of Science In Business Analytics		2XR H01 N301V		4					28	7	VC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
EXTENDED: BACHELOR OF INFORMATION TECHNOLOGY											
Extended: Bachelor of Science In Information Technology		2XX H01 N301V		3					24	7	VC
EXTENDED: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES											
Extended: Bachelor of Science in Environmental Sciences	Botany and Chemistry	2XJ H03 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science in Environmental Sciences	Geography and Botany	2XJ H06 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science in Environmental Sciences	Geography and Computer Science	2XJ H14 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science in Environmental Sciences	Microbiology and Chemistry	2XJ H10 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science in Environmental Sciences	Chemistry and Geography	2XJ H18 N301M	4	3		**3**			22	7	MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Extended: Bachelor of Science in Environmental Sciences	Botany and Biochemistry	2XK H01 N301M	4	3		**3**			22	7	MC
Extended: Bachelor of Science in Environmental Sciences	Botany and Microbiology	2XK H02 N301M	4	3		**3**			22	7	MC
EXTENDED: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES											
Extended: Bachelor of Science in Biological Sciences	Microbiology and Biochemistry	2XK H11 N301M	4	3		**3**			22	7	MC

NAS.1.10.5.3 Bachelor of Science Degree/ *Baccalaureus Scientiae Graad*

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Chemistry and Physics/ *Chemie en Fisika*	2FF H05 N301P 2FF H05 N301M		5		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Chemistry, Mathematics and Applied Mathematics/ *Chemie, Wiskunde en Toegepaste Wiskunde*	2FF H22 N301P		5		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years	Applied Mathematics and Chemistry	2FF H13 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years	Chemistry and Mathematics	2FF H11 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Biochemistry and Chemistry/ *Biochemie en Chemie*	2FF H06 N301P 2FF H06 N301M		4		4			26	7	PC MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Physics and Mathematics/ *Fisika en Wiskunde*	2FF H23 N301P 2FF H23 N301M		5		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Physics and Applied Mathematics/ *Fisika en Toegepaste Wiskunde*	2FF H24 N301P 2FF H24 N301M		5		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Applied Mathematics and Electronics	2FF 14 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Electronics and Mathematics	2FF H19 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Electronics and Physics	2FF 20 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Physics and Computer Science/ *Fisika en Rekenaar-wetenskap*	2FF H25 N301P 2FF H25 N301M		5		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years	Chemistry and Computer Science	2FF H31 N301M		5		4			26	7	MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years	Computer Science and Electronics	2FF H17 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Computer Science and Statistics/ *Rekenaar-wetenskap en Statistiek*	2FF H26 N301P 2FF H26 N301V		5		4			26	7	PC VC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Computer Science and Mathematics/ *Rekenaar-wetenskap en Wiskunde*	2FF H09 N301P 2FF H09 N301M		5		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Computer Science and Economics/ *Rekenaar-wetenskap en Ekonomie*	2FF H28 N301P 2FF H28 N301V		5					26	7	PC VC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Mathematics and Economy/ *Wiskunde en Ekonomie*	2FF H29 N301P 2FF H29 N301V		5					26	7	PC VC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geography and Applied Mathematics/ *Geografie en Toegepaste Wiskunde*	2FF H30 N301P		5		4			26	7	PC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES/ *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Statistics and Mathematics/ *Statistiek en Wiskunde*	2FG H02 N301P 2FG H02 N301V		5		4			26	7	PC VC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Mathematics/ *Wiskunde*	2FG H01 N301P		5		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Applied Mathematics and Mathematics	2FG H03 N301M		5		4			26	7	MC
BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS/ *BACCALAUREUS SCIENTIAE IN FINANSIëLE WISKUNDE*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Financial Mathematics/ *Finansiële Wiskunde*	2FS H01 N301P 2FS H01 N301V		6					32	7	PC VC
BACHELOR OF SCIENCE IN QUANTITATIVE RISK MANAGEMENT/ *BACCALAUREUS SCIENTIAE IN KWANTITATIEWE RISIKOBESTUUR*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Quantitative Risk Management/ *Kwantitatiewe Risikobestuur*	2FT H01 N301P 2FT H01 N301V		6					32	7	PC VC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
BACHELOR OF SCIENCE IN BUSINESS ANALYTCS/ BACCALAUREUS SCIENTIAE IN BESIGHEIDSANALISE											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	**Business Analytics/ *Besigheids-analise***	**2FR H01 N301P** **2FR H01 N301V**		6					32	7	PC VC
BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE/ *BACCALAUREUS SCIENTIAE IN AKTUARIëLE WETENSKAP*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	**Actuarial Sciences/ *Aktuariële Wetenskap***	**2FQ H01 N301P**		6					32	7	PC
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	**Information Technology/ *Inligtings-tegnologie***	Contact/ *Kontak* **2DX H01 N302P** **2DX H01 N302V** Distance/ *Afstand* **2HA H01 N301P**		4					26		PC VC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Botany and Chemistry/ *Plantkunde en Chemie*	2DJ H03 N302P 2DJ H03 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Microbiology and Chemistry/ *Mikrobiologie en Chemie*	2DJ H10 N301P 2DJ H10 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Zoology and Chemistry/ *Dierkunde en Chemie*	2DJ H04 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Chemistry and Geology/ *Chemie en Geologie*	2DJ H07 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geology and Geography/ *Geologie en Geografie*	2DJ H01 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geology and Botany/ *Geologie en Plantkunde*	2DJ H02 N301P		4		4			26	7	PC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geology and Microbiology/ *Geologie en Mikrobiologie*	2DJ H09 N301P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Zoology and Geology/ *Dierkunde en Geologie*	2DJ H08 N301P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Zoology and Geography/ *Dierkunde en Geografie*	2DJ H05 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geography and Botany/ *Geografie en Plantkunde*	2DJ H06 N302P 2DJ H06 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Chemistry and Geography/ *Chemie en Geografie*	2DJ H18 N301M		5		4			26	7	MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Geography and Computer Science/ *Geografie en Rekenaar-wetenskap*	2DJ H14 N301P 2DJ H14 N301M		4		4			26	7	PC MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Tourism and Zoology/ *Toerisme en Dierkunde*	2DJ H15 N301P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Tourism and Geography/ *Toerisme en Geografie*	2DJ H16 N301P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ *3jaar*	Tourism and Botany/ *Toerisme en Plantkunde*	2DJ H17 N301P		4		4			26	7	PC
BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE*											
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Microbiology and Biochemistry/ *Mikrobiologie en Biochemie*	2DK H11 N301P 2DK H11 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Microbiology and Botany/ *Mikrobiologie en Plantkunde*	2DK H10 N302P 2DK H10 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Zoology and Microbiology/ *Dierkunde en Mikrobiologie*	2DK H08 N301P		4		4			26	7	PC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Microbiology and Physiology/ *Mikrobiologie en Fisiologie*	2DK H04 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Zoology and Biochemistry/ *Dierkunde en Biochemie*	2DK H07 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Botany and Biochemistry/ *Plantkunde en Biochemie*	2DK H02 N302P 2DK H02 N301M		4		4			26	7	PC MC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Zoology and Physiology/ *Dierkunde en Fisiologie*	2DK H03 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Chemistry and Physiology/ *Chemie en Fisiologie*	2DK H06 N302P		4		4			26	7	PC
Bachelor of Science/ *Baccalaureus Scientiae* 3years/ 3jaar	Zoology and Botany/ *Dierkunde en Plantkunde*	2DK H09 N301P		4		4			26	7	PC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING/ *BACCALAUREUS SCIENTIAE IN STADS- EN STREEKBEPLANNING*											
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Urban and Regional Planning/ *Stad- en Streek-beplanning***	**2FE K01 N401P**		4	**Selection Test:** Deadline for applications is 30 June. Late applications will be considered on merit. ***Keuringstoets:*** *Aansoeke sluit 30 Junie. Laat aansoeke sal op meriete beoordeel word.*				28	8	PC
BACHELOR OF SCIENCE IN AGRICULTURAL SCIENCES/ *BACCALAUREUS SCIENTIAE IN LANDBOUWETENSKAPPE*											
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Agricultural Economics**	**2FD K01 N401M**	4	4		Physical Science Level 4 **OR** Life Science Level 4			22	8	MC
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Animal Health**	**2FD K07 N401M (1st – 2nd yrs. phasing in) (267 101 phasing out 3rd-4th years)**	4	4		Physical Science Level 4 **OR** Life Science Level 4			22	8	MC
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Animal Science**	**2FD K03 N401M**	4	4		Physical Science Level 4 **OR** Life Science Level 4			22	8	MC
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Agronomy and Horticulture**	**2FD K04 N401M**	4	4		Physical Science Level 4 **OR** Life Science Level 4			22	8	MC

Qualification	Specialization Field	Programme Code	Admission Requirements						APS	NQF Level	Campus
			English	Mathematics	Math. Lit.	Phys. Science	Life Science	Agric. Science			
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Agricultural Economics and Agronomy/ *Landbou-Ekonomie en Agronomie***	**2FD K05 N401P**	4	4		4			22	8	PC
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Soil Science and Agronomy/ *Grondkunde en Agronomie***	**2FD K06 N401P**	4	4		4			22	8	PC
BACHELOR OF SCIENCE IN INDIGENOUS KNOWLEDGE SYSTEMS											
Bachelor of Science/ *Baccalaureus Scientiae* 4years/ *4jaar*	**Indigenous Knowledge Systems**	**2HB K01 N401M** **287 100 N402M** Pipeline Students	4	Matriculation Exemption **OR** Recognition of Prior Learning (RPL) **OR** GCE Certification and an application for conditional exemption with HESA (http://mb.usaf.ac.za)					20	8	MC

NAS.1.10.5.4 Training of Teachers: Postgraduate Certificate in Education (PGCE) / *Onderwyser opleiding: Nagraadse Onderwyssertifikaat in Onderwys (NGOS)*

The Faculty of Natural and Agricultural Sciences regards the training of teachers to be of such importance that information regarding the Postgraduate Certificate in Education (PGCE) is summarised below for the convenience of prospective teachers. However, students should not neglect consulting the PGCE calendar of the Faculty of Education for complete information

Students must first complete their BSc degree, before they can be admitted to the PGCE programme.

Die Fakulteit Natuur- en Landbouwetenskappe beskou onderwysersopleiding so belangrik, dat inligting in verband met die Nagraadse Onderwyssertifikaat (NGOS) hieronder kortliks vir die gerief van voornemende onderwysstudente opgesom word. Studente moet egter nie nalaat om die NGOS jaarboek van die Fakulteit Opvoedkunde vir volledige inligting te raadpleeg nie.

Studente moet hulle BSc graad eers voltooi, voordat hulle toegelaat kan word tot die NGOS program.

****Please note that if a student wants to do a Postgraduate Certificate in Education (PGCE) with Mathematics as a school subject, MTHS111 and MTHS121 must be taken for further admission to Mathematics at 2nd year level.

****Neem kennis dat indien 'n student 'n Nagraadse Onderwyssertifikaat (NGOS) wil doen met Wiskunde as 'n skoolvak, moet MTHS111 en MTHS121 geneem word, vir verdere toelating tot Wiskunde op 2de jaar vlak.*

NAS.1.10.5.5 The following curricula comply with the entry requirements of the PGCE: /
Die volgende kurrikulums voldoen aan die vereistes vir toelating tot die NGOS:

QUALIFICATION AND CURRICULUM CODE / *KWALIFIKASIE- EN KURRIKULUMKODE*	BSC WITH SPECIALISATION IN / *MET SPESIALISERING IN*	PGCE FIELD OF SPECIALISATION/ *NGOS SPESIALITEITSVAKRIGTING*
2DJ H04 N302P	**Zoology and Chemistry**	**Physical Science** Provided Physics is chosen and then Botany and Physiology at 1st year level for the 2nd Life Sciences subject.
	Dierkunde en Chemie	***Fisiese wetenskappe*** *Fisika moet gekies word en dan Plantkunde en Fisiologie op 1ste jaar vlak vir die 2de skoolvak van Lewenswetenskappe.*
2DJ H05 N301P/ N302P	**Zoology and Geography**	**Life Sciences Geography** Subject to Botany and Physiology to the 1st year level. 1 module History together with Geography, to qualify for the Social sciences part of the subject.
	Dierkunde en Geografie	***Lewenswetenskappe Geografie*** *Mits Plantkunde en Fisiologie tot die 1ste jaar vlak is. 1 module Geskiedenis saam met die Geografie om vir die Sosiale wetenskap deel van vak te kwalifiseer.*

2DK H08 **N301P**	**Zoology and Microbiology**	**Life Sciences** (LS) Subject to Botany and Physiology to the 1st year level. Short 2nd school subject [PS: chemistry 2 and physics 1]
	Dierkunde en Mikrobiologie	***Lewenswetenskappe*** *(LW) Mits Plantkunde en Fisiologie tot 1ste jaar vlak is.* *Kort nog 2de skoolvak [FW: chemie 2 en fisika 1])*
2DK H09 **N301P**	**Zoology and Botany**	**Life Sciences** Only 1 school subject (LS) short. 2nd school subject [Chemistry 2 and Physics 1]
	Dierkunde en Plantkunde	***Lewenswetenskappe*** *Slegs 1 skoolvak (LW) kort nog 2de skoolvak* *[Chemie 2 en Fisika 1]*
2DJ H06 **N302P**	**Geography and Botany**	**Life Sciences** **Geography** (LS) Subject to Zoology and Physiology to the 1st year level. Geography, provided that 1 module is history.
	Geografie en Plantkunde	***Lewenswetenskappe*** ***Geografie*** *(LW) mits Dierkunde en Fisiologie tot die 1ste jaar vlak is. Geografie, mits 1 module geskiedenis is.*
2DJ H14 **N301P/ N301M**	**Geography and Computer Science**	**Geography** **Information Technology** IT and Geography, provided that 1 module history is passed for school subject.
	Geografie en Rekenaarwetenskap	***Geografie*** ***Inligtingstegnologie*** *IT en Geografie, mits 1 module geskiedenis geslaag word vir skoolvak.*

2DK H10 **N301P/ N302P** **N301M**	**Microbiology and Botany**	**Life Sciences** (LS) If Zoology and Physiology are taken to 1st year level. (PS) Chemistry 2 and Physics 1 for 2nd school subject.
	Mikrobiologie en Plantkunde	***Lewenswetenskappe*** *(LW) Mits Dierkunde en Fisiologie tot 1ste jaar vlak geneem word. (FW) Chemie 2 en Fisika 1 vir 2de skoolvak.*
2DJ H03 **N302P/** **N301M**	**Botany and Chemistry**	**Physical Science** (PS) Provided Physics 1 (LS) with Zoology and Physiology until the 1st year.
	Plantkunde en Chemie	***Fisiese Wetenskappe*** *(FW) Mits Fisika 1 en (LS) Dierkunde en Fisiologie tot 1ste jaar.*
2FF H05 **N301P/ N301M**	**Chemistry and Physics**	**Physical Science** **Mathematics** Mathematics and Physics
	Chemie en Fisika	***Fisiese Wetenskappe*** ***Wiskunde*** *Wiskunde en Fisika*
2FF H22 **N301P**	**Chemistry, Mathematics and Applied Mathematics**	**Physical Science** **Mathematics** Mathematics and Physics
	Chemie, Wiskunde en Toegepaste Wiskunde	***Fisiese Wetenskappe*** ***Wiskunde*** *Wiskunde en Fisika*
2FF H06 **N301P/ N301M**	**Chemistry and Biochemistry**	**Physical Science** PS: provided physics 1. No 2nd school subject, so will not qualify for PGCE
	Chemie en Biochemie	***Fisiese wetenskappe*** *FW: mits fisika 1. Geen 2de skoolvak dus sal nie kwalifiseer vir NGOS*
2FF H25 **N301P/ N301M**	**Physic and Computer Science**	**Information Technology** **Mathematics** In order for IT and Mathematics PS-provided Chemistry 1
	Fisika en Rekenaarwetenskap	***Inligtingstegnologie*** ***Wiskunde*** *Korrek vir IT en Wiskunde.* *FW – mits Chemie 1*

2FF H26 **N301P/ N301V**	**Computer Science and Statistics**	**Information Technology** **Mathematics** In order for IT and Mathematics
	Rekenaarwetenskap en Statistiek	***Inligtingstegnologie*** ***Wiskunde*** *Korrek vir IT en Wiskunde*
2FF H09 **N301P/ N301M**	**Computer Science and Mathematics**	**Information Technology** **Mathematics** Mathematics and IT
	Rekenaarwetenskap en Wiskunde	***Inligtingstegnologie*** ***Wiskunde*** *Wiskunde en IT*
2FG H02 **N301P**	**Statistics and Mathematics**	**Mathematics** Mathematics and IT
	Statistiek en Wiskunde	***Wiskunde*** *Wiskunde en IT*
2FG H01 **N301P**	**Mathematics**	**Mathematics** No - Need school subject to level 2
	Wiskunde	***Wiskunde*** *Nee- Kort skoolvak tot vlak 2*

NAS.1.10.5.6 Nature and aims of the PGCE / *Die aard en doel van die NGOS*

The PGCE serves as a professional 'capping' qualification for candidates who have completed an appropriate 360 or 480 credits Bachelor's degree and would like to join the education profession. With this certificate an educator can teach from Grade 7 to Grade 12. /

Die NGOS dien as 'n verdere professionele kwalifikasie vir kandidate wat 'n 360- of 480 krediet Baccalaureus graad voltooi het en tot die onderwys professie wil toetree. Met hierdie sertifikaat mag 'n onderwyser vanaf Graad 7 tot 12 onderrig.

NAS.1.10.5.7 Duration of studies / *Duur van studie*

The minimum duration of the study for full time students is one (1) year and the maximum duration is two (2) years/

Die minimum duur van die studie vir voltydse studente is een (1) jaar en 'n maksimum van twee (2) jaar.

The minimum duration of the study for distance students is one (1) year and the maximum duration is three (3) years.

Die minimum duur van die studie vir afstand studente is een (1) jaar en 'n maksimum van drie (3) jaar.

NAS.1.10.5.8 Method of delivery / Metode van aflewering

This qualification can be taken only full time. Contact the Faculty of Education for more information. /

Hierdie kwalifikasie kan slegs voltyds geneem word. Kontak die Fakulteit Opvoedkunde vir meer inligting.

NAS.1.10.5.9 Admission requirements / *Toelatingsvereistes*

A first university degree or relevant qualification of at least 360 credits with two recognised school subjects in that qualification. /

'n Eerste universiteitsgraad met twee erkende skoolvakke of 'n erkende kwalifikasie wat in totaal 360 krediete optel.

Students must also be able to take two (2) methodologies in order to obtain the PGCE qualification. The curriculum of the certificate must be structured as follows: /

Studente moet ook in staat wees om twee (2) metodieke te kan neem ten einde die kwalifikasie te verwerf. Die samestelling in die graadkursus moet die volgende wees:

- Recognised school subject at level 3 + recognised school subject at level 2. /

  Erkende skoolvak op vlak 3 + erkende skoolvak op vlak 2.

- Students must enrol for the methodologies of the subject in which he/she obtained the highest qualification. /

  In geval van 'n keuse tussen metodiek van akademiese vakke reeds geslaag vir 'n vorige kwalifikasie, moet die student die twee neem waarin die hoogste gekwalifiseer is.

NAS.1.10.5.10 Exceptions / Uitsonderings

A student who wants to take Life Sciences as methodology needs to present one of the subjects Botany, Zoology or Physiology at level 3 and the other 2 on level1. /

'n Student wat Lewenswetenskappe as metodiek wil neem moet een van die volgende vakke Plantkunde, Dierkunde of Fisiologie op vlak 3 en die ander 2 tot op vlak 1.

A student who wants to take Physical Sciences as methodology needs to present 1 of the subjects Chemistry or Physics on level 2 and the other at level 1. /

'n Student wat Fisiese Wetenskappe as metodiek wil neem moet 1 van Chemie of Fisika op graad vlak 2 vir toelating tot die NGOS aanbied en die ander ten minste op graad vlak 1.

A student who wants to take the Methodology of Mathematics must have completed Mathematics on level 2 or otherwise Mathematics on level 1 with one of the following on level 2: Statistics, Mathematical Statistics, Applied Mathematics and Financial Mathematics. (****see also note NAS1.10.5.4)/

*ʼn Student wat die metodiek van Wiskunde wil neem, moet Wiskunde op vlak 2 geslaag het, andersins kan Wiskunde op vlak 1 saam met een van die volgende op vlak 2 aangebied word: Statistiek, Toegepaste Wiskunde, Finansiële Wiskunde. (**** sien ook nota NAS1.10.5.4)*

A student who wants to take the Methodology of Life Orientation must have Psychology and one of the following subjects on degree level: Sociology, Political Studies, Human Movement Science, Labour -and Industrial studies or, - Philosophy. The student must also have a second school subject on degree level for the second methodology. /

ʼn Student wat die Metodiek van Lewensoriëntering wil neem, moet Sielkunde en een van die volgende vakke op graad vlak geneem het: Sosiologie, Politieke Studies, Menslike Bewegingskunde, Arbeid– en Industriële studies en Filosofie. Die student moet dan steeds ook ʼn tweede skoolvak op graad vlak geneem het vir die tweede metodiek.

A student who wants to take the Methodology of any language must have completed that language at level 3. /

'n Student wat die Metodiek van enige taal wil neem, moet die betrokke taal ten minste op graad vlak 3 geslaag het.

NAS.1.11 SCHOOLS AND CENTRES OF THE FACULTY / *SKOLE EN SENTRUMS IN DIE FAKULTEIT*

The Faculty of Natural and Agricultural Sciences consists of six schools and two centres, each of which is made up of different subject groups. At the head of each school/centre is a director and who is assisted by a subject chairperson from each subject group. The school/centre is responsible for teaching graduate, honours and lectured master's programmes. These schools/centres and subject groups that make up each school are represented in the following table: /

Die Fakulteit Natuur- en Landbouwetenskappe het ses skole en twee sentrums wat elkeen saamgestel is uit verskillende vakgroepe. Aan die hoof van elke skool/sentrum staan 'n direkteur en hy/sy word uit elke vakgroep bygestaan deur 'n vakvoorsitter. Die skole/sentrums is veral verantwoordelik vir onderrig van voorgraadse, honneurs- en gedoseerde Magisterprogramme. Dié skole/sentrums en die vakgroepe waaruit elke skool/sentrum saamgestel is, word in die tabel weergegee

SCHOOLS & CENTRES OF THE FACULTY WITH SUBJECT GROUPS/ ***SKOLE & SENTRUMS VAN DIE FAKULTEIT MET VAKGROEPE***
School of Agricultural Sciences / ***Skool vir Landbouwetenskappe***
Agricultural Economics and Extension/ *Landbou-ekonomie en Voorligting* Animal Sciences / *Dierewetenskappe* Agronomy and Horticulture / *Agronomie en Tuinbou* Animal Health / *Dieregesondheid*
School of Biological Sciences / ***Skool vir Biologiese Wetenskappe***
Botany / *Plantkunde* Microbiology / *Mikrobiologie* Zoology / *Dierkunde*
School of Geo- and Spatial Sciences / ***Skool vir Geo- en Ruimtelike Wetenskappe***
Geography */ Geografie* Geology */ Geologie* Urban and Regional Planning */ Stad- en Streeksbeplanning* Agriculture */ Landbou (*PC only */ Slegs PC)* *Agriculture with Soil Science and Agronomy/ *Landbou met Landbou-ekonomie en Agronomie* *Agriculture with Agricultural Economics and Agronomy/ *Landbou met Grondkunde en Agronomie*
School of Computer Science and Information Systems / ***Skool vir Rekenaarwetenskap en Inligtingstelsels***
Computer Science and Information Systems / *Rekenaarwetenskap en Inligtingstelsels*
School of Mathematical and Statistical Sciences / ***Skool vir Wiskundige en Statistiese Wetenskappe***
Statistics / *Statistiek* Mathematics and Applied Mathematics / *Wiskunde en Toegepaste Wiskunde*

School of Physical and Chemical Sciences / *Skool vir Fisiese en Chemiese Wetenskappe*
Biochemistry / *Biochemie* Chemistry / *Chemie* Physics / *Fisika*
Centre for Business Mathematics and Informatics / *Sentrum vir Bedryfswiskunde en Informatika*
Actuarial Science / *Aktuariële Wetenskap* Business Analytics / *Besigheidsanalise* Financial Mathematics / *Finansiële Wiskunde* Quantitative Risk Management / *Kwantitatiewe Risikobestuur*

NAS.1.12 RE-CURRICULATION OF QUALIFICATIONS AND PROGRAMMES TO ADHERE TO HEQSF REQUIREMENTS / *HERKURRIKULERING VAN KWALIFIKASIES EN PROGRAMME OM TE VOLDOEN AAN HEQSF- VEREISTES*

Please note that the Faculty has re-curriculated its qualifications and re-linked it's programmes over, as managed by the institutional HEQSF-alignment project team. The programmes were HEQSF-aligned during 2016 and 2017 and are included in the 2019-2020 yearbooks. Only pipeline students will be phasing out on the old programmes, as was registered in 2017-2019. These programmes are also listed in the yearbook (NAS.1.14.). /

Neem asseblief kennis dat die Fakulteit sy kwalifikasies en gekoppelde programme herkurrikuleer het, soos deur die institusionele HEQSF-belyningsprojek span bestuur word. Die programme is in 2016 en 2017 deur die HEQSF belyn en is in die 2019-2020 jaarboeke ingesluit. Slegs pyplynstudente sal uitfaseer op die ou programme, soos in 2017-2019 geregistreer was. Hierdie programme word in 'n tabel gelys (NAS.1.14.).

NAS.1.13 LIST OF MODULES ALL CAMPUSES/ *LYS VAN MODULES ALLE KAMPUSSE*

NAS.1.13.1 CONTACT (CAMPUS) STUDENTS / *KONTAK- (KAMPUS-) STUDENTE*

When a first semester module in a particular year level is set in the faculty rules as assumed learning for a second semester module, a module mark of at least 40% must be achieved in the first semester module concerned, before the student may continue with the second semester module, provided that they have at least qualified for admission to the examination. /

Wanneer 'n eerstesemestermodule op 'n bepaalde jaarvlak in die fakulteitsreëls as veronderstelde leer gestel word vir 'n tweede semester module, moet 'n modulepunt van ten minste 40% in die betrokke eerste semester module behaal word, voordat die student mag voortgaan met die tweede semester module, met dien verstande dat hulle ten minste tot die eksamentoelating gekwalifiseer het.

NAS.1.13.2 BSC IT PROGRAMME: DISTANCE LEARNING STUDENTS (UODL) / *BSC IT PROGRAM: AFSTANDSLEER STUDENT (EOAL)*

When a module is set in the faculty rules as assumed learning (a linked module or prerequisite) for another module, students may continue with that module provided that they have at least qualified for admission to the examination in the linked module and are awaiting a second examination opportunity. /

Wanneer 'n module in die fakulteitsreëls opgestel word as veronderstelde leer ('n gekoppelde module of voorvereiste) vir 'n ander module, kan studente voortgaan met die module mits hulle ten minste vir eksamentoelating in die gekoppelde module gekwalifiseer het en nog op 'n tweede eksamengeleentheid wag.

NAS.1.13.3 LIST OF ALL MODULES WITH PREREQUISITES AT ALL CAMPUSES / *LYS VAN ALLE MODULES MET VOORVEREISTES OP ALLE KAMPUSSE*

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Financial Accounting / *Finansiële Rekeningkunde*						
• Students who did not have Accounting as a school subject are recommended to register for an accounting preparatory course at the commencement of their studies. If the course is passed with 75%, students are advised to register for ACCC111 in the first semester. Students who achieve between 50% and 75% for the course are advised to register for ACCF111. Students with less than 50% for the course are advised to register for ACCS111. Students who did have Accounting as a school subject may also register for the preparatory course to better prepare them for university Accounting. Please note, however, that performance in this preparatory course is in all cases subordinate to the admission requirements of the programme. The Programme Leader for Chartered Accountancy may be contacted for more information in this regard. • If a student achieves 65% at the end of the first semester in ACCS111, the student may be allowed to do ACCF121 in the second semester. • If a student achieves 65% at the end of the first semester in ACCF111, the student may be allowed to do ACCC121 in the second semester. • If a student achieves 65% in ACCF121, he/she may write the second examination opportunity of ACCC121 and if a mark of 55% is achieved, he/she may be admitted to the second-year CA Accounting (ACCC271).						
ACCC111	ACCC111	Accounting: Framework, Foundations, Cycle and Financial Reporting/ *Rekeningkunde: Raamwerk, Grondslae, Siklus en Finansiële Verslagdoening*	Mathematics Gr 12 Level 5 (60-69%) / *Wiskunde Gr 12 Vlak* 5 (60-69%)	16	PC VC	Faculty of Economic & Management Sciences
ACCC121	ACCC121	Accounting for Different Entity Forms/ *Rekeningkunde vir Verskillende Entiteitsvorme*	ACCC111 (50%) **OR/ OF** ACCF111 (65%)	16	PC VC	Faculty of Economic & Management Sciences
ACCF111	ACCF111	Financial Accounting: Basic Concepts, Accounting Systems and Elementary Financial Reporting/ *Finansiële Rekeningkunde: Basiese Konsepte, Rekeningkundige Stelsels en Elementêre Finansiële Verslagdoening*	Mathematics Gr 12 Level 4 (50-59%)/ *Wiskunde Gr 12 Vlak* 4 (50-59%)	16	PC VC	Faculty of Economic & Management Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Financial Accounting (Special) / *Finansiële Rekeningkunde (Spesiaal)*						
ACCF121	ACCF121	Financial Accounting: Elementary Financial Reporting, Partnerships, and Companies / *Finansiële Rekeningkunde: Elementêre Finansiële Verslagdoening, Vennootskappe, en Maatskappye*	ACCF111 (40%) **OR / OF** ACCC111 (40%)	16	PC VC	Faculty of Economic & Management Sciences
ACCS111	ACCS111	Financial Accounting (Special) – Basic Concepts, Accounting Cycle and Accounting Systems/ *Finansiële Rekeningkunde (Spesiaal) – Basiese Konsepte, Rekeningkundige Siklus en Rekeningkundige Stelsels*	Mathematics Grade 12 Level 3 (40-49%)/ *Wiskunde Graad 12 Vlak 3 (40-49%)*	16	PC VC	Faculty of Economic & Management Sciences
ACCS121	ACCS121	Financial Accounting (Special) – Bank Reconciliation, Elementary Financial Reporting and Analysis and Interpretation of Elementary Financial Statements/ *Finansiële Rekeningkunde (Spesiaal) – Bankrekonsiliasies, Elementêre Finansiële Verslagdoening, Elementêre Ontleding en Vertolking van Finansiële State*	ACCS111 (40%)	16	PC VC	Faculty of Economic & Management Sciences
ACFS111	ACFS111	Financial Accounting *Special/* *Finansiële Rekeningkunde Spesiaal*		16	VC	Faculty of Economic & Management Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Financial Accounting (Special) / *Finansiële Rekeningkunde (Spesiaal)*						
ACFS121	ACFS121	Financial Accounting Special/ *Finansiële Rekeningkunde Spesiaal*	ACFS111 (40%)	16	VC	Faculty of Economic & Management Sciences
Agriculture / *Landbou*						
AECM111	AECM111	Introduction to Agricultural Economics		12	MC	Faculty of Natural and Agricultural Sciences
AECM221	AECM221	Land Reform and Agricultural Development		8	MC	Faculty of Natural and Agricultural Sciences
AECM223	AECM223	Farm Accounting		8	MC	Faculty of Natural and Agricultural Sciences
AECM311	AECM311	Agricultural Micro-Economics	AECM111	16	MC	Faculty of Natural and Agricultural Sciences
AECM312 (Replaced by AECM327)	AECM312	International Agricultural Trade	AECM111	8	MC	Faculty of Natural and Agricultural Sciences
AECM313	AECM313	Agricultural Statistics for Research I	ANSM121	16	MC	Faculty of Natural and Agricultural Sciences
AECM314	AECM314	Farm Management and Accounting	AECM111	8	MC	Faculty of Natural and Agricultural Sciences
AECM315	AECM315	Food Security Analysis	AECM111	8	MC	Faculty of Natural and Agricultural Sciences
AECM316		Agricultural Production Economics		16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Agriculture / *Landbou*						
AECM321	AECM321	Land Resource and Environmental Economics	AECM111	16	MC	Faculty of Natural and Agricultural Sciences
AECM322 (Replaced by AECM316)	AECM322	Agricultural Production Economics	AECM111 **&** AECM311 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AECM323	AECM323	Agricultural Marketing	AECM314 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AECM325	AECM325	Agricultural Macro-Economics	AECM111 **&** AECM311 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AECM326	AECM326	Agricultural Finance	AECM314 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AECM327		International Agricultural Trade		8	MC	Faculty of Natural and Agricultural Sciences
AECM411	AECM411	Agricultural Project Appraisal and Management	AECM314	8	MC	Faculty of Natural and Agricultural Sciences
AECM412	AECM412	Research Project and Seminar I		16	MC	Faculty of Natural and Agricultural Sciences
AECM413	AECM413	Quantitative Methods in Agricultural Economics	AECM311 **&** AECM325	16	MC	Faculty of Natural and Agricultural Sciences
AECM414	AECM414	Agricultural Statistics for Research II	AECM313	16	MC	Faculty of Natural and Agricultural Sciences
AECM415	AECM415	Agribusiness Management	AECM314	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Agriculture / *Landbou*						
AECM421	AECM421	Farm Planning and Linear Programming	AECM314	8	MC	Faculty of Natural and Agricultural Sciences
AECM422	AECM422	Agricultural Policy Analysis		16	MC	Faculty of Natural and Agricultural Sciences
AECM423 (Replaced by AECM326)		Agricultural Finance		8	MC	Faculty of Natural and Agricultural Sciences
AECM424	AECM424	Agriculture and Economic Development	AECM221 **&** AECM311	8	MC	Faculty of Natural and Agricultural Sciences
AECM425	AECM425	Research Project and Seminar II		16	MC	Faculty of Natural and Agricultural Sciences
AECP121		Farm Record Keeping and Finance/ *Plaasrekordhouding en Finansies*		12	PC	Faculty of Economic & Management Sciences
AECP211		Farm management and Planning/ *Landboubestuur en Beplanning*		16	PC	Faculty of Economic & Management Sciences
AECP223		Agricultural Marketing/ *Landboubemarking*		16	PC	Faculty of Economic & Management Sciences
AECP311		Agribusiness Management/ *Agri-besigheidbestuur*		16	PC	Faculty of Economic & Management Sciences
AECP321		Land resource and Environmental Economics/ *Hulpbron-en Omgewingsekonomie*		16	PC	Faculty of Economic & Management Sciences
AECP322		Agricultural Production Economics/ *Landbou Produksie Ekonomie*		16	PC	Faculty of Economic & Management Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Agriculture / *Landbou*						
AEDM111	AEDM111	Introduction to Agricultural Economics		12	MC	Faculty of Natural and Agricultural Sciences
AEDM314	AEDM314	Farm Management and Accounting	AEDM111	8	MC	Faculty of Natural and Agricultural Sciences
AEXM211	AEXM211	Fundamentals of Agricultural Extension		16	MC	Faculty of Natural and Agricultural Sciences
AEXM212	AEXM212	Communication and Agricultural Technology Transfer	AEXM211	8	MC	Faculty of Natural and Agricultural Sciences
AEXM222	AEXM222	Agricultural Extension for Development		8	MC	Faculty of Natural and Agricultural Sciences
AEXM324	AEXM324	Agricultural Rural Sociology	AEXM211 **&** AEXM222	8	MC	Faculty of Natural and Agricultural Sciences
AXDM211	AXDM211	Fundamentals of Agricultural Extension		16	MC	Faculty of Natural and Agricultural Sciences
AXDM311		Agricultural Extension for Development		8	MC	Faculty of Natural and Agricultural Sciences
Academic Literacy/ *Akademiese Geletterdheid*						
ALDE111/ ALDA111	AGLE111/ AGLA111	Introduction to Academic Literacy/ *Inleiding tot Akademiese Geletterdheid*		12	MC PC VC	Faculty of Humanities
ALDE122/ ALDA122	AGLE122/ AGLA122	Academic Literacy/ *Akademiese Geletterdheid*	ALDE111 **OR / OF** ALDA111 (40%)	12	MC PC VC	Faculty of Humanities

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHBM321 Phasing out 30/12/24 (Replaced by AHDR327)	AHBM321	Research Methodology	AHPM312 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHDM316 Phasing out 30/12/23 *Only Pipeline Students*		Meat Inspection I	AHVM111, 112, 122, 121 213, 221, 212, 225	8	MC	Faculty of Natural and Agricultural Sciences
AHDM317 Phasing out 30/12/23 *Only Pipeline Students*		Veterinary Jurisprudence	AHVM111, 122, 121, 213, 221, 212, 225	8	MC	Faculty of Natural and Agricultural Sciences
AHDM326 Phasing out *Only Pipeline Students*		Meat Inspection II		8	MC	Faculty of Natural and Agricultural Sciences
AHDM327 Phasing out *Only Pipeline Students*		Veterinary Jurisprudence		8	MC	Faculty of Natural and Agricultural Sciences
AHDR111		Animal Health, Handling and Welfare I	ALDE111, ALDE121, MCBN111	8	MC	Faculty of Natural and Agricultural Sciences
AHDR121		Animal Health, Handling and Welfare II	AHDR111	8	MC	Faculty of Natural and Agricultural Sciences
AHDR211		Anatomy and Physiology I: Animal Health	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121	12	MC	Faculty of Natural and Agricultural Sciences
AHDR212		Ethno veterinary Medicine	ALDE 11, ALDE 21, MCBN111, MCHE121, MTHS114, ANSM121	8	MC	Faculty of Natural and Agricultural Sciences
AHDR213		Fundamentals of Aquaculture	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121	8	MC	Faculty of Natural and Agricultural Sciences
AHDR221		Anatomy and Physiology: Animal Health	AHDR211	12	MC	Faculty of Natural and Agricultural Sciences
AHDR222		Microbiology and Immunology for Animal Health	ALDE111, ALDE 121, MCBN111, MCHE121,MTHS114, ANSM121	12	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHDR311		Diseases I: Bacterial Diseases	ALDE111, ALDE 121, MCBN111, MCHE121, MTHS114, ANSM 121, AHDR 211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR312		Diseases II: Metabolic and Fungal Diseases	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR313		Epidemiology for Animal Health	ALDE111, ALDE 121, MCBN111, MCHE121, MTHS114, ANSM 121	8	MC	Faculty of Natural and Agricultural Sciences
AHDR314		Pathology I: General Pathology	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM 121, AHDR211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR315		Obstetrics and Genital Diseases	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR316		Parasitology	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR317		Introduction to Game and Wildlife	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211/221	8	MC	Faculty of Natural and Agricultural Sciences
AHDR321		Diseases III: Viral Diseases	ALDE111, ALDE121, MCBN111, MCHE12, MTHS114, ANSM121, AHDR211, AHDR221, AHDR311	8	MC	Faculty of Natural and Agricultural Sciences
AHDR322		Meat Inspection I	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM 121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	8	MC	Faculty of Natural and Agricultural Sciences
AHDR323		Pharmacology and Toxicology	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	12	MC	Faculty of Natural and Agricultural Sciences
AHDR324		Pathology II: Organ Pathology	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHDR325		Clinical Laboratory Techniques	ALDE111, ALDE121, MCBN111, MCHE121, MTHS114, ANSM121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	8	MC	Faculty of Natural and Agricultural Sciences
AHDR326 (Used in Degree)		Veterinary Jurisprudence	ALDE111, ALDE 121, MCBN111, MCHE121, MTHS114, ANSM 121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	8	MC	Faculty of Natural and Agricultural Sciences
AHDR327		Research Methodology	ALDE111, ALDE 121, MCBN111, MCHE121, MTHS114, ANSM 121, AHDR211, AHDR221, AHDR311, AHDR312, AHDR316, AHDR314	8	MC	Faculty of Natural and Agricultural Sciences
AHDR412		Scheduled Diseases, Quarantine and Biosecurity	All first, second and third year modules	8	MC	Faculty of Natural and Agricultural Sciences
AHD413		Environmental and Public Health for Animal Health	All first, second and third year modules	8	MC	Faculty of Natural and Agricultural Sciences
AHDR421		Meat Inspection II	All first, second and third year modules	8	MC	Faculty of Natural and Agricultural Sciences
AHDR422		Management and Entrepreneurship	All first, second and third year modules	8	MC	Faculty of Natural and Agricultural Sciences
AHDR471		WIL I: Companion Animal Medicine and Surgery	All first, second and third year modules	16	MC	Faculty of Natural and Agricultural Sciences
AHDR472		WIL II: Production Animal Clinical Care for Animal Health	All first, second and third year modules	32	MC	Faculty of Natural and Agricultural Sciences
AHDR473		WIL III: Pathology and Laboratory Practice	All first, second and third year modules	16	MC	Faculty of Natural and Agricultural Sciences
AHDR474		WIL IV: Applied Biosecurity for Animal Health	All first, second and third year modules	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHDR476		Research Project	All first, second and third year modules	6	MC	Faculty of Natural and Agricultural Sciences
AHLH111		Animal Health, Handling and Welfare I		8	MC	Faculty of Natural and Agricultural Sciences
AHLH112		Anatomy and Physiology I: Animal Health		12	MC	Faculty of Natural and Agricultural Sciences
AHLH121		Animal Health, Handling and Welfare II		8	MC	Faculty of Natural and Agricultural Sciences
AHLH122		Anatomy and Physiology II: Animal Health		12	MC	Faculty of Natural and Agricultural Sciences
AHLH123		Basic Microbiology and Immunology for Animal Health		12	MC	Faculty of Natural and Agricultural Sciences
AHLH124		Diseases I: Bacterial Diseases		8	MC	Faculty of Natural and Agricultural Sciences
AHLH211		Diseases II: Viral and Fungal Diseases		8	MC	Faculty of Natural and Agricultural Sciences
AHLH212		Parasitology		8	MC	Faculty of Natural and Agricultural Sciences
AHLH213		Pathology I: General Pathology		8	MC	Faculty of Natural and Agricultural Sciences
AHLH221		Diseases III: Viral Diseases		8	MC	Faculty of Natural and Agricultural Sciences
AHLH222		Obstetrics and Genital Diseases		8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHLH223		Pathology II: Organ Pathology		8	MC	Faculty of Natural and Agricultural Sciences
AHLH224		Pharmacology and Toxicology		8	MC	Faculty of Natural and Agricultural Sciences
AHLH225		Meat Inspection I		8	MC	Faculty of Natural and Agricultural Sciences
AHLH226		Clinical Laboratory Techniques		8	MC	Faculty of Natural and Agricultural Sciences
AHLH312		Epidemiology for Animal Health		8	MC	Faculty of Natural and Agricultural Sciences
AHLH313 (Replaces AHLH311)		Environmental and Public Health for Animal Health		8	MC	Faculty of Natural and Agricultural Sciences
AHLH314 (Used in Dipl.))		Veterinary Jurisprudence		8	MC	Faculty of Natural and Agricultural Sciences
AHLH321		Meat Inspection II		8	MC	Faculty of Natural and Agricultural Sciences
AHLH322		Scheduled Diseases, Quarantine and Biosecurity		8	MC	Faculty of Natural and Agricultural Sciences
AHLH323		Management and Entrepreneurship		8	MC	Faculty of Natural and Agricultural Sciences
AHLH371		WIL I: Companion Animal Medicine and Surgery		16	MC	Faculty of Natural and Agricultural Sciences
AHLH372		WIL II: Production Animal Clinical Care for Animal Health		32	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHLH373		WIL III: Pathology and Laboratory Practice		16	MC	Faculty of Natural and Agricultural Sciences
AHLH374		WIL IV: Applied Biosecurity for Animal Health		16	MC	Faculty of Natural and Agricultural Sciences
AHPM211		Microbiology for Animal Health	AHDR111	16	MC	Faculty of Natural and Agricultural Sciences
AHPM212	**AHPM212**	Anatomy and Physiology I		16	MC	Faculty of Natural and Agricultural Sciences
AHPM213 Phasing out 30/12/24 (Replaced by AHDR222)	AHPM213	Veterinary Microbiology		16	MC	Faculty of Natural and Agricultural Sciences
AHPM214 Phasing out 30/12/24 (Replaced by AHDR211)		Anatomy and Physiology: Animal Health I		12	MC	Faculty of Natural and Agricultural Sciences
AHPM216 Phasing out 30/12/24 (Replaced by AHDR111)	AHPM216	Animal Welfare, Handling and Equipment I		12	MC	Faculty of Natural and Agricultural Sciences
AHPM221	AHPM221	Anatomy and Physiology II		8	MC	Faculty of Natural and Agricultural Sciences
AHPM223 Phasing out 30/12/24 (Replaced by AHDR121)	AHPM223	Animal Welfare, Handling and Equipment II	AHPM212 (40%)	12	MC	Faculty of Natural and Agricultural Sciences
AHPM224 Phasing out 30/12/24 (Replaced by AHDR212 & 211)		Anatomy and Physiology: Animal Health II		12	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHPM225 (Replaced by AHD121**)**		Animal Welfare, Handling and Equipment II		12	MC	Faculty of Natural and Agricultural Sciences
AHPM311 Phasing out 30/12/24 (Replaced by AHDR311)	AHPM311	Diseases I	AHPM211	16	MC	Faculty of Natural and Agricultural Sciences
AHPM313 Phasing out 30/12/24 (Replaced by AHDR315)	AHPM313	Obstetrics and Genital Diseases: Animal Health	AHPM212, 221	16	MC	Faculty of Natural and Agricultural Sciences
AHPM315 Phasing out 30/12/24 (Replaced by AHDR413)		Public Health for Animal Health I		8	MC	Faculty of Natural and Agricultural Sciences
AHPM317 Phasing out 30/12/24 (Replaced by AHDR314)	AHPM317	Pathology I	AHPM211, 212, 221, 222	8	MC	Faculty of Natural and Agricultural Sciences
AHPM318 Phasing out 30/12/24 (Replaced by AHDR317)	AHPM318	Introduction to Game and Wildlife	AHPM222	12	MC	Faculty of Natural and Agricultural Sciences
AHPM319 (Replaced by AHDR313)		Epidemiology for Animal Health Technicians		8	MC	Faculty of Natural and Agricultural Sciences
AHPM321 Phasing out 30/12/24 (Replaced by AHDR312)	AHPM321	Diseases II	AHPM211 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHPM322 Phasing out 30/12/24 (Replaced by AHDR316)	AHPM322	Parasitology: Animal Health	AHPM311	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHPM323 Phasing out 30/12/24 (Replaced by AHDR323)	AHPM323	Pharmacology and Toxicology: Animal Health	AHPM212, APM221 **&** AHPM311 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHPM325 Phasing out 30/12/24 (Replaced by AHDR325)	AHPM325	Clinical Laboratory Techniques	AHPM211	8	MC	Faculty of Natural and Agricultural Sciences
AHPM326	AHPM326	Livestock Diseases	AHPM211 (Animal Science)	8	MC	Faculty of Natural and Agricultural Sciences
AHPM327 Phasing out 30/12/24 (Replaced by AHDR326)	AHPM327	Veterinary Jurisprudence	AHPM311 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHPM329 Phasing out 30/12/24 (Replaced by ADR324)	AHPM329	Pathology II	AHPM211, 212, 221, 222 **&** AHPM313, 317, 314 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHPM411 Phasing out 30/12/24 (Replaced by AHDR471)	AHPM411	Companion Animal Clinical Care I	AHPM211, 212, 221, 222 **&** AHPM313, 323, 314, 325	16	MC	Faculty of Natural and Agricultural Sciences
AHPM412 Phasing out 30/12/24 (Replaced by AHD472)	AHPM412	Production Animal Clinical Care I	AHPM211, 212, 221, 222 **&** AHPM313, 323, 314, 325	16	MC	Faculty of Natural and Agricultural Sciences
AHPM415 Phasing out 30/12/24 (Replaced by AHDR475)	AHPM415	Research Project and Seminar		16	MC	Faculty of Natural and Agricultural Sciences
AHPM416 *Only Pipeline Students*		Public Health for AHT II		8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHPM417 *Only Pipeline Students*		Work Integrated Learning		8	MC	Faculty of Natural and Agricultural Sciences
AHPM421 Phasing out 30/12/24 (Replaced by AHDR471)	AHPM421	Companion Animal Clinical Care II	AHPM211, 212, 221, 222 **&** AHPM313, 323, 314, 325, **&** AHPM411 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHPM422 Phasing out 30/12/24 (Replaced by AHDR472)	AHPM422	Production Animal Clinical Care II	AHPM211, 212, 221, 222 **&** AHPM313, 323, 314, 325	16	MC	Faculty of Natural and Agricultural Sciences
AHPM424 Phasing out 30/12/24	AHPM424	Practical Learning and Experiential Learning II	AHPM211, 212, 221, 222 **&** AHPM313, 323, 314, 325	8	MC	Faculty of Natural and Agricultural Sciences
AHPM425 Phasing out 30/12/24 (Replaced by AHDR475)	AHPM425	Research Project and Seminar	AHPM415 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHPM426 Phasing out 30/12/24 (Replaced by AHDR413)	AHPM426	Scheduled Diseases	AHPM311 **OR / OF** AHPM321	8	MC	Faculty of Natural and Agricultural Sciences
AHPM427 *Only Pipeline Students*		Work Integrated Learning		8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHVM111 Phasing out 30/12/23 (Replaced by AHLH112)	AHVM111	Anatomy and Physiology : Animal Health I		12	MC	Faculty of Natural and Agricultural Sciences
AHVM112 Phasing out 30/12/23 (Replaced by AHLH111)	AHVM112	Animal Handling and Equipment I		8	MC	Faculty of Natural and Agricultural Sciences
AHVM121 Phasing out 30/12/23 (Replaced by AHLH123)	AHVM121	Basic Microbiology for Animal Health		12	MC	Faculty of Natural and Agricultural Sciences
AHVM122 Phasing out 30/12/23 (Replaced by AHLH122)	AHVM122	Anatomy and Physiology : Animal Health II	AHVM111	12	MC	Faculty of Natural and Agricultural Sciences
AHVM123 Phasing out 30/12/23 (Replaced by AHLH121)	AHVM123	Animal Handling and Equipment II	AHVM111, 112 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHVM211 (Replaced by AHLH124)	AHVM211	Diseases I		16	MC	Faculty of Natural and Agricultural Sciences
AHVM212 Phasing out 30/12/23 (Replaced by AHLH212)	AHVM212	Parasitology for Animal Health	AHVM111, 122 **&** AHVM213	8	MC	Faculty of Natural and Agricultural Sciences
AHVM213 Phasing out 30/12/23	AHVM213	Diseases I	AHVM111, 122, 121	12	MC	Faculty of Natural and Agricultural Sciences
AHVM214 Phasing out 30/12/23 (Replaced by AHLH213)	AHVM214	Pathology I	AHVM111, 122, 121	8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHVM222 Phasing out 30/12/23 (Replaced by AHLH222)	AHVM222	Obstetrics and Genital Diseases: Animal Health	AHVM111, 122 **&** AHVM213 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHVM223 Phasing out 30/12/23 (Replaced by AHLH224)	AHVM223	Pharmacology and Toxicology: Animal Health	AHVM111, 122 **&** AHVM213 (40%)	16	MC	Faculty of Natural and Agricultural Sciences
AHVM224 Phasing out 30/12/23 (Replaced by AHLH313)	AHVM224	Public Health for Animal Health		8	MC	Faculty of Natural and Agricultural Sciences
AHVM225 Phasing out 30/12/23 (Replaced by AHLH226)	AHVM225	Clinical Laboratory Techniques	AHVM111, 122, 121 **&** AHVM213, 212 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHVM226 Phasing out 30/12/23 (Replaced by ALH123)	AHVM226	Basic Microbiology (Animal Science)	AHVM121	16	MC	Faculty of Natural and Agricultural Sciences
AHVM227 Phasing out 30/12/23	AHVM227	Diseases II		12	MC	Faculty of Natural and Agricultural Sciences
AHVM228 Phasing out 30/12/23 (Replaced by AHLH223)	AHVM228	Pathology II	AHVM111, 122, 121 **&** AHVM213, 214 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
AHVM316 Phasing out 30/12/23	AHVM316	Companion Animal Clinical Care for AHT I		12	MC	Faculty of Natural and Agricultural Sciences
AHVM317 Phasing out 30/12/23 (Replaced by AHLH372)	AHVM317	Production Animal Clinical Care for AHT I		12	MC	Faculty of Natural and Agricultural Sciences
AHVM318 Phasing out 30/12/23 (Replaced by AHLH312)	AHVM318	Epidemiology	AHVM111, 122, 121 **&** AHVM213, 221, 212, 225	8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
AHVM319 Phasing out 30/12/23 (Replaced by AHLH321)	AHVM319	Practical Experiential Learning I		12	MC	Faculty of Natural and Agricultural Sciences
AHVM324 Phasing out 30/12/23 (Replaced by AHLH322)	AHVM324	Scheduled Diseases	AHVM111, 122, 121 **&** AHVM213, 221, 212, 225	8	MC	Faculty of Natural and Agricultural Sciences
AHVM326 AHVM322 Phasing out 30/12/23 Replaced by AHLH371 & AHLH323)	AHVM328	Companion Animal Clinical Care for AHT II		12	MC	Faculty of Natural and Agricultural Sciences
AHVM327 Phasing out 30/12/23 (Replaced by AHLH372)	AHVM328	Production Animal Clinical Care for AHT II		12	MC	Faculty of Natural and Agricultural Sciences
AHVM328 Phasing out 30/12/23 (Replaced by AHLH374)	AHVM328	Practical Experiential Learning II		12	MC	Faculty of Natural and Agricultural Sciences
ANDM121	ANDM121	Introduction to Animal Science		12	MC	Faculty of Natural and Agricultural Sciences
ANDM122	ANDM122	Non–Ruminant Production		8	MC	Faculty of Natural and Agricultural Sciences
ANDM211	ANDM211	Animal Nutrition	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM212	ANDM212	Animal Genetics and Breeding		8	MC	Faculty of Natural and Agricultural Sciences
ANDM213	ANDM213	Ruminant Animal Production		8	MC	Faculty of Natural and Agricultural Sciences

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Animal Health & Animal Science						
ANDM221	ANDM221	Small Stock Production and Management	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM223	ANDM223	Beef Production and Management	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM225	ANDM225	Principles of Veld Management		16	MC	Faculty of Natural and Agricultural Sciences
ANDM226		Grazing Management		16	MC	Faculty of Natural and Agricultural Sciences
ANDM312	ANDM312	Poultry Production and Management	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM313	ANDM313	Dairy Production and Management	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM314	ANDM314	Pig Production and Management	ANDM121	16	MC	Faculty of Natural and Agricultural Sciences
ANDM321	ANDM321	Practical Animal Production	ANDM121 **&** ANDM221, 223 **&** ANDM312, 313, 314 (40%)	56	MC	Faculty of Natural and Agricultural Sciences
ANSM121	ANSM121	Introduction to Agricultural Biometry		12	MC	Faculty of Natural and Agricultural Sciences
ANSM211	ANSM211	Introduction to Animal Science		16	MC	Faculty of Natural and Agricultural Sciences
ANSM214	ANSM214	Ruminant Production Science		8	MC	Faculty of Natural and Agricultural Sciences
ANSM223	ANSM223	Animal Nutrition		16	MC	Faculty of Natural and Agricultural Sciences

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Animal Health & Animal Science						
ANSM224	ANSM224	Non-Ruminant Production		8	MC	Faculty of Natural and Agricultural Sciences
ANSM226		Animal Breeding and Genetics		12	MC	Faculty of Natural and Agricultural Sciences
ANSM311	ANSM311	Principles of Veld Management		16	MC	Faculty of Natural and Agricultural Sciences
ANSM312	ANSM312	Applied Agricultural Biometry	ANSM121	16	MC	Faculty of Natural and Agricultural Sciences
ANSM313		Agricultural Biochemistry		8	MC	Faculty of Natural and Agricultural Sciences
ANSM314	ANSM314	Physiology of Reproduction and Growth	AHPM212 **&** AHPM221	16	MC	Faculty of Natural and Agricultural Sciences
ANSM321		Applied Ruminant Nutrition	ANSM211 **&** ANSM223	16	MC	Faculty of Natural and Agricultural Sciences
ANSM322	ANSM322	Planted Pastures and Fodder Crops		8	MC	Faculty of Natural and Agricultural Sciences
ANSM323	ANSM323	Quantitative Genetics		16	MC	Faculty of Natural and Agricultural Sciences
ANSM326		Small Ruminant Production Science	ANSM211 (40%)	12	MC	Faculty of Natural and Agricultural Sciences
Phasing Out (Replaced by ANSM416)	ANSM411	Applied Mono gastric Nutrition		16	MC	Faculty of Natural and Agricultural Sciences
Phasing Out	ANSM412	Applied Animal Breeding	ANSM323	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Animal Health & Animal Science						
Phasing Out (Replaced by ANSM479)	ANSM413	Research Project and Seminar I		16	MC	Faculty of Natural and Agricultural Sciences
Phasing Out (Replaced by ANSM415)	ANSM414	Large Stock Production and Science		8	MC	Faculty of Natural and Agricultural Sciences
ANSM415		Beef Production Science	ANSM211	12	MC	Faculty of Natural and Agricultural Sciences
ANSM416		Applied Non-Ruminant Nutrition	ANSM223	16	MC	Faculty of Natural and Agricultural Sciences
ANSM421 (Replaced by ANSM479)		Research Project and Seminar I		16	MC	Faculty of Natural and Agricultural Sciences
ANSM423	ANSM423	Practical Experience		8	MC	Faculty of Natural and Agricultural Sciences
Phasing Out	ANSM424	Poultry Science		16	MC	Faculty of Natural and Agricultural Sciences
ANSM426		Pig Production Science	ANSM211	12	MC	Faculty of Natural and Agricultural Sciences
ANSM427		Poultry Production Science	ANSM211	12	MC	Faculty of Natural and Agricultural Sciences
ANSM428		Dairy Production Sciences	ANSM313 **&** 314	12	MC	Faculty of Natural and Agricultural Sciences
ANSM479		Research Project		32	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Applied Mathematics / *Toegepaste Wiskunde*						
APPM111	APMM117	Introduction to Mechanics	Gr12 Mathematics Level 5	12	MC VC	Faculty of Natural and Agricultural Sciences
APPM121 (B.Eng Pogramme)	TGWN121 (BEng)	Statics and Mathematical Modelling/ *Statika en Wiskundige Modellering*	MTHS111 (40%) **&** NPHY111 (40%)	12	PC	Faculty of Natural and Agricultural Sciences
APPM122	TGWN122 (BSc)/ APMM127	Mathematical Modelling and Vector Algebra/ *Wiskundige Modellering en Vektoralgebra*	MTHS111 (40%) **&** NPHY111 (40%) **OR / OF** APPM111 (40%)	12	MC PC VC	Faculty of Natural and Agricultural Sciences
APPM171	APPM171	Introduction to Mechanics		12	MC	Faculty of Natural and Agricultural Sciences
APPM172	APPM172	Mathematical Modelling and Vector Algebra	APPM171	12	MC	Faculty of Natural and Agricultural Sciences
APPM211	TGWN211	Dynamics I/ *Dinamika I*	MTHS111, MTHS121 **&** APPM121 **OR / OF** APPM122	8	PC	Faculty of Natural and Agricultural Sciences
APPM212	TGWN213/ Part of APMM217	Differential Equations/ *Differensiaalvergelykings*	MTHS111 **&** MTHS121	8	PC	Faculty of Natural and Agricultural Sciences
APPM213	Part of APMM227	Linear Programming	MTHS111, MTHS121 **&** APPM121 **OR / OF** APPM122	8	MC	Faculty of Natural and Agricultural Sciences
APPM221	TGWN221	Dynamics II/ *Dinamika II*	APPM212 (40%) **&** APPM121 **OR / OF** APPM122	8	PC	Faculty of Natural and Agricultural Sciences
APPM222	TGWN223/ Part of APMM217	Numerical Methods/ *Numeriese Metodes*	MTHS111 **&** MTHS121	8	MC PC VC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Applied Mathematics / *Toegepaste Wiskunde*						
APPM223	Part of APMM227	Mathematical Methods	MTHS211 (40%) **&** MTHS212 (40%) **&** ***one of*** APPM212 (40%) **OR/ OF** APPM213 (40%)	8	MC	Faculty of Natural and Agricultural Sciences
APPM311	TGWN311/ APMM318	Partial Differential Equations/ *Parsiële Differensiaalvergelykings*	MTHS221 **OR / OF** MTHS223 **&** APPM212	16	MC PC	Faculty of Natural and Agricultural Sciences
APPM312	TGWN312	Numerical Methods for Partial Differential Equations/ *Numeriese Metodes vir Parsiële Differensiaalvergelykings*	APPM222**,** MTHS211 **&** MTHS212	16	PC	Faculty of Natural and Agricultural Sciences
APPM313	APMM328	Numerical Analysis	APPM222, MTHS211 **&** MTHS212	16	MC	Faculty of Natural and Agricultural Sciences
APPM321	TGWN323	Dynamical Systems/ *Dinamiese Stelsels*	APPM212, MTHS211 **&** MTHS222 **OR/ *OF*** MTHS224	16	PC	Faculty of Natural and Agricultural Sciences
APPM322	TGWN322/ APMM317	Optimisation/ *Optimalisering*	MTHS211 **&** MTHS212 **And one of the following:** APPM211 **OR / OF** APPM213 **OR / OF** MTHS224	16	MC PC	Faculty of Natural and Agricultural Sciences
APPM323	APMM327	Fluid Mechanics/ *Vloeimeganika*	APPM212 **OR / OF** APPM223 **&** MTHS221 **OR / OF** MTHS223 **&** MTHS222 **OR / OF** MTHS224	16	MC PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Biochemistry/ *Biochemie*						
BCDT311		Nutritional Biochemistry/ *Voedingsbiochemie*		12	PC	Faculty of Health Sciences
BCHF215		Biochemistry for Health Sciences/ *Biochemie vir Gesondheids-wetenskappe*		16	PC	Faculty of Health Sciences
IBCH221		Clinical Biochemistry/ *Kliniese Biochemie*		8		Faculty of Health Sciences
BCHN213	BCHN213	Introductory Biochemistry/ *Inleidende Biochemie*	NCHE111 **&** NCHE121	16	MC PC	Faculty of Natural and Agricultural Sciences
BCHN214		Biochemistry for Animal Health		8	MC	Faculty of Natural and Agricultural Sciences
BCHN222	BCHN222	Metabolism/ *Metabolisme*	NCHE111 **&** NCHE121	16	MC PC	Faculty of Natural and Agricultural Sciences
BCHS316	BCHS316	Enzymology/ *Ensimologie*	BCHN213 **&** BCHN222	16	MC PC	Faculty of Natural and Agricultural Sciences
BCHS317	BCHS317	Molecular Biology/ *Molekulêre Biologie*	BCHN213 **&** MCBN121	16	MC PC	Faculty of Natural and Agricultural Sciences
BCHS321	BCHS321	Analytical Biochemistry/ *Analitiese Biochemie*	MCBN111 **&** BCHN222	16	MC PC	Faculty of Natural and Agricultural Sciences
BCHS322	BCHS322	Biochemistry Research Project/ *Biochemie Navorsingsprojek*	BCHN213 **&** BCHN222	16	MC PC	Faculty of Natural and Agricultural Sciences
MCBN111		Molecular and Cell Biology I/ *Molekulêre en Selbiologie I*	Mathematics	12	MC PC	Faculty of Natural and Agricultural Sciences
MCBN121		Molecular and Cell Biology II/ *Molekulêre en Selbiologie II*	Mathematics	12	MC PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Biochemistry/ *Biochemie*						
MCBN171	MCBN171	Introduction to Molecular & Cell Biology I		12	MC	Faculty of Natural and Agricultural Sciences
MCBN172	MCBN172	Introduction to Molecular & Cell Biology II	MCBN171	12	MC	Faculty of Natural and Agricultural Sciences
Business Management / *Ondernemingsbestuur*						
BMAN111	BMAN111	Introduction to Business Management/ *Inleiding tot Ondernemingsbestuur*		12	PC	Faculty of Economic and Management Sciences
BMAN121		General Management / *Algemene Bestuur*		12	PC	Faculty of Economic and Management Sciences
BMAN223		Problem Solving for Managers/ *Probleemoplossing vir Bestuurders*		16	PC VC	Faculty of Economic and Management Sciences
Business Mathematics and Informatics / *Bedryfswiskunde en Informatika*						
BWIA111	BWIA111	Introduction to Financial Mathematics/ *Inleiding tot Finansiële Wiskunde*		12	PC VC	Faculty of Natural and Agricultural Sciences
BWIA121	BWIA121	Introduction to Actuarial Science/ *Inleiding tot Aktuariële Wetenskap*	BWIA111 (40%) **&** MTHS111 (40%)	12	PC VC	Faculty of Natural and Agricultural Sciences
BWIA272		Financial Mathematics/ *Finansiële Wiskunde*	BWIA121 **&** MTHS121	24	PC	Faculty of Natural and Agricultural Sciences
BWIA273	BWIA273	Basics of Financial Mathematics / *Basiese Finansiële Wiskunde*	BWIA121 **&** MTHS121	16	PC VC	Faculty of Natural and Agricultural Sciences
BWIA313	BWIA313	Actuarial Statistical Models/ *Aktuariële Statistiese Modelle*	BWIA271 **OR / OF** BWIA272 **OR / OF** BWIA273	24	PC VC	Faculty of Natural and Agricultural Sciences
BWIA314	BWIA314	Stochastic Processes/ *Stogastiese Prosesse*	BWIA271 **OR / OF** BWIA272	12	PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Business Mathematics and Informatics / *Bedryfswiskunde en Informatika*						
BWIA324	BWIA324	Survival Models/ *Oorlewingsmodelle*	BWIA271 **OR / OF** BWIA272	12	PC	Faculty of Natural and Agricultural Sciences
BWIA371	BWIA371	Contingencies/ *Gebeurlikhede*	BWIA271 **OR / OF** BWIA272	32	PC	Faculty of Natural and Agricultural Sciences
BWIN321	BWIN321	BMI Project: Capital Markets Modelling and Analysis/ *Bedryfswiskunde Projek: Effektebeurs Modellering en Analise*	BWIA111 **&** MTHS111	16	PC VC	Faculty of Natural and Agricultural Sciences
Computer Science and Information Systems / *Rekenaarwetenskap en Inligtingstelsels*						
CMPG111	ITRW111	Introduction to Computing and Programming/ *Inleiding tot Rekenaarwese en Programmering*		12	MC PC VC	Faculty of Natural and Agricultural Sciences
Note: CMPG115 cannot be recognized as a replacement for CMPG111. ***Nota:*** *CMPG115 kan nie in die plek van CMPG111 erken word nie.*						
CMPG112	ITRW112 CISM112	Introduction to End User Computing/ *Inleiding tot Rekenaareindgebruik*		12	PC VC	Faculty of Natural and Agricultural Sciences
CMPG115	ITRW115	Programming for Engineers/ *Programmering vir Ingenieurs*		12	PC	Faculty of Natural and Agricultural Sciences
CMPG121	ITRW124/ CISM122	Structured Programming/ *Gestruktureerde Programmering*	CMPG111 **OR / OF** CMPG115 (40%)	12	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG122	ITRW123	User Interface Programming/ *Gebruikerskoppelvlak-programmering*	CMPG111 **OR / OF** CMPG115 (40%)	Q	MC PC	Faculty of Natural and Agricultural Sciences
CMPG171	CMPG171	Introduction to Computing and Programming		12	MC	Faculty of Natural and Agricultural Sciences
CMPG172	CMPG172	Structured Programming	CMPG171	12	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Computer Science and Information Systems / *Rekenaarwetenskap en Inligtingstelsels*						
CMPG211	ITRW212/ CISM214	Object Oriented Programming/ *Objekgeoriënteerde Programmering*	CMPG121	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG212	ITRW211	Apps and Advanced User Interface Programming / *Toepassings en Gevorderde Gebruikerkoppelvlak-programmering*	CMPG122	8	PC VC	Faculty of Natural and Agricultural Sciences
CMPG213	ITRW213	Systems Analysis and Design I/ *Stelselontleding en Ontwerp I*	CMPG121 **OR / OF** CMPG122	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG214	ITRW315	Communication Skills/ *Kommunikasie-vaardighede*	CMPG121 **OR / OF** CMPG122	8	PC VC	Faculty of Natural and Agricultural Sciences
CMPG215		Information Security/ *Inligtingsekuriteit*	CMPG121 **OR / OF** CMPG122	8	PC VC	Faculty of Natural and Agricultural Sciences
CMPG221	ITRW222/ CISM213	Data Structures and Algorithms/ *Datastrukture en Algoritmes*	CMPG211 (40%)	8	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG222		Data Analytics/ *Data Analise*	MTHS111/ 112/ 113/ 114/ 123 **OR/ *OF*** STTN121 **&** CMPG111/ 112	8	PC VC	Faculty of Natural and Agricultural Sciences
CMPG223	ITRW225	System Analysis and Design II/ *Stelselontleding en Ontwerp II*	CMPG213 (40%)	16	MC VC PC	Faculty of Natural and Agricultural Sciences
CMPG224	CISM226 (CMPG224)	Introduction to Software Engineering	CMPG121	8	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Computer Science and Information Systems / *Rekenaarwetenskap en Inligtingstelsels*						
CMPG311	ITRW311	Databases/ *Databasisse*	CMPG221 **OR / OF** CMPG223	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG312	ITRW214	Decision Support Systems I/ *Besluitsteunstelsels I*	MTHS111/ 113/ 123/ 112	16	PC VC	Faculty of Natural and Agricultural Sciences
CMPG313	ITRW317/ CISM326	Artificial Intelligence/ *Kunsmatige Intelligensie*	CMPG221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG315	ITRW322/ CISM327	Computer Networks/ *Rekenaarnetwerke*	CMPG221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG321	ITRW321	Advanced Databases/ *Gevorderde Databasisse*	CMPG311 (40%)	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG322	ITRW325	Decision Support Systems II/ *Besluitsteunstelsels II*	CMPG312 (40%)	16	PC VC	Faculty of Natural and Agricultural Sciences
CMPG323	ITRW324	IT Developments/ *IT-Ontwikkelings*	CMPG221 **&** CMPG311 (40%)	16	PC VC	Faculty of Natural and Agricultural Sciences
CMPG324	ITRW316	Operating Systems/ *Bedryfstelsels*	CMPG221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
CMPG325		Computer Networks/ *Rekenaarnetwerke*	CMPG221	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Extended programmes VC IT codes / *Verlengde programme VK IT kodes*						
ITSP111	ITSP111	Introduction to Problem Solving/ *Inleiding tot Probleemoplossing*		12	VC	Faculty of Natural and Agricultural Sciences
ITSP113	ITSP113	Introduction to Graphical Interface Programming/ *Inleiding tot Grafiese Koppelvlak-programmering*		16	VC	Faculty of Natural and Agricultural Sciences
ITSP114	ITSP114	Introduction to Object Oriented Programming/ *Inleiding tot Objekgeöriënteerde Programmering*		16	VC	Faculty of Natural and Agricultural Sciences
ITSP121	ITSP121	Introductory Programming Principles/ *Inleidende Programmerings-beginsels*		12	VC	Faculty of Natural and Agricultural Sciences
Agriculture / *Landbou*						
CSDM111	CSDM111	Botany for Agriculture		12	MC	Faculty of Natural and Agricultural Sciences
CSDM121	CSDM121	Introduction to Crop Production		12	MC	Faculty of Natural and Agricultural Sciences
CSDM211	CSDM211	Introduction to Soil Science		16	MC	Faculty of Natural and Agricultural Sciences
CSDM212	CSDM212	Agricultural Climatology		12	MC	Faculty of Natural and Agricultural Sciences
CSDM213	CSDM213	Farm Machinery		8	MC	Faculty of Natural and Agricultural Sciences
CSDM215	CSDM215	Vegetable Production	CSDM121	8	MC	Faculty of Natural and Agricultural Sciences

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Agriculture / *Landbou*						
CSDM221	CSDM221	Principles of Crop Improvement	CSDM111	16	MC	Faculty of Natural and Agricultural Sciences
CSDM222	CSDM222	Soil Fertility & Fertilizers		16	MC	Faculty of Natural and Agricultural Sciences
CSDM223	CSDM223	Soil Conservation		12	MC	Faculty of Natural and Agricultural Sciences
CSDM224	CSDM224	Farm Practical II		8	MC	Faculty of Natural and Agricultural Sciences
CSDM225	CSDM225	Fruit Production	CSDM121	8	MC	Faculty of Natural and Agricultural Sciences
CSDM311	CSDM311	Agronomy of Summer Crops	CSDM211 **&** CSDM223	8	MC	Faculty of Natural and Agricultural Sciences
CSDM312	CSDM312	Plant Protection	CSDM215 **&** CSDM225	16	MC	Faculty of Natural and Agricultural Sciences
CSDM315	CSDM315	Pedology and Soil Classification	CSDM211 **&** CSDM222	8	MC	Faculty of Natural and Agricultural Sciences
CSDM321	CSDM321	Agronomy of Winter Crops	CSDM211 **&** CSDM223	8	MC	Faculty of Natural and Agricultural Sciences
CSDM322	CSDM322	Weeds & Weed Control	CSDM215 **&** CSDM225	16	MC	Faculty of Natural and Agricultural Sciences
CSDM323	CSDM323	Elements of Agricultural Microbiology	CSDM111	16	MC	Faculty of Natural and Agricultural Sciences
CSDM324	CSDM324	Elementary Irrigation	CSDM211 **&** CSDM223	16	MC	Faculty of Natural and Agricultural Sciences

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Agriculture / *Landbou*						
CSDM371		Practical Crop Production	CSDM224	16	MC	Faculty of Natural and Agricultural Sciences
CSPS411	CSPS411	Advanced Plant Breeding	CSPM326 **&** ANSM312	16	MC	Faculty of Natural and Agricultural Sciences
CSPS412	CSPS412	Horticultural Science	CSPM313 **&** CSPM323	12	MC	Faculty of Natural and Agricultural Sciences
CSPM211	CSPM211	Introduction to Soil Science	MCHE114 **&** MCHE121	16	MC	Faculty of Natural and Agricultural Sciences
CSPM212	CSPM212	Agricultural Climatology		12	MC	Faculty of Natural and Agricultural Sciences
CSPM213	CSPM213	Farm Machinery		8	MC	Faculty of Natural and Agricultural Sciences
CSPM221	CSPM221	Introduction to Crop Production		16	MC	Faculty of Natural and Agricultural Sciences
CSPM222	CSPM222	Soil Fertility & Fertilizers	MCHE114 **&** MCHE121	16	MC	Faculty of Natural and Agricultural Sciences
CSPM223	CSPM223	Soil Conservation	MCBN111 **&** MCBN121	12	MC	Faculty of Natural and Agricultural Sciences
CSPM225	CSPM225	Agricultural Microbiology	MCBN111 **&** MCBN121	12	MC	Faculty of Natural and Agricultural Sciences
CSPM311	CSPM311	Agronomy of Summer Crops	CSPM211 **&** CSPM221	8	MC PC	Faculty of Natural and Agricultural Sciences
CSPM313	CSPM313	Vegetable Production	CSPM221 **&** CSPM222	16	MC PC	Faculty of Natural and Agricultural Sciences

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Agriculture / *Landbou*						
CSPM315	CSPM315	Plant Physiology		8	PC	Faculty of Natural and Agricultural Sciences
CSPM317	CSPM317	Plant Pathology and Nematology	CSPM221	12	MC	Faculty of Natural and Agricultural Sciences
CSPM319	CSPM319	Agricultural Entomology	CSPM221	8	MC	Faculty of Natural and Agricultural Sciences
CSPM321	CSPM321	Agronomy of Winter Crops	CSPM211 **&** CSPM221	8	MC PC	Faculty of Natural and Agricultural Sciences
CSPM322	CSPM322	Weeds and Weed Control	CSPM221	16	MC	Faculty of Natural and Agricultural Sciences
CSPM323	CSPM323	Fruit Production	CSPM221	16	MC	Faculty of Natural and Agricultural Sciences
CSPM324	CSPM324	Principles of Irrigation	CSPM211 **&** CSPM221	16	MC PC	Faculty of Natural and Agricultural Sciences
CSPM325	CSPM325	Plant Physiology (only MC)	CSPM221	8	MC	Faculty of Natural and Agricultural Sciences
CSPM326	CSPM326	Principles of Genetics & Plant Breeding	CSPM221	8	MC	Faculty of Natural and Agricultural Sciences
CSPM327	CSSS423	Soil Survey and Land Use Planning	CSPM211 **&** CSPM221	8	MC	Faculty of Natural and Agricultural Sciences
CSPM411	CSPM411	Crop Production Systems	CSPM311 **&** CSPM321	8	MC PC = 2022	Faculty of Natural and Agricultural Sciences
CSPM415	CSPM415	Pedology & Soil Classification	CSPM211	16	MC	Faculty of Natural and Agricultural Sciences

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Agriculture / *Landbou*						
CSPM416		Soil Physics	CSPM211	8	MC	Faculty of Natural and Agricultural Sciences
CSPM419		Soil Chemistry & Mineralogy	CSPM211 **&** CSPM222	12	MC	Faculty of Natural and Agricultural Sciences
CSPM421	CSPM421	Crop Physiology	CSPM325	16	MC	Faculty of Natural and Agricultural Sciences
CSPM425		Applied Crop Protection	CSPM317, CSPM319 **&** CSPM322	12	MC	Faculty of Natural and Agricultural Sciences
CSPM426		Soil Microbiology	CSPM225	12	MC	Faculty of Natural and Agricultural Sciences
CSPM474		Research Project and Seminar	ANSM312	32	MC	Faculty of Natural and Agricultural Sciences
CSPM479		Practical Crop Production Training		12	MC	Faculty of Natural and Agricultural Sciences
Zoology / *Dierkunde*						
DRKN211	DRKN211	Developmental Biology/ *Ontwikkelingsbiologie*	DRKS111 **&** DRKS121	16	PC	Faculty of Natural and Agricultural Sciences
DRKN321	DRKN321	Animal Parasitology/ *Dierparasitologie*	DRKN211, DRKS221 **&** DRKS311 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
DRKS111	DRKS111	Invertebrates/ *Invertebrate*		12	PC	Faculty of Natural and Agricultural Sciences
DRKS121	DRKS121	Chordates/ *Chordata*	DRKS111 (40%)	12	PC	Faculty of Natural and Agricultural Sciences

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Zoology / *Dierkunde*						
DRKS221	DRKS221	Comparative Animal Physiology/ *Vergelykende Dierfisiologie*	DRKS111 **&** DRKS121	16	PC	Faculty of Natural and Agricultural Sciences
DRKS311	DRKS311	Ecology/ *Ekologie*	DRKN211 **&** DRKS221	32	PC	Faculty of Natural and Agricultural Sciences
DRKS322	DRKS322	Ethology/ *Etologie*	DRKN211, DRKS221 **&** DRKS311 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
Economics / *Economics*						
ECON112	ECON111	Basic Micro-economics/ *Basiese Mikro-ekonomie*		12		Faculty of Economic and Management Sciences
ECON122	ECON121	Introduction to Macro-economics/ *Inleiding tot Makro-ekonomie*		12		Faculty of Economic and Management Sciences
ECON211		Macro-economics/ *Makro-ekonomie*	ECON122 **&** MTHS111/ 112/ 123/ 113 (40%) **OR / OF** STTN111 **&** 122 **/** STFM111 **OR / OF** STFM112 **OR / OF** STFM125 (40%)	16		Faculty of Economic and Management Sciences
ECON212		Macro-economic Applications	ECON112 **&** STFM111 **OR / OF** STFM112	16		Faculty of Economic and Management Sciences

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Economics / *Economics*						
ECON221		Micro-economics/ *Mikro-ekonomie*	ECON111/112 **&** MTHS111/ 112/ 123 **OR / OF** STTN111 **&** 122 **OR / OF** STFM111 **OR / OF** STFM112 **OR / OF** STFM125 (40%)	16		Faculty of Economic and Management Sciences
ECON222		Micro-economic Applications		16		Faculty of Economic and Management Sciences
ECON313		Monetary Economics		16		Faculty of Economic and Management Sciences
ECON314		Public Economics		16		Faculty of Economic and Management Sciences
ECON322		Development Economics/ *Ontwikkelings-ekonomie*		16		Faculty of Economic and Management Sciences
ECON325		Econometrics		16		Faculty of Economic and Management Sciences
Risk Management / *Risikobestuur*						
EKRP211	EKRP211	Introduction to Risk Management/ *Inleiding tot Risikobestuur*		16	PC VC	Faculty of Economic and Management Sciences
EKRP221	EKRP221	Investment Management/ *Beleggingsbestuur*		16	PC VC	Faculty of Economic and Management Sciences

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Risk Management / *Risikobestuur*						
EKRP311	EKRP311	Bank Risk Management/ *Bankrisikobestuur*		16	PC VC	Faculty of Economic and Managemen t Sciences
EKRP321	EKRP321	Financial Markets/ *Finansiële Markte*		16	PC VC	Faculty of Economic and Managemen t Sciences
Electronics						
ELYM115	ELYM115	Electricity, Magnetism and Circuits	AP2 26, Maths Level 5, Physical Science Level 4	12	MC	Faculty of Natural and Agricultural Sciences
ELYM127	ELYM127	Introduction to Electronics	APS 26, Maths Level 5, Physical Science Level 4	12	MC	Faculty of Natural and Agricultural Sciences
ELYM215	ELYM215	Analogue Electronics and Systems	ELYM115 **&** ELYM127 **OR/ *OF*** SFEM171 **&** SFEM172	16	MC	Faculty of Natural and Agricultural Sciences
ELYM227	ELYM227	Digital Electronics and Systems	ELYM115 **&** ELYM127 **OR/ *OF*** SFEM171 **&** SFEM172	16	MC	Faculty of Natural and Agricultural Sciences
ELYM315	ELYM315	Advanced Analogue Electronics	ELYM215 **&** ELYM227	16	MC	Faculty of Natural and Agricultural Sciences
ELYM316	ELYM316	Introduction to Signals and Systems	ELYM215 **&** ELYM227	16	MC	Faculty of Natural and Agricultural Sciences
ELYM327	ELYM327	Advanced Digital Techniques and Systems	ELYM215 **&** ELYM227	16	MC	Faculty of Natural and Agricultural Sciences

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Electronics						
ELYM328	ELYM328	Introduction to Microcontroller Systems	ELYM215 **&** ELYM227	16	MC	Faculty of Natural and Agricultural Sciences
SFEM171	SFEM171	Foundation Electricity, Magnetism and Circuits	Admission into the faculty with Grade 12 Mathematics and Physical Science	12	MC	Faculty of Natural and Agricultural Sciences
SFEM172	SFEM172	Introduction to Electronics	SFEM171	12	MC	Faculty of Natural and Agricultural Sciences
Financial Management / *Finansiële Bestuur*						
FINM271	FINM221	Introduction to Applied Financial Management/ *Inleiding tot Toegepaste Finansiële Bestuur*	ACCC121 (40%) **OR / OF** ACCF121 **&** MTHS112/ 123	18	PC VC	Faculty Of Economic and Managemen t Sciences
Physiology / *Fisiologie*						
FKLT331		Principles of Pharmacokinetics		8	PC	Faculty of Health Sciences
FLGX113	FLGX113	Introduction to Physiology/ *Inleiding tot Fisiologie*		12	PC	Faculty of Health Sciences
FLGX123	FLGX123	Membrane and Muscle Physiology/ *Membraan- en Spierfisiologie*	FLGX113	12	PC	Faculty of Health Sciences
FLGX213	FLGX213	Endocrine System and Digestion/ *Endokriene Stelsel en Spysvertering*	FLGX113	16	PC	Faculty of Health Sciences
FLGX223	FLGX223	Physiological Defence Mechanisms/ *Fisiologiese Verdedigings-meganismes*	FLGX113 & FLGX123	8	PC	Faculty of Health Sciences
FLGX224	FLGX224	Metabolism/ *Metabolisme*	FLGX113 & FLGX213	8	PC	Faculty of Health Sciences
FLGX312	FLGX312	Excretion/ *Uitskeiding*	FLGX113	8	PC	Faculty of Health Sciences

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Physiology / *Fisiologie*						
FLGX313	FLGX313	Respiration/ *Respirasie*	FLGX113	8	PC	Faculty of Health Sciences
FLGX317		Cardiovascular Physiology/ *Kardiovaskulêre Fisiologie*	FLGX113	8	PC	Faculty of Health Sciences
FLGX325	FLGX325	Neurophysiology/ *Neurofisiologie*	FLGX113	16	PC	Faculty of Health Sciences
FLGX328		Reproduction Physiology/ *Voortplantings-fisiologie*	FLGX113	8	PC	Faculty of Health Sciences
FLGX329		Cardiovascular Physiology Applications/ *Kardiovaskulêre Fisiologie Toepassings*	FLGX113	8	PC	Faculty of Health Sciences
Soil Science / *Grondkunde*						
GDKN121	GDKN121	Introduction to Soil Science/ *Inleidende Grondkunde*		12	PC	Faculty of Natural and Agricultural Sciences
GDKN211	GDKN211	Advanced Soil Science/ *Gevorderde Grondkunde*	GDKN121	16	PC	Faculty of Natural and Agricultural Sciences
GDKN221	GDKN221	Soil Degradation and Rehabilitation/ *Gronddegradasie en Rehabilitasie*	GDKN211 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
GDKN311		Soil Genesis and Classification/ *Grond Genese en Klassifikasie*		16	PC	Faculty of Natural and Agricultural Sciences
GDKN322		Soil Physics/ *Grondfisika*		16	PC	Faculty of Natural and Agricultural Sciences
***FIELD MAPPING DURING THE DECEMBER HOLIDAY OF THE 3RD YEAR IS A PREREQUISITE FOR 4TH YEAR REGISTRATION.** The field mapping include fieldwork and soil mapping with regards to the application of basic field techniques, sampling, soil mapping techniques, application of the South African taxonomic classification system, certain laboratory analysis of field samples, fertiliser applications, data interpretation and report writing.						

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Soil Science / *Grondkunde*						
***GDKN421**		Precision Farming/ *Presisieboerdery*		24	PC	Faculty of Natural and Agricultural Sciences
Geography / *Geografie*						
GEOG111	GGFS112	Introduction to Physical Geography/ *Inleiding tot Fisiese Geografie*		12	MC PC	Faculty of Natural and Agricultural Sciences
GEOG121	GGFS121	Introduction to Human Geography/ *Inleiding tot Menslike Geografie*		12	MC PC	Faculty of Natural and Agricultural Sciences
GEOG171	GEOG171	Introduction to Physical Geography		12	MC	Faculty of Natural and Agricultural Sciences
GEOG172	**GEOG172**	Introduction to Human Geography	GEOG171	12	MC	Faculty of Natural and Agricultural Sciences
GEOG211	**GGFS212**	Physical Geography/ *Fisiese Geografie*	GEOG111	16	MC PC	Faculty of Natural and Agricultural Sciences
GEOG212	GEOG212	Environmental Thermodynamics/ *Omgewings-termodinamika*	MTHS111 **OR / OF** MTHS121	8	MC PC	Faculty of Natural and Agricultural Sciences
GEOG221	GGFS222	Human Geography/ *Menslike Geografie*	GEOG121	16	MC PC	Faculty of Natural and Agricultural Sciences
GEOG311	GGFS312	GIS and Remote Sensing/ *GIS en Afstandwaarneming*	GEOG211 **&** GEOG221	32	MC PC	Faculty of Natural and Agricultural Sciences
GEOG321	GGFS322	Applied Geography/ *Toegepaste Geografie*	GEOG211, GEOG221 **&** GEOG311 (40%)	32	MC PC	Faculty of Natural and Agricultural Sciences

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Geology / *Geologie*						
GLGN112	GLGN112	Geology and the Environment/ *Geologie en die Omgewing*		12	PC	Faculty of Natural and Agricultural Sciences
GLGN122	GLGN122	South African Geology/ *Suid-Afrikaanse Geologie*	GLGN112 (40%)	12	PC	Faculty of Natural and Agricultural Sciences
GLGN211	GLGN211	Mineralogy and Igneous Petrology/ *Mineralogie en Stollingspetrologie*	GLGN112 **&** GLGN122	16	PC	Faculty of Natural and Agricultural Sciences
GLGN221	GLGN221	Sedimentology, Structural Geology and Neotechtonics/ *Sedimentologie, Struktuurgeologie en Neotektoniek*	GLGN112, GLGN122 **&** GLGN211 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
GLGN311	GLGN311	Metamorphic Petrology and Geochemistry/ *Metamorfe Petrologie en Geochemie*	GLGN211 **&** GLGN221	32	PC	Faculty of Natural and Agricultural Sciences
GLGN321	GLGN321	Hydrogeology/ *Hidrogeologie*	GLGN211, GLGN221 **&** GLGN311 (40%)	32	PC	Faculty of Natural and Agricultural Sciences
Indigenous Knowledge Systems						
NOTE 1	Year level 1 & 2: Compulsory Note 1 All first and second year modules are compulsory for all students					
NOTE 2	Year level 3: Candidates have the choice of electives modules Note 2 In year three 1st semester students must take the compulsory modules* and select 2 or 3 modules from the following to a total of 32 credits (see programme NAS.1.25.2)					
NOTE 3	Note 3 In year three 2nd semester students must take the compulsory module* and select 3 modules from the following (see programme NAS.1.25.2)					
NOTE 4	Year level 4: Candidates have the choice of electives modules Note 4 In year four 1st semester students must take the compulsory modules* and select 1 module from the following (see programme NAS.1.25.2)					

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Indigenous Knowledge Systems						
IKSA311 Note 2 MC	IKSA311 Note 2 MC	Impact of Climate Change on African Indigenous Food Security Systems	IKSM114	16	MC	Faculty of Natural and Agricultural Sciences
IKSA321 Note 3 MC	IKSA321 Note 3 MC	African Indigenous Agriculture and Sustainable Community Livelihood and Development in Southern Africa		16	MC	Faculty of Natural and Agricultural Sciences
IKSA322 Note 3 MC	IKSA322 Note 3 MC	Comparative African Indigenous Cultural, Bio-diversity and Heritage	IKSM224	16	MC	Faculty of Natural and Agricultural Sciences
IKSA323 Note 3 MC	IKSA323 Note 3 MC	Comparative African Indigenous and Western Food Security Systems	IKSM125	16	MC	Faculty of Natural and Agricultural Sciences
IKSA413 Note 4 MC	IKSA413 Note 4 MC	Indigenous Knowledge and Renewable Energy Sources for Sustainable Livelihood II		16	MC	Faculty of Natural and Agricultural Sciences
IKSC311 Note 2 MC	IKSC311 Note 2 MC	Comparative Western and African Indigenous Life Skills Education	ISKM115	16	MC	Faculty of Natural and Agricultural Sciences
IKSC312 Note 2 MC	IKSC312 Note 2 MC	Comparative African Indigenous and Western Peace and Conflict Resolution Approaches		16	MC	Faculty of Natural and Agricultural Sciences
IKSC321 Note 3 MC	IKSC321 Note 3 MC	African Traditional Governance and Democracy		16	MC	Faculty of Natural and Agricultural Sciences
IKSC322 Note 3 MC	IKSC322 Note 3 MC	African Indigenous Music and Dance		16	MC	Faculty of Natural and Agricultural Sciences
IKSC323 Note 3 MC	IKSC323 Note 3 MC	Gender in African Indigenous Arts and Culture		16	MC	Faculty of Natural and Agricultural Sciences

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Indigenous Knowledge Systems						
IKSC413 Note 4 MC	IKSC413 Note 4 MC	African Indigenous Music and Drama		16	MC	Faculty of Natural and Agricultural Sciences
IKSH311 Note 2 MC	IKSH311 Note 2 MC	Comparative Health Care Systems	IKSM213	8	MC	Faculty of Natural and Agricultural Sciences
IKSH312 Note 2 MC	IKSH312 Note 2 MC	African Indigenous Medicinal and Nutritional Significance of Living Organisms		16	MC	Faculty of Natural and Agricultural Sciences
IKSH314 Note 2 MC	IKSH314 Note 2 MC	Gender in African Indigenous Health Care Systems		8	MC	Faculty of Natural and Agricultural Sciences
IKSH321 Note 3 MC	IKSH321 Note 3 MC	African Indigenous Health Care Providers	IKSM113 **&** IKSM124	16	MC	Faculty of Natural and Agricultural Sciences
IKSH322 Note 3 MC	IKSH322 Note 3 MC	Indigenous Knowledge and Innovations in Public Health Care	IKSM113 **&** IKSM124	16	MC	Faculty of Natural and Agricultural Sciences
IKSH323	IKSH323 Note 3 MC	African Traditional Medicine and Health Care Systems II	IKSM113 **&** IKSM124			Faculty of Natural and Agricultural Sciences
IKSH411	IKSH411 Note 4 MC	African Traditional Medicine and Health Care Systems II		16	MC	Faculty of Natural and Agricultural Sciences
IKSM111 Note 1 MC	IKSM111 Note 1 MC	The Nature of Indigenous Knowledge Systems and Innovations		12	MC	Faculty of Natural and Agricultural Sciences
IKSM112 Note 1 MC	IKSM112 Note 1 MC	African Languages and Communication Systems		12	MC	Faculty of Natural and Agricultural Sciences
IKSM113 Note 1 MC	IKSM113 Note 1 MC	Introduction to Health Care Systems in Relation to Indigenous Knowledge Systems (IKS)		12	MC	Faculty of Natural and Agricultural Sciences

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Indigenous Knowledge Systems						
IKSM114 Note 1 MC	IKSM114 Note 1 MC	The Role of Indigenous Knowledge Systems in Climate Change		12	MC	Faculty of Natural and Agricultural Sciences
IKSM115 Note 1 MC	IKSM115 Note 1 MC	Introduction to African Indigenous Life Skills Education		12	MC	Faculty of Natural and Agricultural Sciences
IKSM121 Note 1 MC	IKSM121 Note 1 MC	A Historiography of African Science and Technology		12	MC	Faculty of Natural and Agricultural Sciences
IKSM122 Note 1 MC	IKSM122 Note 1 MC	Introduction to Tools of Indigenous Knowledge Management		12	MC	Faculty of Natural and Agricultural Sciences
IKSM123 Note 1 MC	IKSM123 Note 1 MC	The Use and Roles of Signs and Symbols in African Communities		12	MC	Faculty of Natural and Agricultural Sciences
IKSM124 Note 1 MC	IKSM124 Note 1 MC	The Nature and Roles of African Indigenous Health Care Providers		12	MC	Faculty of Natural and Agricultural Sciences
IKSM125 Note 1 MC	IKSM125 Note 1 MC	African Indigenous Food Security Systems		12	MC	Faculty of Natural and Agricultural Sciences
IKSM211 Note 1 MC	IKSM211 Note 1 MC	The Rights of Indigenous Peoples		12	MC	Faculty of Natural and Agricultural Sciences
IKSM212 Note 1 MC	IKSM212 Note 1 MC	African Cultural Astronomy		12	MC	Faculty of Natural and Agricultural Sciences
IKSM213 Note 1 MC	IKSM213 Note 1 MC	The Nature and Characteristics of African Indigenous Health Care Systems		12	MC	Faculty of Natural and Agricultural Sciences
IKSM214 Note 1 MC	IKSM214 Note 1 MC	African Indigenous Knowledge Development and Management		12	MC	Faculty of Natural and Agricultural Sciences

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Indigenous Knowledge Systems						
IKSM215 Note 1 MC	IKSM215 Note 1 MC	Implications of Intellectual Property Rights (IPR) on Indigenous Knowledge Systems (IKS)/Traditional Knowledge (TK)		12	MC	Faculty of Natural and Agricultural Sciences
IKSM221 Note 1 4MC	IKSM221 Note 1 4MC	African Indigenous Architecture and Design		12	MC	Faculty of Natural and Agricultural Sciences
IKSM222 Note 1 MC	IKSM222 Note 1 MC	African Indigenous Approaches to Peace and Conflict Resolution		12	MC	Faculty of Natural and Agricultural Sciences
IKSM223 Note 1 MC	IKSM223 Note 1 MC	Socio-Cultural Protocols Associated with African Traditional Medicine and Health Care Systems		12	MC	Faculty of Natural and Agricultural Sciences
IKSM224 Note 1 MC	IKSM224 Note 1 MC	African Indigenous Cultural, Bio-Diversity and Heritage		12	MC	Faculty of Natural and Agricultural Sciences
IKSM225 Note 1 MC	IKSM225 Note 1 MC	Foundations of African Indigenous Education		12	MC	Faculty of Natural and Agricultural Sciences
IKSM313 Compulsory MC	IKSM313 Compulsory MC	Theories of African Indigenous Community Innovation Systems for Sustainable Livelihood	IKSM111 **&** IKSM121	16	MC	Faculty of Natural and Agricultural Sciences
IKSM411* Compulsory MC	IKSM411* Compulsory MC	Basic Research Methods		16	MC	Faculty of Natural and Agricultural Sciences
IKSM412* Compulsory MC	IKSM412* Compulsory MC	Qualitative and Quantitative Research in IKS		16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Indigenous Knowledge Systems						
IKSM421* Compulsory MC	IKSM421* Compulsory MC	Internship and Research Project	IKSM411 & IKSM412	64	MC	Faculty of Natural and Agricultural Sciences
IKSS311 MC Note 2	IKSS311 MC Note 2	Introduction to African Ethno-mathematics	IKSM111, IKSM121 & IKSM122	16	MC	Faculty of Natural and Agricultural Sciences
IKSS312 MC note 2	IKSS312 MC note 2	Comparative African Indigenous and Western Science and Technology Systems	IKSM111 & IKSM121	16	MC	Faculty of Natural and Agricultural Sciences
IKSS321 Note 3 MC	IKSS321 Note 3 MC	African Indigenous Metallurgy I	IKSM111 & IKSM121	16	MC	Faculty of Natural and Agricultural Sciences
IKSS322 Note 3 MC	IKSS322 Note 3 MC	African Indigenous Ethno-mathematics II	IKSM111, IKSM121 & IKSS311	16	MC	Faculty of Natural and Agricultural Sciences
IKSS323 Note 3 MC	IKSS323 Note 3 MC	Comparative African Indigenous Textile Technologies	IKSM111 & IKSM121	16	MC	Faculty of Natural and Agricultural Sciences
IKSS324 Compulsory MC	IKSS324 Compulsory MC	Indigenous Knowledge and Renewable Energy Sources for Sustainable Livelihood I	IKSM111 & IKSM121	16	MC	Faculty of Natural and Agricultural Sciences
IKSS413 Note 4 MC	IKSS413 Note 4 MC	African Indigenous Metallurgy II	IKSS321	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Microbiology / *Mikrobiologie*						
MKBN121	MKBN121	Microbiology for Nursing/ *Mikrobiologie vir Verpleegkunde*		12	MC PC	Faculty of Natural and Agricultural Sciences
MKBN211	MKBN211 (PC) MKBS211 & MKBS212 (MC)	Introductory Microbiology/ *Inleidende Mikrobiologie*	NCHE111 & NCHE121	16	MC PC	Faculty of Natural and Agricultural Sciences
MKBS221	MKBS221 (PC)	Introductory Microbial Genetics, Virology and Immunology/ *Inleidende Mikrobiese Genetika, Virologie en Immunologie*	MKBN211 (40%)	16	MC PC	Faculty of Natural and Agricultural Sciences
MKBS313	MKBS313	Microbial Physiology/ *Mikrobiese Fisiologie*	MKBN211 & MKBS221	16	PC	Faculty of Natural and Agricultural Sciences
MKBS314	MKBS314	Recombinant DNA Technology and Industrial Microbiology/ *Rekombinante DNA Tegnologie & Industriële Mikrobiologie*	MKBN211 & MKBS221	16	PC	Faculty of Natural and Agricultural Sciences
MKBS316		Microbial Ecology	MKBN211 & MKBS221	16	MC	Faculty of Natural and Agricultural Sciences
MKBS317		Environmental Microbiology and Public Health	MKBN211 & MKBS221	16	MC	Faculty of Natural and Agricultural Sciences
MKBS325	MKBS325	Diversity and Ecology of Microorganisms/ *Diversiteit en Ekologie van Mikroörganismes*	MKBN211 & MKBS221	32	PC	Faculty of Natural and Agricultural Sciences
MKBS326		Industrial Microbiology and Biotechnology	MKBN211 & MKBS221	16	MC	Faculty of Natural and Agricultural Sciences
MKBS327		Virology and Immunology	MKBN211 & MKBS221	16	MC	Faculty of Natural and Agricultural Sciences

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Microbiology / *Mikrobiologie*						
MKBX213	MKBX213	Microbiology for Food and Nutrition/ *Mikrobiologie vir Voedsel en Voeding*		8	PC	Faculty of Natural and Agricultural Sciences
MKPN111	MKPN111	Microbiology (for Pharmacy)/ *Mikrobiologie (vir Farmasie)*		12	PC	Faculty of Natural and Agricultural Sciences
Mathematics / *Wiskunde*						
MTHS111	WISN111/ MAYM117	Introductory Algebra and Calculus I/ *Inleidende Algebra en Calculus I*	Gr12 Mathematics Level 5/ *Gr12 Wiskunde Vlak 5*	12	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS112	WISN112	Mathematical Techniques/ *Wiskundige Tegnieke*	Gr12 Mathematics Level 4/ *Gr12 Wiskunde Vlak 4* **Extended/ *Verlengde*** WISS112 **&** 122	12	PC VC	Faculty of Natural and Agricultural Sciences
MTHS113	WISN113	Basic Mathematical Techniques/ *Basiese Wiskundige Tegnieke*	Gr12 Mathematics Level 4/ *Gr12 Wiskunde Vlak 4*	12	PC VC	Faculty of Natural and Agricultural Sciences
MTHS114		Applied Calculus I/ *Toegepaste Calculus I*	Gr12 Mathematics Level 4/ *Gr12 Wiskunde Vlak 4*	12	MC PC	Faculty of Natural and Agricultural Sciences
MTHS115	MAYM115	Pre-Calculus for Science I	Gr12 Mathematics Level 3	12	MC	Faculty of Natural and Agricultural Sciences
MTHS119	CFMA111	Pre-Calculus for Commerce I	Gr12 Mathematics Level 3 **OR / OF** Mathematics Literacy 70%	12	MC VC	Faculty of Natural and Agricultural Sciences

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Mathematics / *Wiskunde*						
MTHS121	WISN121/ MAYM127	Introductory Algebra and Calculus II/ *Inleidende Algebra en Calculus II*	MTHS111 (40%)	12	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS123	WISN123	Mathematical Techniques/ *Wiskundige Tegnieke*	Gr12 Mathematics Level 4/ *Gr12 Wiskunde Vlak 4*	12	PC VC	Faculty of Natural and Agricultural Sciences
MTHS124		Applied Calculus II/ *Toegepaste Calculus II*	MTHS111 (40%) **OR / OF** MTHS114 (40%)	12	MC PC	Faculty of Natural and Agricultural Sciences
MTHS125	MAYM125	Pre-Calculus for Science II	MTHS115 (40%)	12	MC	Faculty of Natural and Agricultural Sciences
MTHS129	CFMA121	Pre-Calculus for Commerce II	MTHS119 (40%)	12	MC VC	Faculty of Natural and Agricultural Sciences
MTHS171		Introductory Algebra and Calculus I		12	MC	Faculty of Natural and Agricultural Sciences
MTHS172		Introductory Algebra and Calculus II	MTHS171	12	MC	Faculty of Natural and Agricultural Sciences
MTHS173		Applied Calculus I		12	MC	Faculty of Natural and Agricultural Sciences
MTHS174		Applied Calculus II	MTHS173	12	MC	Faculty of Natural and Agricultural Sciences
MTHS175		Foundation Mathematics II (Law Faculty, not FNAS)	Gr12 Mathematics Level 3 **OR / OF** Mathematics Literacy Level 5	16	MC	Faculty of Law

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Mathematics / *Wiskunde*						
MTHS221	WISN224/ 2nd Part of MAYM227	Multivariable Calculus II/ *Meerveranderlike Calculus II*	MTHS211 (40%)	8	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS222	WISN226/ 2nd Part of MAYM217	Linear Algebra II/ *Lineêre Algebra II*	MTHS212 (40%)	8	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS223	WISN225	Engineering Analysis/ *Ingenieursanalise*	MTHS211 (40%)	8	PC	Faculty of Natural and Agricultural Sciences
MTHS224	WISN227	Applied Linear Algebra/ *Toegepaste Lineêre Algebra*	MTHS212 (40%)	8	PC	Faculty of Natural and Agricultural Sciences
MTHS225	WISN223	Discrete Mathematics/ *Diskrete Wiskunde*	MTHS111 **OR / OF** MTHS112 **OR / OF** MTHS113 **OR / OF** MTHS123	8	PC VC	Faculty of Natural and Agricultural Sciences
MTHS311	WISN324 & MAYM317	Real Analysis/ *Reële Analise*	MTHS221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS312	WISN312	Combinatorics/ *Kombinatorika*	MTHS212 **&** MTHS221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS321	WISN314 & MAYM327	Complex Analysis/ *Komplekse Analise*	MTHS211 **&** MTHS221	16	MC PC VC	Faculty of Natural and Agricultural Sciences
MTHS322	WISN322 MAYM328	Algebraic Structures/ *Algebraïese Strukture*	MTHS212 **&** MTHS222	16	MC PC VC	Faculty of Natural and Agricultural Sciences

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Mathematics: Extended						
WISS111	WISS111	Introduction to Mathematics I/ *Inleiding tot Wiskunde I*	Gr12 Mathematics Level 3/ *Gr12 Wiskunde Vlak 3*	12	VC	Faculty of Natural and Agricultural Sciences
WISS113	WISS113	Introduction to Mathematical Techniques I/ *Inleiding tot Wiskundige Tegnieke I*	Gr12 Mathematics Level 3/ *Gr12 Wiskunde Vlak 3*	12	VC	Faculty of Natural and Agricultural Sciences
WISS121	WISS121	Introduction to Mathematics II/ *Inleiding tot Wiskunde II*	WISS111 (40%)	12	VC	Faculty of Natural and Agricultural Sciences
WISS123	WISS123	Introduction to Mathematical Techniques II/ *Inleiding tot Wiskundige Tegnieke II*	WISS113 (40%)	12	VC	Faculty of Natural and Agricultural Sciences

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Chemistry / *Chemie* **PC old code = CHEM/CHEN; MC old code = MCHE**						
NCHE111	Introductory Inorganic and Physical Chemistry/ *Inleidende Anorganiese en Fisiese Chemie*			12	MC PC	Faculty of Natural and Agricultural Sciences
	CHEM111	Introductory Inorganic and Physical Chemistry/ *Inleidende Anorganiese en Fisiese Chemie*		12	PC	Faculty of Natural and Agricultural Sciences
	MCHE114	Introductory Chemistry I		12	MC	Faculty of Natural and Agricultural Sciences
MCHE115	MCHE115	Introductory Chemistry		12	MC	Faculty of Natural and Agricultural Sciences
NCHE121	Introductory Organic Chemistry/ *Inleidende Organiese Chemie*			12	MC PC	Faculty of Natural and Agricultural Sciences
	CHEM121	Introductory Organic Chemistry/ *Inleidende Organiese Chemie*		12	PC	Faculty of Natural and Agricultural Sciences
	MCHE121	Introductory Chemistry II		12	MC	Faculty of Natural and Agricultural Sciences
NCHE171	SFCM171	Introductory Inorganic and Physical Chemistry/ *Inleidende Anorganiese en Fisiese Chemie*		12	MC	Faculty of Natural and Agricultural Sciences
NCHE172	SFCM172	Introductory Organic Chemistry/ *Inleidende Organiese Chemie*	NCHE171	12	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Chemistry / *Chemie* **PC old code = CHEM/CHEN; MC old code = MCHE**						
NCHE211	Analytical Chemistry II/ *Analitiese Chemie II*		NCHE111 **&** NCHE121 **OR/ OF** NCHE171 **&** NCHE172	8	MC PC	Faculty of Natural and Agricultural Sciences
	CHEN211	Analytical Chemistry II/ *Analitiese Chemie II*	NCHE111 **&** NCHE121 **OR/ OF** CHEM111 & CHEM121	8	PC	Faculty of Natural and Agricultural Sciences
	MCHE223	Analytical Chemistry I	NCHE171 **&** NCHE172 **OR/ OF** MCHE114 & 121 **or** SFCM171 & 172	8	MC	Faculty of Natural and Agricultural Sciences
NCHE212	Physical Chemistry II/ *Fisiese Chemie II*		NCHE111 **&** NCHE121 **OR/ OF** NCHE171 **&** NCHE172 **&** MTHS111 **&** MTHS121 **OR/ OF** MTHS114 **&** MTHS124	8	PC MC	Faculty of Natural and Agricultural Sciences
	CHEN212	Physical Chemistry II/ *Fisiese Chemie II*	NCHE111 & 121 **OR/ OF** NCHE171 & 172 **&** MTHS111 & 121 **OR/ *OF*** MTHS114 & 124 **OR/ *OF*** CHEM111 & 121 **or** MCHE11 & 121 **or** SFCM171 & 172 **&** WISN111 & 121	8	PC	Faculty of Natural and Agricultural Sciences
	MCHE215	Physical Chemistry I	NCHE171 & 172 **OR/ *OF*** MCHE114 & MCHE121 **OR/ *OF*** SFCM171 & SFCM172	8	MC	Faculty of Natural and Agricultural Sciences
NCHE213	CHEN213	Organic Chemistry II Pharmacy/ Biological Sciences/ *Organiese Chemie II Farmasie /Biologiese Wetenskappe*	NCHE111 **&** NCHE121 **OR/ *OF*** NCHE171 **&** NCHE172			Faculty of Natural and Agricultural Sciences

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Chemistry / *Chemie* **PC old code = CHEM/CHEN; MC old code = MCHE**						
NCHE221	Inorganic Chemistry II/ *Anorganiese Chemie II*		NCHE111 **&** NCHE121 **OR/ *OF*** NCHE171 **&** NCHE172	8	PC MC	Faculty of Natural and Agricultural Sciences
	CHEN222	Inorganic Chemistry II/ *Anorganiese Chemie II*	NCHE111 **&** NCHE121 **OR/ *OF*** CHEM111 & 121	8	PC	Faculty of Natural and Agricultural Sciences
	MCHE216	Inorganic Chemistry I	NCHE171 **&** NCHE172 **OR/ *OF*** MCHE114 **&** MCHE121 **or** SFCM171 **&** 172	8	MC	Faculty of Natural and Agricultural Sciences
NCHE222	Organic Chemistry II/ *Organiese Chemie II*		NCHE111 **&** NCHE121 **OR/ *OF*** NCHE171 **&** NCHE172	8	MC PC	Faculty of Natural and Agricultural Sciences
	CHEN223	Organic Chemistry II/ *Organiese Chemie II*	CHEM111 & CHEM121	8	PC	Faculty of Natural and Agricultural Sciences
	MCHE221	Organic Chemistry I	MCHE114 **or** MCHE121 **or** SFCM171 **&** SFCM172	8	MC	Faculty of Natural and Agricultural Sciences
NCHE311	Analytical Methods III/ *Analitiese Metodes III*		NCHE211 **OR/ *OF*** NCHE212	16	MC PC	Faculty of Natural and Agricultural Sciences
	CHEM311	Analytical Methods III/ *Analitiese Metodes III*	NCHE212 **OR/ *OF*** CHEN211	16	PC	Faculty of Natural and Agricultural Sciences
	MCHE316	Analytical Chemistry II	MCHE223	16	MC	Faculty of Natural and Agricultural Sciences

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Chemistry / *Chemie* **PC old code = CHEM/CHEN; MC old code = MCHE**						
NCHE312	Physical Chemistry III / *Fisiese Chemie III*		NCHE212	16	MC PC	Faculty of Natural and Agricultural Sciences
	CHEN312	Physical Chemistry III/ *Fisiese Chemie III*	NCHE212 **OR/ *OF*** CHEN212	16	PC	Faculty of Natural and Agricultural Sciences
	MCHE321	Physical Chemistry II	MCHE215 **or** PHYM118 **or** 124 **or** MAYM116 **or** 117, MAYM126 **or** 127	16	MC	Faculty of Natural and Agricultural Sciences
NCHE321	Inorganic Chemistry III/ *Anorganiese Chemie III*		NCHE221	16	MC PC	Faculty of Natural and Agricultural Sciences
	CHEN321	Inorganic Chemistry III/ *Anorganiese Chemie III*	NCHE221 **OR/ *OF*** CHEN222	16	PC	Faculty of Natural and Agricultural Sciences
	MCHE322	Inorganic Chemistry II	MCHE216	16	MC	Faculty of Natural and Agricultural Sciences
NCHE322	Organic Chemistry III/ *Organiese Chemie III*		NCHE222	16	MC PC	Faculty of Natural and Agricultural Sciences
	CHEN322	Organic Chemistry III/ *Organiese Chemie III*	NCHE222 **OR/ *OF*** CHEN223	16	PC	Faculty of Natural and Agricultural Sciences
	MCHE315	Organic Chemistry II	MCHE221	16	MC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Physics / *Fisika*						
NPHY111	FSKS111	Basic Physics I/ *Basiese Fisika I*		12	MC PC	Faculty of Natural and Agricultural Sciences
NPHY121	FSKS121	Basic Physics II/ *Basiese Fisika II*	NPHY111 (40%) **&** MTHS111 (40%)	12	MC PC	Faculty of Natural and Agricultural Sciences
NPHY123		Introduction to Physics	Admissions into Agriculture Degree Programme	12	MC	Faculty of Natural and Agricultural Sciences
NPHY124		Introduction to Basic Physics Concepts	Admissions into Agriculture Degree Programme	12	MC	Faculty of Natural and Agricultural Sciences
NPHY171	NPHY171	Basic Physics I		12	MC	Faculty of Natural and Agricultural Sciences
NPHY172	NPHY172	Basic Physics II	NPHY171 (40%) **&** MTHS171 (40%)	12	MC	Faculty of Natural and Agricultural Sciences
FSKS113	FSKS113	Physics for Biology I/ *Fisika vir Biologie I*		12	PC	Faculty of Natural and Agricultural Sciences
FSKS123	FSKS123	Physics for Biology II/ *Fisika vir Biologie II*	FSKS113 (40%) **OR/ *OF*** NPHY111 (40%)	12	PC	Faculty of Natural and Agricultural Sciences
NPHY211	FSKS211	Electricity and Magnetism / *Elektrisiteit en Magnetisme*	NPHY111/ NPHY171 **&** NPHY121/ NPHY172 **&** MTHS111	8	MC PC	Faculty of Natural and Agricultural Sciences
NPHY212	FSKS221	Modern Physics / *Moderne Fisika*	NPHY111/ NPHY171 **&** NPHY121/ NPHY172 **&** MTHS111 **&** MTHS121	8	MC PC	Faculty of Natural and Agricultural Sciences
NPHY221	FSKS222	Introductory Quantum Physics/ *Inleidende Kwantumfisika*	NPHY212 (40%) **&** MTHS211 (40%)	8	MC PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Physics / *Fisika*						
NPHY222	FSKS212	Optics and Waves/ *Optika en Golwe*	NPHY212 (40%) **&** MTHS211 (40%)	8	MC PC	Faculty of Natural and Agricultural Sciences
NPHY311	FSKS311	Electromagnetism/ *Elektromagnetisme*	NPHY211 **&** MTHS211	16	PC	Faculty of Natural and Agricultural Sciences
NPHY312	FSKS312	Wave Mechanics/ *Golfmeganika*	NPHY212, NPHY221, NPHY222 **&** MTHS211 **as well as one of:** MTHS221 **OR/ *OF*** MTHS223 **OR/ *OF*** MTHS212 **OR/ *OF*** MTHS222 **OR/ *OF*** MTHS224	16	MC PC	Faculty of Natural and Agricultural Sciences
NPHY321	FSKS321	Thermodynamics/ *Termodinamika*	NPHY312	16	PC	Faculty of Natural and Agricultural Sciences
NPHY322	FSKS322	Nuclear Physics and Elementary Particles/ *Kernfisika en Elementêre Deeltjies*	NPHY312 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
Agricultural Degree / *Landbougraad* (4th yr. modules 2022)						
OMSA422		Weeds: Interactions and Control/ *Onkruid: Interaksies en Beheer*		16	PC	Faculty of Natural and Agricultural Sciences
OMSA423		Plant Pathology / *Plant Patologie*		16	PC	Faculty of Natural and Agricultural Sciences
OMSE144		Agroecology		16	PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Agricultural Degree / *Landbougraad* (4th yr. modules 2022)						
OMSE474		Projects and Seminar/ *Navorsingsprojek en Seminaar*		32	PC	Faculty of Natural and Agricultural Sciences
OMWP411		Pest Phenology and Damage Symptoms/ Econometrics *Plaagfenologie en Skade-simptome/ Ekonometrie*		16	PC	Faculty of Natural and Agricultural Sciences
Botany / *Plantkunde*						
PLKS111	PLKS111	Plant Structure and Function/ *Plantstruktuur en -funksie*		12	MC PC	Faculty of Natural and Agricultural Sciences
PLKS122	PLKS121	Biodiversity/ *Biodiversiteit*	PLKS111 (40%)	12	MC PC	Faculty of Natural and Agricultural Sciences
PLKS171	PLKS171	Plant Structure and Function		12	MC	Faculty of Natural and Agricultural Sciences
PLKS172	PLKS172	Biodiversity	PLKS171	12	MC	Faculty of Natural and Agricultural Sciences
PLKS211	PLKS221 (closes Dec 2020)	Environmental Botany/ *Omgewings-plantkunde*	PLKS111 & PLKS122	16	MC PC	Faculty of Natural and Agricultural Sciences
PLKS223	PLKN213	Plant Genomics/ *Plantgenomika*	PLKS111 & PLKS122	16	MC PC	Faculty of Natural and Agricultural Sciences
PLKS314	PLKS312	Plant Physiology/ *Plantfisiologie*	PLKS223	32	MC PC	Faculty of Natural and Agricultural Sciences
PLKS324	PLKN323	Plant Ecology/ *Plantekologie*	PLKS211 & PLKS223	32	MC PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Urban and Regional Planning / *Stad- en Streeksbeplanning*						
SANL225		Urban Anthropology		16	PC	Faculty of Humanities
SBES212		Layout Planning/ *Uitlegbeplanning*	SBSS111, SBSS121 **&** GEOG111	16	PC	Faculty of Natural and Agricultural Sciences
SBES313		Infrastructure Planning *Infrastruktuur-beplanning*	SBES212 **&** SBSS223	16	PC	Faculty of Natural and Agricultural Sciences
SBRS221		Regional Plans/ *Streekplanne*	SBES212 (40%), ECON112 **&** ECON211	16	PC	Faculty of Natural and Agricultural Sciences
SBRS313		Regional Development Theory/ *Streekontwikkelings-teorie*	SBRS221 **&** ECON325 **&** MTHS114 **&** STTN111 **&** STTN124	16	PC	Faculty of Natural and Agricultural Sciences
SBRS411		Regional Analysis and Application/ *Streeksanalise en -toepassing*	SBRS313	16	PC	Faculty of Natural and Agricultural Sciences
SBSS111		Planning and Settlement History/ *Beplanning- en Nedersettings-Geskiedenis*	Admission requirements as described in N.1.6/ *Toelatings-vereistes soos in N.1.6 beskryf*	12	PC	Faculty of Natural and Agricultural Sciences
SBSS121		Introduction to Planning/ *Inleiding tot Beplanning*	SBSS111 (40%)	12	PC	Faculty of Natural and Agricultural Sciences
SBSS223		Urban Design/ *Stedelike Ontwerp*	SBES212 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
SBSS313		Planning for Sustainable Cities/ *Beplanning vir Volhoubare Stede*	SBSS223 **&** GEOG211	16	PC	Faculty of Natural and Agricultural Sciences
SBSS321		Transport Planning and Systems/ *Vervoerbeplanning en Stelsels*	SBES313 (40%) **&** SBRS313 (40%)	16	PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Urban and Regional Planning / *Stad- en Streeksbeplanning*						
SBSS323		Planning Theory/ *Beplanningsteorie*	SBSS313 (40%) **&** SBRS313 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
SBSS412		Integrated Housing Development/ *Geïntegreerde Behuisings-ontwikkeling*	SRSK323 **&** SBSS323	16	PC	Faculty of Natural and Agricultural Sciences
SBSS414		Land Use Planning and Development Policy/ *Grondgebruik-beplanning en Ontwikkelingsbeleid*	SBES313 **&** SBSS321	16	PC	Faculty of Natural and Agricultural Sciences
SBSS424		Strategic- and Participatory Planning/ *Strategiese- en Deelnemende Beplanning*	SANL225 **&** SBSS412 (40%) **&** SBSS414 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
SBSS472		Research Project / *Navorsingsprojek*	SBSS313 **&** SBRS313 **&** SBES313 **&** SBSS321 **&** SBSS323 **&** SECO321 **&** SRSK323 **&** GEOG311 **&** ECON322 **&** WVNS211 **&** WVNS221 **&** SANL225	32	PC	Faculty of Natural and Agricultural Sciences
SECO321		Urban Ecology for Planners/ *Stedelike Ekologie vir Beplanners*	SBSS313 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
SGSS414		Research Methodology for Geo- and Spatial Sciences/ *Navorsings-metodologie vir Geo- en Ruimtelike Wetenskappe*	SBSS323 **&** WVNS211 **&** WVNS221	16	PC	Faculty of Natural and Agricultural Sciences
SRSK323		Urban Risk Management/ *Stedelike Risikobestuur*	SBSS313 (40%) **&** GEOG311(40%)	16	PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Urban and Regional Planning / *Stad- en Streeksbeplanning*						
SSBP421		Planning Practice / *Beplanningspraktyk*	SBES313 **&** SBSS321 **&** SBSS414 (40%) **&** SBSS412 (40%) **&** SBRS411 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
Statistics / *Statistiek*						
STTN111	STTN111	Descriptive Statistics/ *Beskrywende Statistiek*		12	PC VC	Faculty of Natural and Agricultural Sciences
STTN115	STTN115	Descriptive Statistics and Inference/ *Beskrywende Statistiek en Inferensie*		12	PC VC	Faculty of Natural and Agricultural Sciences
STTN121	STTN121	Introductory Statistical Inference I/ *Inleidende Statistiese Inferensie I*	STTN111 (40%) **OR/ OF** STTN115 (40%) **OR/ OF** STTN122	12	PC VC	Faculty of Natural and Agricultural Sciences
STTN122		Introductory Statistics/ *Inleidende Statistiek*		12	PC	Faculty of Natural and Agricultural Sciences
STTN124	STTN124	Practical Statistics/ *Praktiese Statistiek*	STTN111 (40%) **OR/ OF** STTN115 **OR/ OF** STTN122	12	PC VC	Faculty of Natural and Agricultural Sciences
STTN125	STTN125	Introductory Probability Theory/ *Inleidende Waarskynlikheidsleer*	STTN111 (40%) **&** MTHS111 **OR/ OF** STTN115 (40%) **&** MTHS111 **OR/ OF** STTN122 (40%) **&** MTHS111	12	PC VC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Statistics / *Statistiek*						
STTK214	STTK214	Statistics for Life Sciences/ *Statistiek vir Lewenswetenskappe*		16	PC	Faculty of Natural and Agricultural Sciences
STTN215	STTN215	Probability and Sampling Theory/ *Waarskynlikheidsleer en Steekproefteorie*	STTN125 **&** MTHS121	16	PC VC	Faculty of Natural and Agricultural Sciences
STTN225	STTN225	Statistical Inference and Data Analysis/ *Statistiese Inferensie en Data-analise*	STTN215 (40%)	16	PC VC	Faculty of Natural and Agricultural Sciences
STTN316		Linear Models I/ *Lineêre Modelle I*	STTN225	24	PC VC	Faculty of Natural and Agricultural Sciences
STTN317		Statistical Software and Applications I/ *Statistiese Sagteware en Toepassings I*	STTN225	8	PC VC	Faculty of Natural and Agricultural Sciences
STTN326		Analysis of Dependent Data/ *Analise van Afhanklike Data*	STTN225	16	PC VC	Faculty of Natural and Agricultural Sciences
STTN327		Statistical Software and Applications II/ *Statistiese Sagteware en Toepassings II*	STTN317 (40%)	16	PC VC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Statistics (Extended)/ *Statistiek (Verlengde)*						
STTF115	STTF115	Descriptive Statistics/ *Beskrywende Statistiek*		12	VC	Faculty of Natural and Agricultural Sciences
STTF125	STTF125	Introductory Statistical Inference/ *Inleidende Statistiese Inferensie*	STTF115 (40%)	16	VC	Faculty of Natural and Agricultural Sciences
STTF215	STTF215	Practical Statistics/ *Praktiese Statistiek*	STTF125	16	VC	Faculty of Natural and Agricultural Sciences
STTF225	STTF225	Introduction to Probability/ *Inleiding tot Waarskynlikheidsleer*	STTF215 (40%) **&** MTHS111	16	VC	Faculty of Natural and Agricultural Sciences
Tourism / *Toerisme*						
TMBP111	TMBP111	Introduction to Tourism Management/ *Inleiding tot Toerismebestuur*		12	PC	Faculty of Natural and Agricultural Sciences
TMBP211	TMBP211	Applied Tourism Management/ *Toegepaste Toerismebestuur*		16	PC	Faculty of Natural and Agricultural Sciences
TMBP221	TMBP221	Tourism Marketing/ *Toerismebemarking*		16	PC	Faculty of Natural and Agricultural Sciences
TMBP312	TMBP312	Introduction to Event Management (Choice Module)/ *Inleiding tot Gebeurtenisbestuur*		16	PC	Faculty of Natural and Agricultural Sciences
TMBP313	TMBP311	Nature Tourism/ *Natuur-Toerisme*		16	PC	Faculty of Natural and Agricultural Sciences

Module Code / *Module-kode 2022*	←2021 Module Code/ *Modulekode*	Descriptive Name / *Beskrywende Naam*	Pre-Requisite Subject(s)/ *Voorvereiste Vak(ke)*	Cr/ *Kr*	Campus/ *Kampus*	Faculty/ *Fakulteit*
Tourism / *Toerisme*						
TMBP321	TMBP321	Game Farm Management/ *Wildplaasbestuur*	TMBP313 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
TMBP322 Choice Module/ Keuse-module	TMBP322	Applied Event Management/ *Toegepaste Gebeurtenisbestuur*	TMBP312 (40%)	16	PC	Faculty of Natural and Agricultural Sciences
Understand the World / *Verstaan die Wêreld*						
WVCS223	WVCS221	Understanding the Cultural World	**None**	12	MC	Faculty of Natural and Agricultural Sciences
WVLS317 Note 2 (IKS)	WVCS315* Note 2	Man and Society	**None**	16	MC	Faculty of Natural and Agricultural Sciences
WVES222	WVES221	Understanding the Economic World/ *Verstaan die Ekonomiese Wêreld*		12	PC VC	Faculty of Natural and Agricultural Sciences
WVES312	WVES311	Business Ethics/ *Besigheidsetiek*		12	PC VC	Faculty of Natural and Agricultural Sciences
WVNS211	WVNS211	Understanding the Natural World/ *Verstaan die Natuurlike Wêreld*		12	PC VC	Faculty of Natural and Agricultural Sciences
WVNS221	WVNS221	Science, Technology and Society/ *Wetenskap, Tegnologie en Samelewing*		12	PC VC	Faculty of Natural and Agricultural Sciences

NAS.1.14 PROGRAMMES NOT IN 2021 YEARBOOK/ *PROGRAMME NIE IN 2021 JAARBOEK*

PHASING OUT WITH PIPELINE STUDENTS (See Yearbook and Page for reference). All programmes listed below, are closed for applications. /

FASEER UIT MET PYPLYN STUDENTE *(Sien Jaarboek en Bladsy vir verwysing). Alle programme hieronder gelys, is gesluit vir aansoeke.*

Qualification/ *Kwalifikasie*	Programme Code/ *Programkode*	Yearbook/ *Jaarboek*	Page/ *Bladsy*	Closing date of programme/ *Sluitingsdatum van program*
Univ. Diploma in Animal Health	**266 100 N102M** **2DY B01 N301M**	2019 Yearbook 2020 Yearbook	p114	Closing End of 2021 Closing End of 2022
Univ. Diploma in Animal Science	**279 100 N101M**	2019 Yearbook	p116	Closing End of 2021
Univ Diploma in Agric with Crop Science	**279 101 N101M**	2020 Yearbook	p118	Closing End of 2021
Extended BSc with Computer Science and Mathematics	**200 162 N303M**	2020 Yearbook	p282	Closing End of 2021
Extended BSc with Chemistry and Computer Science	**200 197 N302M**	2020 Yearbook	p270	Closing End of 2021
Extended BSc with Applied Mathematics and Physics	**200 194 N302M**	2020 Yearbook	p262	Closing End of 2021
Extended BSc with Chemistry and Physics	**200 160 N303M**	2020 Yearbook	p276	Closing End of 2021
Extended BSc with Applied Mathematics and Mathematics	**200 158 N303M**	2020 Yearbook	p260	Closing End of 2021
Extended BSc in Financial Mathematics	**200 208 N301V**	2020 Yearbook	p304	Closing End of 2021
Extended BSc in Quantitative Risk Management	**200 207 N301V**	2020 Yearbook	p300	Closing End of 2021
Extended BSc in Data Mining	**200 198 N302V**	2020 Yearbook	p302	Closing End of 2021
Extended BSc in Information Technology	**264 102 N302V**	2020 Yearbook	p298	Closing End of 2021
Extended BSc with Biology and Chemistry	**200 159 N303M**	2020 Yearbook	p266	Closing End of 2021
Extended BSc with Biology and Geography	**200 205 N301M**	2020 Yearbook	p268	Closing End of 2021
Extended BSc with Computer Science and Geography	**200 206 N301M**	2020 Yearbook	p280	Closing End of 2021
Extended BSc with Microbiology and Chemistry	**200 204 N301M**	2020 Yearbook	p296	Closing End of 2021
Extended BSc with Microbiology and Biochemistry	**200 202 N301M**	2020 Yearbook	p294	Closing End of 2021
BSc in Chemistry and Physics	**200 129 N308M**	2020 Yearbook	p126	Closing End of 2021
BSc in Chemistry and Mathematics	**200 140 N307M**	2020 Yearbook	p132	Closing End of 2021

Qualification/ *Kwalifikasie*	Programme Code/ *Programkode*	Yearbook/ *Jaarboek*	Page/ *Bladsy*	Closing date of programme/ *Sluitingsdatum van program*
BSc in Biochemistry and Chemistry	**200 190 N174P**	2020 Yearbook	p134	Closing End of 2021
BSc in Biology and Geography	**200 174 N301M**	2020 Yearbook	p137	Closing End of 2021
BSc in Mathematics and Physics	**200 134 N311M**	2020 Yearbook	p140	Closing End of 2021
BSc in Electronics and Physics	**200 180 N310M**	2020 Yearbook	p149	Closing End of 2021
BSc in Computer Science and Electronics	**200 177 N125M**	2020 Yearbook	p155	Closing End of 2021
BSc in Computer Science and Statistics	**200 191 N156P** **200 191 N156V**	2020 Yearbook	p157	Closing End of 2021
BSc in Computer Science and Mathematics	**200 137 N127M**	2020 Yearbook	p160	Closing End of 2021
BSc in Computer Science and Economics	**200 191 N175P** **200 191 N175V**	2020 Yearbook	p162	Closing End of 2021
BSc in Statistics and Mathematics	**200 191 N158P** **200 138 N306M**	2020 Yearbook	p172 p173	Closing End of 2021
BSc in Financial Mathematics	**200 167 N135P** **200 167 N135V**	2020 Yearbook	p233	Closing End of 2021
BSc in Environmental Sciences with Geology and Geography	**200 118 N147P** **2DJ H01 N301P**	2020 Yearbook	p216	Closing End of 2021
BSc in Environmental and Biological Sciences – Geography and Computer Science	**200 178 N301M**	2020 Yearbook	p220	Closing End of 2021
BSc in Microbiology and Biochemistry	**200 118 N167M**	2020 Yearbook	p180 p181	Closing End of 2021
BSc in Environmental and Biological Sciences – Geology and Botany	**200 118 N148P**	2019 Yearbook		Closing End of 2021
BSc in Environmental and Biological Sciences - Microbiology and Physiology	**2DK H04 N301P**	2020 Yearbook	p191	**200 118 N186P** Closing End of 2021
BSc in Botany and Biochemistry	**2DK H02 N301P**	2020 Yearbook	p183	**200 118 N170P** Closing End of 2021
BSc in Agriculture with Agricultural Economics	**267 100 N401M**	2020 Yearbook	p243	Closing End of 2021
BSc in Agriculture with Animal Health	**267 101 N401M** **Senior/pipeline students**	2020 Yearbook	p244	Closing End of 2024 Phasing out
BSc in Agriculture with Animal Science	**267 102 N401M**	2020 Yearbook	p247	Closing End of 2021
BSc in Indigenous Knowledge Systems	**287 100 N402M**	2021 Yearbook	p224	Closing End of 2023

NAS.1.15 RULES FOR DIPLOMAS

After completion of the 3-year Diploma, a student can either exit with a diploma qualification or could proceed to register for a BSc degree in Agriculture provided they have applied for and been granted matriculation exemption prior to registering for the Degree program of choice. Successful applicants into BSc Programme may be credited for modules taken and passed during the course of the Diploma Programme provided that a final pass mark of 60% or more was obtained in the module earmarked for exemption. A list of Diploma modules that are judged to be equivalent to BSc modules is available from the Schools. The granting of exemptions in the selected modules to students from the Diploma Program is based on the application of the Credit Accumulation and Transfer (CAT) policy.

After completion of the 3-year Diploma, a student can either exit with a diploma qualification or could proceed to register for a BSc in Agriculture. Successful applicants into BSc Programme will NOT be credited for modules taken and passed during the course of the Diploma Programme. A Diploma candidate is, therefore, required to complete BSc programme.

NAS.1.15.1 PROGRAMME: DIPLOMA IN ANIMAL HEALTH

NAS.1.15.1.1 Specific programme outcomes

Purpose: The purpose of the qualification is to provide adequate vocational training which equips learners with a sound knowledge of disease surveillance, farm animals and production systems; and to identify problems related to the health, breeding, feeding, management and economics of livestock production, thus contributing to animal production whilst maintaining the animals' health and welfare, protecting humans from zoonosis and ensuring high-quality food products of animal origin for human consumption; and provide services to members of the veterinary profession, para-veterinary professionals, the animal population industry and the community as a whole.

NAS.1.15.1.2 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules proposed for exemption to students moving from Diploma in Animal Health (NEW PROGRAMME – 2DY B01-N302M) to Bachelor of Science in Agriculture with Agricultural Economics (2FD K01-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AGLE111	Academic Literacy	12	**AGLE111**	Academic Literacy	12
AGLE121	Academic Literacy	12	**AGLE121**	Academic Literacy	12
AEDM111	Introduction To Agricultural Economics	12	**AECM111**	Introduction To Agricultural Economics	12
AXDM211	Fundamental Concepts Of Agricultural Extension	16	**AEXM211**	Fundamental Concepts Of Agricultural Extension	16
WVAS221	Understanding The World Of Agriculture	12	**WVAS221**	Understanding The World Of Agriculture	12
WVNS211	Understanding The World Of Natural Sciences	12	**WVNS211**	Understanding The World Of Natural Sciences	12
Total credits proposed for exemption = 76					

Modules proposed for exemption to students moving from Diploma in Animal Health (266 100-N102M/ 2DYB01-N301M) to Bachelor of Science in Agriculture with Animal Science (2FD K03-N401M).

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AEDM111	Introduction to Agricultural Economics	12	**AECM111**	Introduction to Agricultural Economics	12
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE121**	Academic Literacy	12
ANDM211	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
Total credits proposed for exemption = 52					

Modules exemption to students from Diploma in Animal Health (2DY B01-N302M) to Bachelor of Science in Agriculture with Agronomy & Horticulture (2FD K04-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AGLE111	Academic Literacy	12	**ALDE111**	Academic Literacy	12
AGLE121	Academic Literacy	12	**ALDE121**	Academic Literacy	12
AXDM211	Fundamentals of Agric. Extension	16	**AEXM211**	Fundamentals of Agric. Extension	16
AEDM111	Intro. to Agric. Economics	12	**AECM111**	Intro. to Agric. Economics	12
Total credits proposed for exemption = 52					

Modules exemption to students from Diploma in Animal Health (2DY B01-N302M) to Bachelor of Science in Agriculture with Animal Health (2FD K07-N402M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AXDM211	Fundamentals of Agriculture Extension	16	**AEXM211**	Fundamentals of Agriculture Extension	16
AHVM121	Microbiology for Animal Health	16	**AHPM211**	Microbiology for Animal Health	16
ANDM213	Ruminant Production	8	**ANSM214**	Ruminant Production	8
ANDM212	Animal Breeding & Genetics	12	**ANSM222**	Animal Breeding & Genetics	12
ANDM211	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
AHVM318	Epidemiology	8	**AHPM312**	Epidemiology	8
ALDE111	Introduction to Academic literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic Literacy	12
AEDM111	Intro Agricultural Economics	12	**AECM111**	Intro Agricultural Economics	12
Total credits proposed for exemption = 112					

NAS.1.15.1.3 Diploma in Animal Health

Qualification Code/ *Kwalifikasiekode*			2DY B01 - N302M					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
ALDE111	X	12	AXDM211	X	16	AHLH 313	H	8
AEDM111	X	12	AHLH211	H	8	AHLH312	H	8
AHLH111	H	12	AHLH212	H	8	AHLH314	H	8
AHLH112	H	12	AHLH213	H	8	Year Level 3/ Jaarvlak 3		
MCHE115	H	12	ANDM211	X	16	Second/ Tweede Semester		
MTHS115	X	12	ANDM212	X	8	AHLH321	H	8
			ANDM213	X	8	AHLH322	H	8
						AHLH323	H	8
Total 1st/ Totaal 1ste Semester		72	Total 1st/ Totaal 1ste Semester		72	Total / Totaal 1ste & 2ndSemester		48
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
Second/ Tweede Semester			Second/ Tweede Semester			Year module / Jaarmodule		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
ALDE122	X	12	AHLH221	H	8	AHLH371	H	16
AHLH121	H	8	AHLH222	H	8	AHLH372	H	32
AHLH122	H	12	AHLH223	H	8	AHLH373	H	16
AHLH123	H	12	AHLH224	H	8	AHLH374	H	16
AHLH124	H	8	AHLH225	H	8			
ANDM122	X	8	AHLH226	H	8			
			ANDM226	H	16			
Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		64	Total 2nd/ Totaal 2de Semester		80
Total Year Level 1/ Totaal Jaarvlak 1		132	Total Year Level 2/ Totaal Jaarvlak 2		136	Total Year Level 3/ Totaal Jaarvlak 3		128
Total Credits for the Programme/ Totale Krediete vir die Program								396

NAS.1.15.2 DIPLOMA IN ANIMAL SCIENCE

NAS.1.15.2.1 Specific programme outcomes

Purpose: The aim of the Diploma in Agriculture (Animal Science) is to give students a vocational training in the practical application of scientific principles to animal production.

NAS.1.15.2.2 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules proposed for exemption to students moving from Diploma in Animal Science (NEW PROGRAMME – 2FH B01-N301M)) to Bachelor of Science in Agriculture with Agricultural Economics (2FD K01-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AGLE111	Academic Literacy	12	**AGLE111**	Academic Literacy	12
AGLE121	Academic Literacy	12	**AGLE121**	Academic Literacy	12
AEDM111	Introduction To Agricultural Economics	12	**AECM111**	Introduction To Agricultural Economics	12
AXDM211	Fundamental Concepts Of Agricultural Extension	16	**AEXM211**	Fundamental Concepts Of Agricultural Extension	16
AEDM314	Farm Management & Accounting	8	**AECM314**	Farm Management & Accounting	8
WVAS221	Understanding The World Of Agriculture	12	**WVAS221**	Understanding The World Of Agriculture	12
WVNS211	Understanding The World Of Natural Sciences	12	**WVNS211**	Understanding The World Of Natural Sciences	12
Total credits proposed for exemption = 84					

Modules proposed for exemption to students moving from Diploma in Animal Science (279 100-N101M) to Bachelor of Science in Agriculture with Animal Science (2FD K03-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
ALDE111	Academic Literacy	12	**ALDE111**	Academic Literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic Literacy	12
AEDM111	Introduction To Agricultural Economics	12	**AECM111**	Introduction To Agricultural Economics	12
ANDM211	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
AHVM226	Microbiology	16	**AHPM211**	Microbiology For Animal Health	16
AEDM314	Farm Management And Accounting	8	**AECM314**	Farm Management And Accounting	8
Total credits proposed for exemption = 76					

Modules exemption to students from Diploma in Animal Science (2FH B01-N301M) to Bachelor of Science in Agriculture with Agronomy & Horticulture (2FD K04-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AGLE111	Academic Literacy	12	**ALDE111**	Academic Literacy	12
AGLE121	Academic Literacy	12	**ALDE121**	Academic Literacy	12
AEDM111	Intro to Agric. Economics	12	**AECM111**	Intro to Agric. Economics	12
AXDM211	Fundamentals Of Agric. Extension	16	**AEXM211**	Fundamentals Of Agric. Extension	16
CSDM121	Intro To Crop Production	12	**CSPM221**	Intro To Crop Production	12
AEDM314	Farm Management & Accounting	8	**AECM314**	Farm Management & Accounting	8
Total credits proposed for exemption = 72					

Modules exemption to students from Diploma in Animal Science (2FH B01-N301M) to Bachelor of Science in Agriculture with Animal Health (2FD K07-N402M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AXDM211	Fundamentals of Agriculture Extension	16	**AEXM211**	Fundamentals of Agriculture Extension	16
AHVM121	Microbiology for Animal Health	16	**AHPM211**	Microbiology for Animal Health	16
ANDM213	Ruminant Production	8	**ANSM214**	Ruminant Production	8
ANDM212	Animal Breeding & Genetics	12	**ANSM222**	Animal Breeding & Genetics	12
ANDM211	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic Literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic Literacy	12
AEDM111	Intro Agricultural Economics	12	**AECM111**	Intro Agricultural Economics	12
Total credits proposed for exemption = 104					

NAS.1.15.2.3 Diploma in Animal Science

Qualification Code/ *Kwalifikasiekode*	**2FH B01 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	AHVM211	X	16	AXDM311	X	8
AEDM111	X	12	ANDM211	H	16	AEDM314	X	8
AHVM111	X	12	ANDM212	H	8	ANDM312	H	16
MTHS115	X	12	AXDM211	X	16	ANDM313	H	16
MCHE115	X	12				ANDM314	H	16
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**56**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	ANDM221	H	16	ANDM321	H	56
AHVM122	X	12	ANDM223	H	16			
ANDM121	X	12	ANDM 226	H	16			
CSDM121	H	12	AHVM226	H	16			
MTHS125	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**64**	**Total 2nd/ Totaal 2de Semester**		**56**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**
Total Credits for the Programme/ Totale Krediete vir die Program								**360**

NAS.1.15.3 DIPLOMA IN PLANT SCIENCE WITH CROP PRODUCTION

NAS.1.15.3.1 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules proposed for exemption to students moving from Diploma in Plant Science with Crop Production (2FJ B01-N301M) to Bachelor of Science in Agriculture with Agricultural Economics (2FD K01-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
CSDM211	Introduction To Soil Science	16	**CSPM211**	Introduction To Soil Science	16
AGLE111	Academic Literacy	12	**AGLE111**	Academic Literacy	12
AEDM111	Introduction To Agricultural Economics	12	**AECM111**	Introduction To Agricultural Economics	12
AXDM211	Fundamental Concepts Of Agricultural Extension	16	**AEXM211**	Fundamental Concepts Of Agricultural Extension	16
AEDM314	Farm Management & Accounting	8	**AECM314**	Farm Management & Accounting	8
CSDM121	Introduction To Crop Production	12	**CSPM221**	Introduction To Crop Production	16
AGLE121	Academic Literacy	12	**AGLE121**	Academic Literacy	12
WVAS221	Understanding The World Of Agriculture	12	**WVAS221**	Understanding The World Of Agriculture	12
WVNS211	Understanding The World Of Natural Sciences	12	**WVNS211**	Understanding The World Of Natural Sciences	12
Total credits proposed for exemption = 116					

Modules proposed for exemption to students moving from Diploma in Agriculture with Crop Science (279 101-N101M) to Bachelor of Science in Agriculture with Animal Science (2FD K03-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic literacy	12
AEDM111	Introduction to Agricultural Economics	12	**AECM111**	Introduction to Agricultural Economics	12
AEDM314	Farm Management and Accounting	8	**AECM314**	Farm Management and Accounting	8
Total credits proposed for exemption = 44					

Modules proposed for exemption to students from Diploma in Plant Science with Crop Production (2FJ B01-N301) to Bachelor of Science in Agriculture with Agronomy & Horticulture (2FD K04-N401M)

Diploma			BSc.		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
AGLE 111	Academic Literacy	12	ALDE 111	Academic Literacy	12
AGLE 121	Academic Literacy	12	ALDE 121	Academic Literacy	12
CSDM 211	Intro. Soil Science	16	CSPM 211	Intro. Soil Science	16
AEDM 111	Intro. to Agric. Economics	12	AECM 111	Intro. to Agric. Economics	12
AXDM 211	Fundamentals of Agric. Extension	16	AEXM 211	Fundamentals of Agric. Extension	16
CSDM 223	Soil Conservation	12	CSPM 223	Soil Conservation	12
CSDM 213	Farm Machinery	8	CSPM 213	Farm Machinery	8
CSDM 311	Summer crops	8	CSPM 311	Summer crops	8
CSDM 321	Winter crops	8	CSPM 321	Winter crops	8
AEDM 314	Farm Management & Accounting	8	AECM 314	Farm Management & Accounting	8
Total credits proposed for exemption = 112					

NAS.1.15.3.1 Diploma in Plant Science with Crop Production

Qualification Code/ *Kwalifikasiekode*			**2FJ B01 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	AXDM211	X	16	AXDM311	X	8
AEDM111	X	12	CSDM211	H	16	AEDM314	X	8
CSDM111	H	12	CSDM212	H	12	CSDM311	H	8
MTHS115	X	12	CSDM213	H	8	CSDM312	H	16
MCHE115	X	12	CSDM215	H	8	CSDM315	H	8
						CSDM371	H	8
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**56**

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
ALDE122	X	12	CSDM221	H	16	CSDM321	H	8
ANDM121	X	12	CSDM222	H	16	CSDM322	H	16
CSDM121	H	12	CSDM223	H	12	CSDM323	H	16
MTHS125	X	12	CSDM224	H	8	CSDM324	H	16
NPHY124	X	12	CSDM225	H	8	CSDM371	H	8
Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		64
Total Year Level 1/ Totaal Jaarvlak 1		120	Total Year Level 2/ Totaal Jaarvlak 2		120	Total Year Level 3/ Totaal Jaarvlak 3		120
Total Credits for the Programme/ Totale Krediete vir die Program								360

NAS.1.16 EXTENDED PROGRAMMES: BACHELOR OF SCIENCE

NAS.1.16.1 FACULTY-SPECIFIC RULES FOR THE PROGRAMME

Students who have not achieved the minimum requirements for entry into BSc may be admitted into the BSc Programme (Extended).

NAS.1.16.2 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND CHEMISTRY

Qualification Code/ *Kwalifikasiekode*						**2XF H13 – N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
APPM171	H	12	APPM172	H	12	APPM212	H	8	APPM311	H	16
MTHS171	X	12	MTHS172	X	12	APPM213	H	8	APPM313	H	16
NCHE171	H	12	NCHE172	H	12	MTHS211	X	8	NCHE311	H	16
NPHY171	X	12	NPHY172	X	12	MTHS212	X	8	NCHE312	H	16
ALDE111	X	12				NCHE211	H	8			
						NCHE212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				APPM222	H	8	APPM322	H	16
						APPM223	H	8	APPM323	H	16
						MTHS221	X	8	NCHE321	H	16
						MTHS222	X	8	NCHE322	H	16
						NCHE221	H	8			
						NCHE222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.3 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND ELECTRONICS

Qualification Code/ *Kwalifikasiekode*						**2XF H14 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
APPM171	H	12	APPM172	H	12	APPM212	H	8	APPM311	H	16
MTHS171	X	12	MTHS172	X	12	APPM213	H	8	APPM313	H	16
SFEM171	H	12	SFEM172	H	12	MTHS211	X	8	ELYM315	H	16
CMPG171	X	12	CMPG172	X	12	MTHS212	X	8	ELYM316	H	16
ALDE111	X	12				ELYM215	H	16			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				APPM222	H	8	APPM322	H	16
						APPM223	H	8	APPM323	H	16
						MTHS221	X	8	ELYM327	H	16
						MTHS222	X	8	ELYM328	H	16
						ELYM227	H	16			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.4 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*						**2XF H09 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
APPM171	X	12	APPM172	X	12	APPM212	X	8	MTHS311	H	16
CMPG171	H	12	CMPG172	H	12	APPM213	X	8	MTHS312	H	16
MTHS171	H	12	MTHS172	H	12	CMPG211	H	16	CMPG311	H	16
NPHY171	X	12	NPHY172	X	12	MTHS211	H	8	CMPG313	H	16
ALDE111	X	12				MTHS212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				CMPG221	H	8	MTHS321	H	16
						CMPG224	H	8	MTHS322	H	16
						APPM222	X	8	CMPG321	H	16
						APPM223	X	8	CMPG325	H	16
						MTHS221	H	8			
						MTHS222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.5 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND COMPUTER SCIENCE

Qualification Code/ *Kwalifikasiekode*	**2XF H31 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
CMPG171	H	12	CMPG172	H	12	NCHE211	H	8	CMPG311	H	16
MTHS171	X	12	MTHS172	X	12	NCHE212	H	8	CMPG313	H	16
NPHY171	X	12	NPHY172	X	12	MTHS211	X	8	NCHE311	H	16
NCHE171	H	12	NCHE172	H	12	MTHS212	X	8	NCHE312	H	16
ALDE111	X	12				CMPG211	H	16			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				NCHE221	H	8	CMPG324	H	16
						NCHE222	H	8	CMPG325	H	16
						MTHS221	X	8	NCHE321	H	16
						MTHS222	X	8	NCHE322	H	16
						CMPG221	H	8			
						CMPG224	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**60**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.6 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*	**2XF H11 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
CMPG171	X	12	CMPG172	X	12	NCHE211	H	8	NCHE311	H	16
MTHS171	H	12	MTHS172	H	12	NCHE212	H	8	NCHE312	H	16
NPHY171	X	12	NPHY172	X	12	MTHS211	H	8	MTHS311	H	16
NCHE171	H	12	NCHE172	H	12	MTHS212	H	8	MTHS312	H	16
ALDE111	X	12				NPHY211	X	8			
						NPHY212	X	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				NCHE221	H	8	NCHE321	H	16
						NCHE222	H	8	NCHE322	H	16
						MTHS221	H	8	MTHS321	H	16
						MTHS222	H	8	MTHS322	H	16
						NPHY221	X	8			
						NPHY222	X	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.7 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND APPLIED MATHEMATICS

Qualification Code/ *Kwalifikasiekode*						**2XF H24 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
APPM171	H	12	APPM172	H	12	APPM212	H	8	APPM311	H	16
MTHS171	X	12	MTHS172	X	12	APPM213	H	8	APPM312	H	16
NPHY171	H	12	NPHY172	H	12	MTHS211	X	8	NPHY311	H	16
CMPG171	X	12	CMPG172	X	12	MTHS212	X	8	NPHY312	H	16
ALDE111	X	12				NPHY211	H	8			
						NPHY212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				APPM222	H	8	APPM322	H	16
						APPM223	H	8	APPM321	H	16
						MTHS221	X	8	NPHY321	H	16
						MTHS222	X	8	NPHY322	H	16
						NPHY221	H	8			
						NPHY222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.8 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*						**2XF H23 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
NCHE171 **OR/ *OF*** APPM171	X	12	CMPG172	X	12	APPM213 **&** APPM212	X	8 8	MTHS311	H	16
NPHY171	H	12	NPHY172	H	12	MTHS211	H	8	MTHS312	H	16
MTHS171	H	12	MTHS172	H	12	MTHS212	H	8	NPHY311	H	16
CMPG171	X	12	APPM172	X	12	NPHY211	H	8	NPHY312	H	16
ALDE111	X	12				NPHY212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				APPM223 **&** APPM222	X	8 8	MTHS321	H	16
						MTHS221	H	8	MTHS322	H	16
						MTHS222	H	8	NPHY321	H	16
						NPHY221	H	8	NPHY322	H	16
						NPHY222	H	8			
						WVNS211	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.9 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH BIOCHEMISTRY AND CHEMISTRY

Qualification Code/ *Kwalifikasiekode*						2XF H06 - N301M					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*						Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*						Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester		
Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr
MCBN171	H	12	MCBN172	H	12	BCHN213	H	16	BCHS316	H	16
MTHS173	X	12	MTHS174	X	12	NCHE211	H	8	BCHS317	H	16
NPHY171	H	12	NPHY172	H	12	NCHE212	H	8	NCHE311	H	16
NCHE171	X	12	NCHE172	X	12	MKBN211	X	16	NCHE312	H	16
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		60	Total 1st/ Totaal 1ste Semester		48	Total 1st/ Totaal 1ste Semester		60	Total 1st/ Totaal 1ste Semester		64
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester		
Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr
ALDE122	X	12				BCHN222	H	16	BCHS321	H	16
						NCHE221	H	8	BCHS322	H	16
						NCHE222	H	8	NCHE321	H	16
						MKBS221	X	16	NCHE322	H	16
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		12	Total 2nd/ Totaal 2de Semester		0	Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		64
Total Year Level 1/ Totaal Jaarvlak 1		72	Total Year Level 2/ Totaal Jaarvlak 2		48	Total Year Level 3/ Totaal Jaarvlak 3		120	Total Year Level 4/ Totaal Jaarvlak 4		128
Total Credits for the Programme/ Totale Krediete vir die Program											368

NAS.1.16.10 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH CHEMISTRY AND PHYSICS

Qualification Code/ *Kwalifikasiekode*	**2XF H05 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
CMPG171	H	12	APPM172	H	12	MTHS211	H	8	NCHE311	H	16
MTHS171	X	12	MTHS172	X	12	MTHS212	H	8	NCHE312	H	16
NPHY171	H	12	NPHY172	H	12	NCHE211	H	8	NPHY311	H	16
NCHE171	X	12	NCHE172	X	12	NCHE212	H	8	NPHY312	H	16
ALDE111	X	12				NPHY211	X	8			
						NPHY212	X	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				MTHS221	H	16	NCHE321	H	16
						MTHS222	H	8	NCHE322	H	16
						NCHE221	H	8	NPHY321	H	16
						NCHE222	X	8	NPHY322	H	16
						NPHY221	X	8			
						NPHY222	X	12			
						WVNS211	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.11 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH PHYSICS AND COMPUTER SCIENCE

Qualification Code/ *Kwalifikasiekode*	**2XF H25 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
NCHE171	X	12	NCHE172 **OR/ *OF*** APPM172	X	12	CMPG211	H	16	CMPG311	H	16
CMPG171	H	12	CMPG172	H	12	MTHS211	X	8	CMPG313	H	16
MTHS171	X	12	MTHS172	X	12	MTHS212	X	8	NPHY311	H	16
NPHY171	H	12	NPHY172	H	12	NPHY211	H	8	NPHY312	H	16
ALDE111	X	12				NPHY212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				CMPG221	H	8	CMPG321	H	16
						CMPG222/4	H	8	CMPG325	H	16
						MTHS222	X	8	NPHY321	H	16
						MTHS224	X	8	NPHY322	H	16
						NPHY221	H	8			
						NPHY222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.12 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ELECTRONICS

Qualification Code/ *Kwalifikasiekode*	**2XF H17 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
SFEM171	H	12	SFEM172	H	12	CMPG211	H	16	CMPG311	H	16
CMPG171	H	12	CMPG172	H	12	ELYM215	H	16	CMPG313	H	16
MTHS171	X	12	MTHS172	X	12	MTHS211	X	8	ELYM315	H	16
NPHY171	X	12	NPHY172	X	12	MTHS212	X	8	ELYM316	H	16
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				CMPG221	H	8	CMPG324	H	16
						CMPG224	H	8	CMPG325	H	16
						ELYM227	H	16	ELYM327	H	16
						MTHS221	X	8	ELYM328	H	16
						WVNS221	X	12			
						MTHS222	X	8			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.13 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH ELECTRONICS AND PHYSICS

Qualification Code/ *Kwalifikasiekode*	**2XF H20 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
SFEM171	H	12	SFEM172	H	12	ELYM215	H	16	ELYM315	H	16
NPHY171	H	12	NPHY172	H	12	MTHS211	X	8	ELYM316	H	16
MTHS171	X	12	MTHS172	X	12	MTHS212	X	8	NPHY311	H	16
CMPG171	X	12	CMPG172	X	12	NPHY211	H	8	NPHY312	H	16
ALDE111	X	12				NPHY212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				ELYM227	H	16	ELYM327	H	16
						MTHS221	X	8	ELYM328	H	16
						MTHS222	X	8	NPHY321	H	16
						NPHY221	H	8	NPHY322	H	16
						NPHY222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.14 EXTENDED PROGRAMME: BACHELOR OF SCIENCE WITH ELECTRONICS AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*	**2XF H19 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
SFEM171	H	12	SFEM172	H	12	APPM212	X	8	ELYM315	H	16
CMPG171	X	12	CMPG172	X	12	APPM213	X	8	ELYM316	H	16
MTHS171	H	12	MTHS172	H	12	ELYM215	H	16	MTHS311	H	16
APPM171	X	12	APPM172	X	12	MTHS211	H	8	MTHS312	H	16
ALDE111	X	12				MTHS212	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				APPM222	X	8	ELYM327	H	16
						APPM223	X	8	ELYM328	H	16
						ELYM227	H	16	MTHS321	H	16
						MTHS222	H	8	MTHS322	H	16
						MTHS221	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.15 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH APPLIED MATHEMATICS AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*	**2XG H03 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
APPM171	H	12	APPM172	H	12	APPM212	H	8	APPM311	H	16
MTHS171	H	12	MTHS172	H	12	APPM213	H	8	APPM313	H	16
NPHY171	X	12	NPHY172	X	12	MTHS211	H	8	MTHS311	H	16
CMPG171	X	12	CMPG172	X	12	MTHS212	H	8	MTHS312	H	16
ALDE111	X	12				NPHY211	X	8			
						NPHY212	X	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ADLE122	X	12				APPM222	H	8	APPM322	H	16
						APPM223	H	8	APPM323	H	16
						MTHS221	H	8	MTHS321	H	16
						MTHS222	H	8	MTHS322	H	16
						NPHY221	X	8			
						NPHY222	X	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.16 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS / *BACCALAUREUS SCIENTIAE IN FINANSIËLE WISKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2XS H01- N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Vanderbijlpark (ENGLISH see / *sien* NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ACFS111	X	16	BWIA111	H	12	MTHS211	H	8	BWIA313	H	24
CMPG111	X	12	ECON211	X	16	MTHS212	H	8	MTHS311	H	16
ECON112	X	12	EKRP211	H	16	STTN215	H	16	STTN316	H	24
STTF115	X	12	MTHS111	X	12	WVES312	X	12	STTN317	H	8
WISS111	X	12	STTF215	X	16						
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**44**	**Total 1st/ Totaal 1ste Semester**		**72**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDA/E122	X	12	BWIA121	H	12	APPM222	X	8	BWIN321	H	16
ACFS121	X	16	EKRP221	X	16	MTHS221	X	8	EKRP321	H	16
CMPG122	X	12	MTHS121	H	12	MTHS222	H	8	STTN326	H	16
ECON122	X	12	STTF225	X	16	STTN225	H	16	STTN327	H	16
STTF125	X	12	WVES222	X	12						
WISS121	X	12									
Total 2nd/ Totaal 2de Semester		**76**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**40**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module/ *Jaarmodule*											
						BWIA273	H	16			
Total Year Level 1/ Totaal Jaarvlak 1		**140**	**Total Year Level 2/ Totaal Jaarvlak 2**		**140**	**Total Year Level 3/ Totaal Jaarvlak 3**		**100**	**Total Year Level 4/ Totaal Jaarvlak 4**		**136**
Total Credits for the Programme/ Totale Krediete vir die Program											**516**

NAS.1.16.17 EXTENDED/ *VERLENGDE* PROGRAMME*:*
BACHELOR OF SCIENCE IN QUANTITIVE RISK MANAGEMENT / *BACCALAUREUS SCIENTIAE IN KWANTITATIEWE RISIKOBESTUUR*

Qualification Code/ *Kwalifikasiekode*	**2XT H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Vanderbijlpark (ENGLISH see / *sien* NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ACFS111	X	16	ACCF111	X	16	ECON211	H	16	BWIA313	H	24
CMPG111	X	12	BWIA111	H	12	MTHS211	X	8	EKRP311	H	16
ECON112	X	12	EKRP211	H	16	MTHS212	X	8	STTN316	H	24
STTF115	X	12	MTHS111	X	12	STTN215	H	16	STTN317	H	8
WISS111	X	12	STTF215	X	16	WVES312	X	12			
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**72**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDA/E122	X	12	ACCF121	X	16	APPM222	X	8	BWIN321	H	16
ACFS121	X	16	BWIA121	H	12	MTHS222	X	8	EKRP321	H	16
CMPG122	X	12	EKRP221	H	16	STTN225	H	16	STTN326	H	16
ECON122	X	12	MTHS121	X	12				STTN327	H	16
STTF125	X	12	STTF225	X	16						
WISS121	X	12	WVES222	X	12						
Total 2nd/ Totaal 2de Semester		**76**	**Total 2nd/ Totaal 2de Semester**		**84**	**Total 2nd/ Totaal 2de Semester**		**32**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module/ *Jaar Module*											
						BWIA273	H	16			
						FINM271	H	18			
Total Year Level 1/ Totaal Jaarvlak 1		**140**	**Total Year Level 2/ Totaal Jaarvlak 2**		**156**	**Total Year Level 3/ Totaal Jaarvlak 3**		**126**	**Total Year Level 4/ Totaal Jaarvlak 4**		**136**
Total Credits for the Programme/ Totale Krediete vir die Program											**558**

NAS.1.16.18 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN BUSINESS ANALYTICS / *BACCALAUREUS SCIENTIAE IN BESIGHEIDSANALISE*

Qualification Code/ *Kwalifikasiekode*	**2XR H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Vanderbijlpark (ENGLISH see / *sien* NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ACFS111	X	16	BWIA111	H	12	MTHS211	H	8	CMPG311	H	16
CMPG111	X	12	CMPG211	H	16	MTHS212	H	8	CMPG312	H	16
ECON112	X	12	CMPG213	H	16	STTN215	H	16	CMPG313	H	16
STTF115	X	12	MTHS111	X	12	WVES312	X	12	STTN316	H	24
WISS111	X	12	STTF215	X	16				STTN317	H	8
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**44**	**Total 1st/ Totaal 1ste Semester**		**80**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDA/E122	X	12	BWIA121	H	12	APPM222	X	8	CMPG321	H	16
ACFS121	X	16	CMPG223	H	16	CMPG221	H	8	CMPG322	H	16
CMPG121	H	12	ECON122	X	12	MTHS222	X	8	STTN326	H	16
CMPG122	H	12	MTHS121	X	12	STTN225	H	16	STTN327	H	16
STTF125	X	12	STTF225	X	16	WVES222	X	12			
WISS121	X	12									
Total 2nd/ Totaal 2de Semester		**76**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**52**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module/ *Jaar Module*											
						BWIA273	H	16			
Total Year Level 1/ Totaal Jaarvlak 1		**140**	**Total Year Level 2/ Totaal Jaarvlak 2**		**140**	**Total Year Level 3/ Totaal Jaarvlak 3**		**112**	**Total Year Level 4/ Totaal Jaarvlak 4**		**144**
Total Credits for the Programme/ Totale Krediete vir die Program											**536**

NAS.1.16.19 EXTENDED/ *VERLENGDE* PROGRAMME: BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE*

Qualification Code/ *Kwalifikasiekode*	**2XX H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Vanderbijlpark (ENGLISH: see /*sien* NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
BMAN111	X	12	ACFS111	X	16	CMPG211	H	16	CMPG311	H	16
ITSP111	X	12	ITSP113	X	16	CMPG212	H	8	CMPG312	H	16
STTN111	X	12	ITSP114	X	16	CMPG213	H	16	CMPG313	H	16
WISS113	X	12	MTHS113	X	12	CMPG214	H	8	CMPG315	H	16
			CMPG111	H	12	CMPG215	H	8			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**48**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**68**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDA/E121	X	12	ACFS121	X	16	CMPG221	H	8	CMPG321	H	16
ITSP121	X	12	BMAN223	X	16	CMPG222	H	8	CMPG322	H	16
STTN121	X	12	CMPG121	H	12	CMPG223	H	16	CMPG323	H	16
WISS123	X	12	CMPG122	H	12	MTHS225	X	8	CMPG324	H	16
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**48**	**Total 2nd/ Totaal 2de Semester**		**52**	**Total 2nd/ Totaal 2de Semester**		**56**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**96**	**Total Year Level 2/ Totaal Jaarvlak 2**		**128**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**472**

NAS.1.16.20 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH BOTANY AND CHEMISTRY

Qualification Code/ *Kwalifikasiekode*	**2XJ H03 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN171	H	12	MCBN172	H	12	BCHN213	H	16	PLKS314	H	32
MTHS173	X	12	MTHS172	X	12	NCHE211	H	8	NCHE311	H	16
PLKS171	H	12	PLKS172	H	12	NCHE212	H	8	NCHE312	H	16
NCHE171	X	12	NCHE172	X	12	PLKS211	X	16			
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				BCHN222	X	16	PLKS324	H	32
						NCHE221	H	8	NCHE321	H	16
						NCHE222	H	8	NCHE322	H	16
						PLKS223	H	16			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.21 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND BOTANY

Qualification Code/ *Kwalifikasiekode*	**2XJ H06 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN171	X	12	MCBN172	X	12	MKBN211	X	16	GEOG311	H	32
GEOG171	H	12	GEOG172	H	12	PLKS211	H	16	PLKS314	H	32
PLKS171	H	12	PLKS172	H	12	GEOG211	H	16			
NCHE171	X	12	NCHE172	X	12	WVNS211	X	12			
ALDE111	X	12									
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				PLKS223	H	16	GEOG321	H	32
						GEOG221	H	16	PLKS324	H	32
						MKBS221	X	16			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.22 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND COMPUTER SCIENCE

Qualification Code/ *Kwalifikasiekode*	**2XJ H14 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
GEOG171	H	12	GEOG172	H	12	CMPG211	H	16	CMPG311	H	16
CMPG171	H	12	CMPG172	H	12	GEOG211	H	16	CMPG313	H	16
MTHS173	X	12	MTHS174	X	12	PLKS211	X	16	GEOG311	H	32
PLKS171	X	12	PLKS172	X	12	WVNS211	X	12			
ALDE111	X	12									
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				CMPG221	H	08	CMPG324	H	16
						CMPG224	H	08	CMPG325	H	16
						GEOG221	H	16	GEOG321	H	32
						PLKS223	X	16			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.23 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH MICROBIOLOGY AND CHEMISTRY

Qualification Code/ *Kwalifikasiekode*	**2XJ H10 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN171	H	12	MCBN172	H	12	BCHN213	X	16	NCHE311	H	16
NCHE171	H	12	NCHE172	H	12	NCHE211	H	8	NCHE312	H	16
MTHS173	X	12	MTHS174	X	12	NCHE212	H	8	MKBS316	H	16
NPHY171	X	12	NPHY172	X	12	MKBN211	H	16	MKBS317	H	16
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				BCHN222	X	16	NCHE321	H	16
						NCHE221	H	8	NCHE322	H	16
						NCHE222	H	8	MKBS326	H	16
						MKBS221	H	16	MKBS327	H	16
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.24 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOGRAPHY

Qualification Code/ *Kwalifikasiekode*	**2XJ H18 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
GEOG171	H	12	GEOG172	H	12	MTHS211 & MTHS212 **OR/*OF*** NPHY211 & NPHY212	X X X X	8 8 8 8	NCHE311	H	16
MTHS171	X	12	MTHS172	X	12				NCHE312	H	16
NPHY171	X	12	NPHY172	X	12				GEOG311	H	32
NCHE171	H	12	NCHE172	H	12						
ALDE111	X	12				GEOG211	H	16			
						NCHE211	H	08			
						NCHE212	H	08			
						WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				GEOG221	H	16	NCHE321	H	16
						NPHY221 & NPHY222 **OR/*OF*** MTHS221 & MTHS222	X X X X	8 8 8 8	NCHE322	H	16
									GEOG321	H	32
						NCHE221	H	8			
						NCHE222	H	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.25 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND BIOCHEMISTRY

Qualification Code/ *Kwalifikasiekode*	**2XK H01 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
PLKS171	H	12	PLKS172	H	12	PLKS211	H	16	PLKS314	H	32
MCBN171	H	12	MCBN172	H	12	BCHN213	H	16	BCHS316	H	16
MTHS173	X	12	MTHS174	X	12	NCHE211	X	8	BCHS317	H	16
NCHE171	X	12	NCHE172	X	12	NCHE212	X	8			
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				PLKS223	H	16	PLKS324	H	32
						BCHN222	H	16	BCHS321	H	16
						NCHE221	X	8	BCHS322	H	16
						NCHE222	X	8			
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.26 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND MICROBIOLOGY

Qualification Code/ *Kwalifikasiekode*	**2XK H02 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
PLKS171	H	12	PLKS172	H	12	PLKS211	H	16	PLKS314	H	32
MCBN171 **OR/*OF*** GEOG171	X	12	MCBN172 **OR/*OF*** GEOG172	X	12	MKBN211	H	16	*MKBS316*	H	16
NCHE171	X	12	NCHE172	X	12	BCHN213 **OR/*OF*** GEOG211	X	16	MKBS317	H	16
NPHY171	X	12	NPHY172	X	12	WVNS211	X	12			
ALDE111	X	12									
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				PLKS223	H	16	PLKS324	H	32
						MKBS221	H	16	MKBS326	H	16
						BCHN222 **OR/*OF*** GEOG221	X	16	MKBS327	H	16
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.16.27 EXTENDED PROGRAMME: BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BIOCHEMISTRY

Qualification Code/ *Kwalifikasiekode*	**2XK H11 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN171	H	12	MCBN172	H	12	BCHN213	H	16	BCHS316	H	16
NCHE171	H	12	NCHE172	H	12	NCHE211	X	8	BCHS317	H	16
MTHS173	X	12	MTHS174	X	12	NCHE212	X	8	MKBS316	H	16
NPHY171	X	12	NPHY172	X	12	MKBN211	H	16	MKBS317	H	16
ALDE111	X	12				WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**48**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12				BCHN222	H	16	BCHS321	H	16
						NCHE221	X	8	BCHS322	H	16
						NCHE222	X	8	MKBS326	H	16
						MKBS221	H	16	MKBS327	H	16
						WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**12**	**Total 2nd/ Totaal 2de Semester**		**0**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**72**	**Total Year Level 2/ Totaal Jaarvlak 2**		**48**	**Total Year Level 3/ Totaal Jaarvlak 3**		**120**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**368**

NAS.1.17 RULES FOR THE DEGREE BACHELOR OF SCIENCE (BSC) / *REËLS VIR DIE GRAAD BACCALAUREUS SCIENTIAE (BSC)*

NAS.1.17.1 DURATION (MINIMUM AND MAXIMUM DURATION) / *DUUR (MINIMUM EN MAKSIMUM DUUR)*

[A-Rule/ *A-Reël 1.14]*

Full time: The minimum duration of the studies for a BSc 3yr degree is three years and BSc 4yr degree, is four years and the maximum duration for completing the degree is five years for a 3yr and six years for a 4yr degree.

Voltyds: *Die minimum duur van die studie vir 'n BSc 3jr graad is drie jaar en vir 'n BSc 4jr graad, is 4jr en die maksimum tydsduur vir die voltooiing van die graad is vyf jaar vir 'n 3jr en ses jaar vir 'n 4jr graad.*

Distance learning: The minimum duration of the studies for a BSc degree is three years and the maximum duration for completing the degree is 6 years.

Afstandstudie: *Die minimum duur van die studie vir 'n BSc-graad is drie jaar en die maksimum tydsduur vir die voltooiing van die graad is 6 jaar.*

NAS.1.17.2 FACULTY-SPECIFIC REQUIREMENTS / *FAKULTEITSPESIFIEKE TOELATINGSVEREISTES*

See paragraph/ *Kyk paragraaf* NAS.1.10.1.4

NAS.1.17.3 STRUCTURE OF A GENERIC BACHELOR OF SCIENCE DEGREE / *STRUKTUUR VAN 'N GENERIESE BACCALAUREUS SCIENTIAE GRAAD*

The diagram shows how a generic BSc degree is compiled. Professional degrees are compiled differently. /

Die diagram dui aan hoe 'n generiese BSc-kwalifikasie saamgestel word. Professionele grade verskil hiervan.

<table>
<tr><th></th><th colspan="7">Semester 1</th><th colspan="7">Semester 2</th></tr>
<tr><td>Year 1/ Jaar 1
Total Credits/
Totale Krediete:
120</td><td>12</td><td>12</td><td>12</td><td>12</td><td colspan="2">ALDE/
ALDA
12</td><td>12</td><td>12</td><td>12</td><td>12</td><td colspan="2">ALDE/ ALDA
12</td></tr>
<tr><td>Year 2/ Jaar 2
Total Credits/
Totale Krediete:
120</td><td>8</td><td>8</td><td>8</td><td>8</td><td>8</td><td>8</td><td>WVNS
12</td><td>8</td><td>8</td><td>8</td><td>8</td><td>8</td><td>8</td><td>WVNS
12</td></tr>
<tr><td>Year 3/ Jaar 3
Total Credits/
Totale Krediete:
128</td><td colspan="2">16</td><td colspan="2">16</td><td colspan="2">16</td><td>16</td><td colspan="2">16</td><td colspan="2">16</td><td colspan="2">16</td><td>16</td></tr>
<tr><td>Total Credits/
Totale Krediete:
368</td><td colspan="7">184</td><td colspan="7">184</td></tr>
</table>

NAS.1.17.4 OUTCOMES OF A GENERIC BACHELOR OF SCIENCE DEGREE / *UITKOMSTE VIR 'N GENERIESE BACCALAUREUS SCIENTIAE GRAAD*

a. General / *Algemeen*

At the end of the study period, the student will have the ability to integrate the basic knowledge and techniques of the core subjects in the curriculum he completed with a view to investigating phenomena in nature relevant to the core subjects of the curriculum and solving relevant *problems. /*

Aan die einde van die studie is die student in staat om die basiese kennis en tegnieke van die kernvakke van die kurrikulum wat hy voltooi het, te integreer om verskynsels in die natuur wat met die kernvakke van die kurrikulum verband hou te ondersoek en gepaardgaande probleme op te los.

b. Knowledge / *Kennis*

The student must have a thorough knowledge of the core subjects of the curriculum he completed in order to be able to apply his knowledge; to understand the physical reality in terms of this knowledge; and to be ready to continue with postgraduate studies in one of the core subjects. /

Die student moet 'n deeglike kennis van die kernvakke van die kurrikulum wat voltooi is, besit, sodat die kennis toegepas kan word; die fisiese werklikheid in terme van hierdie kennis verstaan kan word; die student gereed is om met nagraadse studie in een van die kernvakke voort te kan gaan.

c. Skills / *Vaardighede*

The student must have acquired the following skills:

- the ability to retrieve knowledge and information electronically and otherwise in preparation of lifelong learning;
- the ability to perform mathematical-analytical and mathematical-numerical data processing, problem solving and modelling;
- the ability to process, evaluate and report on scientific information;
- where applicable, the basic laboratory skills;
- the ability to work in groups and where necessary to exercise the necessary leadership.

Die student moet die volgende vaardighede aangeleer het:

- *die vermoë besit om kennis en inligting te ontsluit, elektronies en andersins ter voorbereiding van lewenslange leer;*
- *wiskundig-analitiese en wiskundig-numeriese dataverwerking, probleemoplossing en modellering kan doen;*
- *in staat wees om wetenskaplike inligting te kan verwerk, evalueer en daaroor verslag te kan doen;*
- *waar van toepassing oor basiese laboratoriumvaardighede beskik;*
- *in staat wees om in groepe te kan saamwerk en waar nodig leierskap te kan uitoefen/aanvaar.*

d. Values / *Waardes*

The student ought to have acquired the following values:

- the ability to understand and strive after the normative aspects of practising science and in this way demonstrate a sense of responsibility towards fellow human beings and the environment in scientific investigations;
- scientific honesty and integrity.

Die student moet die volgende waardes aangeleer het:

- *die normatiewe aspekte van wetenskapsbeoefening verstaan en nastreef en sodoende 'n verantwoordelikheidsin teenoor die medemens en omgewing in wetenskaplike ondersoeke openbaar;*
- *wetenskaplike eerlikheid en integriteit.*

NAS.1.17.4.1 Programmes / *Programme*

All curricula in this programme are compiled from the module list in N.14.

NOTE: Core modules (majors) are indicated by a (H). /

Al die kurrikulums is saamgestel uit modules in die modulelys in N.14.

OPMERKING: *Kernmodules (hoofvakke) word telkens met ʼn (H) daarnaas aangedui.*

Every year a student registers subject to the rules valid for the specific year. If the curriculum/programme for which a student registered the previous year has been changed in this Calendar, the curriculum/programme of the student will be adapted according to the version in this Calendar. If possible, adaptation will be done in such a way that a student's study load will not be increased. /

'n Student registreer elke jaar onder die reëls wat vir die betrokke jaar geld. Indien die kurrikulum/program waarvoor 'n student in 'n voorafgaande jaar geregistreer het in hierdie jaarboek gewysig is, sal die student se kurrikulum/program aangepas word om in ooreenstemming te wees met die weergawe in hierdie jaarboek. Indien enigsins moontlik sal aanpassings so gedoen word dat 'n student se studie las nie daardeur verswaar word nie.

If obstacles such as insurmountable clashes in the schedule should arise because of necessary curriculum/programme changes, the Dean may decide that students who enrolled previously must switch to the changed curriculum/programme, even if an increase should result. /

Indien struikelblokke soos onoorkomelike roosterbotsings egter as gevolg van noodsaaklike kurrikulum- programwysigings sou onstaan, mag die Dekaan beslis dat reeds ingeskrewe studente na die gewysigde kurrikulum/program sal oorslaan, al sou dit 'n verswaring tot gevolg hê.

In the case where students have to repeat one or more modules at a specific year level of a curriculum/programme, the following applies: /

In die geval waar studente in 'n bepaalde jaarvlak van 'n kurrikulum/program een of meer modules uit een of meer vorige jaarvlakke van 'n kurrikulum/program moet herhaal, geld die volgende:

- The total number of credits of the modules taken by a student in any semester at any year level, also by the student who has to repeat modules, is limited in accordance with the General Rule 2.3. /

  Die totale kredietpunte van die modules wat 'n student, wat ook modules moet herhaal, in enige semester op enige jaarvlak mag neem, word beperk in ooreenstemming met Algemene Reël 2.3

- The Faculty cannot undertake that modules that have to be repeated and the other modules that must be taken will all fit in the class schedule. Clashes that arise because of modules that have to be repeated will result in the student having to take those modules in a future year. /

  Die fakulteit kan nie onderneem dat modules wat herhaal moet word saam met die ander modules wat geneem moet word, op die rooster sal inpas nie; roosterbotsings wat ontstaan as gevolg van modules wat herhaal moet word, sal tot gevolg hê dat die student daardie modules in 'n latere jaar moet neem;

- If a student has not completed the modules of a specific year level of the curriculum/programme for which he enrolled in the minimum prescribed period of study, and the modules of the specific year level of the curriculum/programme have since been changed, the Dean may decide that the student must complete the relevant year level as published in the latest edition of the Calendar. This means that if a student must repeat a module that has since been replaced by another module, the Dean may decide that the student must take the latter module. /

  Indien 'n student modules van 'n bepaalde jaarvlak van die kurrikulum/program waarvoor hy ingeskryf is, nie in die minimum voorgeskrewe studietydperk voltooi het nie en die modules van die betrokke jaarvlak van dié kurrikulum/program is intussen gewysig, mag die dekaan beslis dat die student die betrokke jaarvlak moet voltooi soos gepubliseer in die jongste uitgawe van die jaarboek. Dit kom daarop neer dat indien die student 'n module moet herhaal wat intussen in die kurrikulum/program deur 'n ander module vervang is, die dekaan mag beslis dat die student laasgenoemde module moet neem.

NAS.1.17.4.2 Articulation possibilities / *Artikulasiemoontlikhede*

Credits will be awarded for modules that have been passed in other faculties or at other universities, provided such modules contribute to the outcomes and total credit requirements of the curriculum/programme concerned. /

Krediet sal verleen word vir modules wat in ander fakulteite of by ander universiteite geslaag is, mits sodanige modules bydra tot die uitkoms- en totale kredietvereistes van die betrokke kurrikulum/program.

With the basic and applied skills that the student has acquired by this qualification in the mathematical, computer and natural science disciplines he will be prepared to continue further learning in several specialised subject areas at other institutions. /

Met die basiese en toepasbare vaardighede wat die student met hierdie kwalifikasie in die wiskundige, rekenaarkundige en natuurwetenskaplike dissiplines opgedoen het, sal die student toegerus wees om met verdere leer voort te gaan in verskeie gespesialiseerde vakgebiede aan ander inrigtings.

NAS.1.17.5 BACHELOR OF SCIENCE WITH CHEMISTRY AND PHYSICS/ *BACCALAUREUS SCIENTIAE MET CHEMIE EN FISIKA*

NAS.1.17.5.1 Programme outcomes / *Programuitkomste*

On completion of studies, the student will have the ability to integrate the basic knowledge and techniques of Physics and Mathematics in the curriculum completed with a view to investigating phenomena in the nature relevant to the core subjects of the curriculum and solving relevant problems. /

Aan die einde van die studie is die student in staat om die basiese kennis en tegnieke van die kernvakke wat voltooi is, te integreer om verskynsels in die natuur wat met die kernvakke van die kurrikulum/program verband hou te ondersoek en gepaardgaande probleme op te los.

Qualification Code/ *Kwalifikasiekode*			**2FF H05 - N301P 2FF H05 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH), Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	NCHE211	H	8	NCHE311	H	16
NCHE111	H	12	NCHE212	H	8	NCHE312	H	16
NPHY111	H	12	NPHY211	H	8	NPHY311	H	16
CMPG111	X	12	NPHY212	H	8	NPHY312	H	16
MTHS111	X	12	MTHS212	X	8			
			MTHS211	X	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	NCHE221	H	8	NCHE321	H	16
NCHE121	H	12	NCHE222	H	8	NCHE322	H	16
NPHY121	H	12	NPHY221	H	8	NPHY321	H	16
APPM122	X	12	NPHY222	H	8	NPHY322	H	16
MTHS121	X	12	MTHS222	X	8			
			MTHS221	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.6 BACHELOR OF SCIENCE WITH CHEMISTRY, MATHEMATICS AND APPLIED MATHEMATICS/ *BACCALAUREUS SCIENTIAE MET CHEMIE, WISKUNDE EN TOEGEPASTE WISKUNDE*

Note: Students enrolled for this degree, need to take APPM311 & APPM321 as additional modules if they wish to do an Honours degree in Applied Mathematics, and MTHS311 & MTHS321 as additional modules if they wish to do an Honours degree in Mathematics.

Qualification Code/ *Kwalifikasiekode*			**2FF H22 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	NCHE211	H	8	NCHE311	H	16
NCHE111	H	12	NCHE212	H	8	NCHE312	H	16
NPHY111	X	12	NPHY212	X	8	APPM312	H	16
STTN111	X	12	APPM211	H	8	MTHS312	H	16
MTHS111	H	12	MTHS211	H	8			
			MTHS212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	NCHE221	H	8	NCHE321	H	16
NCHE121	H	12	NCHE222	H	8	NCHE322	H	16
NPHY121	X	12	NPHY221	X	8	APPM322	H	16
APPM122	H	12	APPM222	H	8	MTHS322	H	16
MTHS121	H	12	MTHS221	H	8			
			MTHS222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.7 BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND CHEMISTRY

Qualification Code/ *Kwalifikasiekode*			**2FF H13 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	APPM212	H	8	APPM311	H	16
APPM111	H	12	APPM213	H	8	APPM313	H	16
MTHS111	X	12	MTHS211	X	8	NCHE311	H	16
NCHE111	H	12	MTHS212	X	8	NCHE312	H	16
NPHY111	X	12	NCHE211	H	8			
			NCHE212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	APPM222	H	8	APPM322	H	16
APPM122	H	12	APPM223	H	8	APPM323	H	16
MTHS121	X	12	MTHS221	X	8	NCHE321	H	16
NCHE121	H	12	MTHS222	X	8	NCHE322	H	16
NPHY121	X	12	NCHE221	H	8			
			NCHE222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.8 BACHELOR OF SCIENCE WITH CHEMISTRY AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*			**2FF H11 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	NCHE211	H	8	NCHE311	H	16
NCHE111	H	12	NCHE212	H	8	NCHE312	H	16
MTHS111	H	12	MTHS211	H	8	MTHS311	H	16
CMPG111	X	12	MTHS212	H	8	MTHS312	H	16
NPHY111	X	12	NPHY211	X	8			
			NPHY212	X	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	NCHE221	H	8	NCHE321	H	16
NCHE121	H	12	NCHE222	H	8	NCHE322	H	16
MTHS121	H	12	MTHS221	H	8	MTHS321	H	16
CMPG121	X	12	MTHS222	H	8	MTHS322	H	16
NPHY121	X	12	NPHY221	X	8			
			NPHY222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.9 BACHELOR OF SCIENCE WITH BIOCHEMISTRY AND CHEMISTRY / *BACCALAUREUS SCIENTIAE MET BIOCHEMIE EN CHEMIE*

Qualification Code/ *Kwalifikasiekode*	**2FF H06 - N301P** **2FF H06 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH) Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	*FLGX213 **OR/*OF*** MKBN211	X	16	BCHS316	H	16
*FLGX113 **OR/*OF*** **NPHY111	X	12	BCHN213	H	16	BCHS317	H	16
MCBN111	H	12	NCHE211	H	8	NCHE311	H	16
MTHS114	X	12	NCHE212	H	8	NCHE312	H	16
NCHE111	H	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	NCHE221	H	8	BCHS321	H	16
MCBN121	H	12	NCHE222	H	8	BCHS322	H	16
*FLGX123 **OR/*OF*** **NPHY121	X	12	BCHN222	H	16	NCHE321	H	16
MTHS124	X	12	*FLGX223 **&** *FLGX224 **OR/*OF*** MKBS221	X X X	8 8 16	NCHE322	H	16
NCHE121	H	12	WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*__FLGX__ only for Potch students- not offered at Mahikeng Campus.
**__NPHY111/ 121__ only for Mahikeng students.

NAS.1.17.10 BACHELOR OF SCIENCE WITH PHYSICS AND MATHEMATICS / *BACCALAUREUS SCIENTIAE MET FISIKA EN WISKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2FF H23 - N301P** **2FF H23 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH); Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	NPHY211	H	8	NPHY311	H	16
NPHY111	H	12	NPHY212	H	8	NPHY312	H	16
CMPG111	X	12	APPM211 (PC only) **OR/ *OF*** APPM213 (MC only)	X	8	MTHS311	H	16
STTN115* **OR/*OF*** APPM111**	X	12	APPM212	X	8	MTHS312	H	16
MTHS111	H	12	MTHS211	H	8			
			MTHS212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	NPHY221	H	8	NPHY321	H	16
NPHY121	H	12	NPHY222	H	8	NPHY322	H	16
CMPG121	X	12	APPM221(PC only) **OR/ *OF*** APPM223 (MC only)	X	8	MTHS321	H	16
APPM122	X	12	APPM222	X	8	MTHS322	H	16
MTHS121	H	12	MTHS221	H	8			
			MTHS222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

***STTN115**- Only available on PC
****APPM111** - Only available on MC

NAS.1.17.11 BACHELOR OF SCIENCE WITH PHYSICS AND APPLIED MATHEMATICS/ *BACCALAUREUS SCIENTIAE MET FISIKA EN TOEGEPASTE WISKUNDE*

NAS.1.17.11.1 Programme outcomes/ *Programuitkomste*

Please note that the module APPM323*** Fluid Mechanics will only be presented on the Potchefstroom campus if there is sufficient interest, and if capacity allows it. Please consult the subject group Mathematics and Applied Mathematics for advice in this regard. /

*Let asseblief daarop dat die module APPM323*** Vloeimeganika slegs op die Potchefstroom kampus aangebied sal word indien daar voldoende belangstelling is en kapasiteit dit toelaat. Raadpleeg asseblief die vakgroep Wiskunde en Toegepaste Wiskunde vir advies in die verband*.

NAS.1.17.11.2 Bachelor of Science with Physics and Applied Mathematics / *Baccalaureus Scientiae met Fisika en Toegepaste Wiskunde*

Qualification Code/ *Kwalifikasiekode*	**2FF H24 - N301P** **2FF H24 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH); Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	NPHY211	H	8	NPHY311	H	16
CMPG111	X	12	NPHY212	H	8	NPHY312	H	16
NPHY111	H	12	APPM211 (PC only) **OR/ *OF*** APPM213 (MC only)	H	8	APPM311	H	16
MTHS111	X	12	APPM212	H	8	APPM312*(PC) APPM313**(MC)	H	16
STTN115* (PC) **OR/*OF*** APPM111**(MC)	X	12	MTHS211	X	8			
			MTHS212	X	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	NPHY221	H	8	NPHY321	H	16
NPHY121	H	12	NPHY222	H	8	NPHY322	H	16
CMPG121	X	12	APPM221 (PC only) **OR/ *OF*** APPM223 (MC only)	H	8	**Choose 2 of the following modules / *Kies 2 van die volgende modules***		
APPM122	H	12	APPM222	H	8			
MTHS121	X	12	MTHS221	X	8			
			MTHS222	X	8	APPM321***(PC) **OR/*OF*** APPM322 **OR/*OF*** APPM323***	H H H	16 16 16
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*__STTN115 & APPM312__ only offered at PC/ *STTN**115* & APPM312 Slegs op PC beskikbaar.*
__APPM111/313__ only offered at MC / ***APPM111/313* *Slegs op MC beskikbaar.*
__APPM321__ only offered at PC and __APPM323__ will be offered if student numbers justify it/ ***APPM321 *slegs op PC beskikbaar en* ***APPM323*** *slegs beskikbaar as studentegetalle dit regverdig.*

NAS.1.17.12 BACHELOR OF SCIENCE WITH APPLIED MATHEMATICS AND ELECTRONICS

Qualification Code/ *Kwalifikasiekode*	**2FF H14 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	APPM212	H	8	APPM311	H	16
APPM111	H	12	APPM213	H	8	APPM313	H	16
CMPG111	X	12	MTHS211	X	8	ELYM315	H	16
MTHS111	X	12	MTHS212	X	8	ELYM316	H	16
ELYM115	H	12	ELYM215	H	16			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	APPM222	H	8	APPM322	H	16
APPM122	H	12	APPM223	H	8	APPM323	H	16
CMPG121	X	12	MTHS221	X	8	ELYM327	H	16
MTHS121	X	12	MTHS222	X	8	ELYM328	H	16
ELYM127	H	12	ELYM227	H	16			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.13 BACHELOR OF SCIENCE WITH ELECTRONICS AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*	**2FF H19 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	APPM212	X	8	MTHS311	H	16
APPM111	X	12	APPM213	X	8	MTHS312	H	16
ELYM115	H	12	ELYM215	H	16	ELYM315	H	16
CMPG111	X	12	MTHS211	H	8	ELYM316	H	16
MTHS111	H	12	MTHS212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	APPM222	X	8	MTHS321	H	16
APPM122	X	12	APPM223	X	8	MTHS322	H	16
ELYM127	H	12	ELYM227	H	16	ELYM327	H	16
CMPG121	X	12	MTHS221	H	8	ELYM328	H	16
MTHS121	H	12	MTHS222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.14 BACHELOR OF SCIENCE WITH ELECTRONICS AND PHYSICS

Qualification Code/ *Kwalifikasiekode*			2FF H20 - N301M					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
ALDE111	X	12	ELYM215	H	16	ELYM315	H	16
ELYM115	H	12	MTHS211	X	8	ELYM316	H	16
MTHS111	X	12	MTHS212	X	8	NPHY311	H	16
CPMG111	X	12	NPHY211	H	8	NPHY312	H	16
NPHY111	H	12	NPHY212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		60	Total 1st/ Totaal 1ste Semester		60	Total 1st/ Totaal 1ste Semester		64
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
ALDE122	X	12	ELYM227	H	16	ELYM327	H	16
ELYM127	H	12	MTHS221	X	8	ELYM328	H	16
MTHS121	X	12	MTHS222	X	8	NPHY321	H	16
CPMG121	X	12	NPHY221	H	8	NPHY322	H	16
NPHY121	H	12	NPHY222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		64
Total Year Level 1/ Totaal Jaarvlak 1		120	Total Year Level 2/ Totaal Jaarvlak 2		120	Total Year Level 3/ Totaal Jaarvlak 3		128
Total Credits for the Programme/ Totale Krediete vir die Program								368

NAS.1.17.15 BACHELOR OF SCIENCE WITH PHYSICS AND COMPUTER SCIENCE / *BACCALAUREUS SCIENTIAE MET FISIKA EN REKENAARWETENSKAP*

NAS.1.17.15.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program*

CMPG222** and ****CMPG224** are campus electives - PC does **222 and MC does ****224**
CMPG315** and ****CMPG313** are campus electives – PC does **315, and MC does ****CMPG313**.
In the second semester of the third year PC does advanced DB (***CMPG321**) and MC does Networks (****CMPG325**)
* **STTN115** only available for PC.

Qualification Code/ *Kwalifikasiekode*			**2FF H25 - N301P 2FF H25 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH), Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	CMPG211	H	16	CMPG311	H	16
CMPG111	H	12	MTHS211	X	8	CMPG313**(MC) **OR/*OF*** CMPG315*(PC)	H	16
MTHS111	X	12	MTHS212	X	8	NPHY311	H	16
STTN115*(PC) **OR/*OF*** NCHE111	X	12	NPHY211	H	8	NPHY312	H	16
NPHY111	H	12	NPHY212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	MTHS221	X	8	CMPG321*(PC) **OR/ *OF*** CMPG325**(MC)	H	16
CMPG121	H	12	CMPG221	H	8	CMPG324	H	16
MTHS121	X	12	CMPG222*(PC) **OR/ *OF*** CMPG224**(MC)	H	8	NPHY321	H	16
APPM122 **OR/*OF*** NCHE121	X	12	MTHS222	X	8	NPHY322	H	16
NPHY121	H	12	NPHY221	H	8			
			NPHY222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.16 BACHELOR OF SCIENCE WITH CHEMISTRY AND COMPUTER SCIENCE

Qualification Code/ *Kwalifikasiekode*			**2FF H31 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	MTHS211	X	8	CMPG311	H	16
NCHE111	H	12	MTHS212	X	8	CMPG313	H	16
MTHS111	X	12	CMPG211	H	16	NCHE311	H	16
CMPG111	H	12	NCHE211	H	8	NCHE312	H	16
NPHY111	X	12	NCHE212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	NCHE221	H	8	CMPG324	H	16
NCHE121	H	12	NCHE222	H	8	CMPG325	H	16
MTHS121	X	12	CMPG221	H	8	NCHE321	H	16
CMPG121	H	12	CMPG224	H	8	NCHE322	H	16
NPHY121	X	12	MTHS221	X	8			
			MTHS222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.17 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ELECTRONICS

Qualification Code/ ***Kwalifikasiekode***	**2FF H17 - N301M**
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Mahikeng (ENGLISH)
Delivery Mode/ ***Metode van Aflewering***	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	CMPG211	H	16	CMPG311	H	16
ELYM115	H	12	ELYM215	H	16	CMPG313	H	16
MTHS111	X	12	MTHS211	X	8	ELYM315	H	16
CMPG111	H	12	MTHS212	X	8	ELYM316	H	16
NPHY111	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	CMPG221	H	8	CMPG324	H	16
ELYM127	H	12	CMPG224	H	8	CMPG325	H	16
MTHS121	X	12	ELYM227	H	16	ELYM327	H	16
CMPG121	H	12	MTHS221	X	8	ELYM328	H	16
NPHY121	X	12	MTHS222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.18 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND STATISTICS/ *BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN STATISTIEK*

Qualification Code/ *Kwalifikasiekode*	**2FF H26 - N301P** **2FF H26 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH see NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
STTN115	H	12	STTN215	H	16	CMPG313 **OR/ *OF*** CMPG315	H	16
MTHS111	X	12	MTHS211	X	8	STTN316	H	24
NPHY111* ECON112**	X	12	MTHS212	X	8	STTN317	H	8
ALDE/A111	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG121	H	12	CMPG221	H	8	CMPG321	H	16
STTN125	H	12	CMPG222	H	8	CMPG324	H	16
MTHS121	X	12	STTN225	H	16	STTN326	H	16
APPM122* ECON122**	X	12	MTHS221	X	8	STTN327	H	16
ALDE/A122	X	12	MTHS222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*Can only be taken on Potchefstroom campus / * *Kan slegs by Potchefstroomkampus geneem word.*
**Can only be taken on Vanderbijlpark campus / ** *Kan slegs by die Vaaldriehoekkampus geneem word.*

NAS.1.17.19 A: BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND MATHEMATICS/ *A: BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN WISKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2FF H09 - N301P** **2FF H09 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
STTN115* **OR/*OF*** APPM111**	X	12	STTN215* **OR/*OF*** APPM212** **&** APPM213**	X	16 8 8	CMPG313** **OR/*OF*** CMPG315*	H	16
MTHS111	H	12	MTHS211	H	8	MTHS311	H	16
NPHY111	X	12	MTHS212	H	8	MTHS312	H	16
ALDE/A111	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
APPM122	H	12	CMPG221	H	8	CMPG324	H	16
CMPG121	H	12	CMPG222* **OR/*OF*** CMPG224**	H	8 8	CMPG321* **OR/*OF*** CMPG325**	H	16
MTHS121	H	12	MTHS221	H	8	MTHS321	H	16
			MTHS222	H	8	MTHS322	H	16
STTN125* **OR/*OF*** NPHY121**	X	12	STTN225* **OR/*OF*** APPM222** **&** APPM223**	X	16 8 8			
ALDE/A122	X	12	WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**369**

1st & 2nd yr.: ***STTN115/125** and **STTN215/225** only PC
1st yr.: ****APPM111**, ****NPHY121** and ****APPM212/213** and ****APPM222/223** only MC
2nd yr.: ***CMPG222** only PC/PK and ****CMPG224** only MC
3rd yr.: ***CMPG313/315** are electives on PC, but MC should take ****CMPG313**.
3rd yr.: In the 2nd semester of the 3rd yr. PC does ***CMPG321** and MC does ****CMPG325**

NAS.1.17.19.1 B: Bachelor of Science with Computer Science and Mathematics/ B: *Baccalaureus Scientiae met Rekenaarwetenskap en Wiskunde*

Qualification Code/ *Kwalifikasiekode*			**2FF H09 - N301V**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Vanderbijlpark (ENGLISH see NAS1.7)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
STTN115	X	12	STTN215* **OR/*OF*** APPM212** **&** APPM213**	X	16 8 8	CMPG313** **OR/*OF*** CMPG315*	H	16
MTHS111	H	12	MTHS211	H	8	MTHS311	H	16
APPM111	X	12	MTHS212	H	8	MTHS312	H	16
ALDE/A111	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
APPM122	H	12	CMPG221	H	8	CMPG324	H	16
CMPG121	H	12	CMPG222* **OR/*OF*** CMPG224**	H	8 8	CMPG321* **OR/*OF*** CMPG325**	H	16
MTHS121	H	12	MTHS221	H	8	MTHS321	H	16
STTN125	X	12	MTHS222	H	8	MTHS322	H	16
ALDE/A122	X	12	STTN225* **OR/*OF*** APPM222** **&** APPM223**	X	16 8 8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.17.20 BACHELOR OF SCIENCE WITH COMPUTER SCIENCE AND ECONOMICS/ *BACCALAUREUS SCIENTIAE MET REKENAARWETENSKAP EN EKONOMIE*

Qualification Code/ *Kwalifikasiekode*	**2FF H28 - N301P** **2FF H28 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH, see NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	ECON211	H	16	ECON313*	H	16
CMPG111	H	12	CMPG211	H	16	ECON314*	H	16
MTHS111	X	12	MTHS211	X	8	CMPG311	H	16
ECON112	H	12	MTHS212	X	8	CMPG315	H	16
ACCF111 **OR/*OF*** ACCS111	X	16	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	ECON221	H	16	ECON322*	H	16
CMPG121	H	12	CMPG221	H	8	ECON325*	H	16
MTHS121	X	12	CMPG222	H	8	CMPG321	H	16
ECON122	H	12	MTHS221	X	8	CMPG324	H	16
ACCF121 **OR/*OF*** ACCS121	X	16	MTHS222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**64**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**128**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**376**

***Please note** that as of 2020, the package of modules **ECON313, ECON314, ECON322** and **ECON325** will be a prerequisite for Honours studies in Economics.

Neem kennis** dat vanaf 2020, die volgende modules as voorvereistes vir die Honneursstudie in Ekonomie sal wees: **ECON313, ECON314, ECON322** en **ECON325.

NAS.1.17.21 BACHELOR OF SCIENCE WITH MATHEMATICS AND ECONOMY/ *BACCALAUREUS SCIENTIAE MET WISKUNDE EN EKONOMIE*

Qualification Code/ *Kwalifikasiekode*	**2FF H29 - N301P** **2FF H29- N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH) Vanderbijlpark (ENGLISH see NAS.1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	ECON211	H	16	ECON313*	H	16
CMPG111	X	12	CMPG211	X	16	ECON314*	H	16
MTHS111	H	12	MTHS211	H	8	MTHS311	H	16
ECON112	H	12	MTHS212	H	8	MTHS312	H	16
ACCF111 **OR/*OF*** ACCS111	X	16	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	ECON221	H	16	ECON322*	H	16
CMPG121	X	12	CMPG221 **OR/*OF*** APPM222	X	8	ECON325*	H	16
MTHS121	H	12	CMPG222	X	8	MTHS321	H	16
ECON122	H	12	MTHS221	H	8	MTHS322	H	16
ACCF121 **OR/*OF*** ACCS121	X	16	MTHS222	H	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**64**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**128**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**376**

NAS.1.17.22 BACHELOR OF SCIENCE WITH GEOGRAPHY AND APPLIED MATHEMATICS/ *BACCALAUREUS SCIENTIAE MET GEOGRAFIE EN TOEGEPASTE WISKUNDE*

Qualification Code/ *Kwalifikasiekode*			**2FF H30 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	APPM212	H	8	APPM311	H	16
CMPG115	X	12	GEOG211	H	16	APPM312	H	16
GEOG111	H	12	GEOG212	H	8	GEOG311	H	32
NPHY111	X	12	MTHS211	X	8			
MTHS111	X	12	MTHS212	X	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A121	X	12	APPM222	H	8	APPM321	H	16
GEOG121	H	12	GEOG221	H	16	APPM322	H	16
NPHY121	X	12	NPHY222	X	8	GEOG321	H	32
MTHS121	X	12	MTHS223	X	8			
STTN122	X	12	MTHS224	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.18 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE*

NAS.1.18.1 PROGRAMME OUTCOMES / PROGRAMUITKOMSTE

At the completion of this qualification in Mathematical Sciences the student should have:

- the ability to integrate the knowledge and techniques of the core subjects in the programme in order to understand reality, investigate and apply the knowledge and techniques to solve relevant problems;
- the skills to gather information electronically and otherwise, and be able to process, evaluate and report on scientific information, solve problems, prepare for lifelong learning, and finally, to perform mathematical-analytical and mathematical-numerical data processing;
- the ability to work as an individual or in groups and, where necessary to exercise the necessary leadership; to be able to communicate in writing and present scientific data and possible solutions to identified problems orally;
- the ability to maintain high ethical norms when practising science and demonstrating responsibility towards fellow human beings and the environment, in particular when performing scientific investigations. /

By voltooiing van die kwalifikasie in Wiskundige Wetenskappe behoort die student die volgende vaardighede te toon:

- *die kennis en tegnieke van die kernvakke in die program te kan integreer om die werklikheid te verstaan, en kennis en tegnieke toe te pas om relevante probleme op te los;*
- *die vermoë om informasie elektronies en andersins te versamel, te kan prosesseer, beoordeel, en verslag te kan doen oor wetenskaplike informasie, probleme op te los, voor te berei vir lewenslange ondersoek, en laastens, om wiskundig-analitiese en wiskundig-numeriese data prosessering te doen;*
- *die vermoë om as individu of in 'n groep te werk en, waar nodig die nodige leierskap te kan uitoefen; om wetenskaplike data en moontlike oplossings wat geïdentifiseer is, in skrif of mondelings te kan aanbied;*
- *die vermoë om in die beoefening van wetenskap hoë etiese norme te kan handhaaf, en verantwoordelikheid teenoor medemense en die omgewing te kan toon, in die besonder met die uitvoer van wetenskaplike ondersoeke.*

NAS.1.18.2 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH STATISTICS AND MATHEMATICS/ *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE MET STATISTIEK EN WISKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2FG H02 - N301P** **2FG H02 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH) Vanderbijlpark (ENGLISH, see NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	X	12	CMPG211	X	16	MTHS311	H	16
*NPHY111(PC) *APPM111(VC)	X	12	MTHS211	H	8	MTHS312	H	16
MTHS111	H	12	MTHS212	H	8	STTN316	H	24
STTN115	H	12	STTN215	H	16	STTN317	H	8
ALDE/A111	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
APPM122	H	12	CMPG221	X	8	MTHS321	H	16
CMPG121	X	12	CMPG222	X	8	MTHS322	H	16
MTHS121	H	12	MTHS221	H	8	STTN326	H	16
STTN125	H	12	MTHS222	H	8	STTN327	H	16
ALDE/A122	X	12	STTN225	H	16			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*__NPHY111__- Potch campus only and **APPM111**- Vanderbijlpark campus only.

NAS.1.18.3 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE*

NAS.1.18.3.1 Programme outcomes: Mathematics / *Programuitkomste: Wiskunde*

To fulfil the requirements of this degree all students on the Potchefstroom campus, must take at least *two of the three modules in the second semester of the third year: APPM321 Dynamical Systems, APPM322 Optimisation and APPM323 Fluid Mechanics. Please note that the module APPM323** Fluid Mechanics will only be presented on the Potchefstroom campus if there is sufficient interest, and if capacity allows it. Please consult the subject group Mathematics and Applied Mathematics for advice in this regard. /

*Om die voorwaardes van die graad te bereik, moet alle studente op die Potchefstroom in die tweede semester van die derde jaar ten minste *twee van die drie modules APPM321 Dinamiese Stelsels, APPM322 Optimalisering en APPM323 Vloeimeganika voltooi. Let asseblief daarop dat die module APPM323** Vloeimeganika slegs op die Potchefstroom kampus aangebied sal word indien daar voldoende belangstelling is en kapasiteit dit toelaat. Raadpleeg asseblief die vakgroep Wiskunde en Toegepaste Wiskunde vir advies in die verband.*

NAS.1.18.4 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES / *BACCALAUREUS SCIENTIAE IN WISKUNDIGE WETENSKAPPE*

Qualification Code/ *Kwalifikasiekode*			**2FG H01 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	STTN215	X	16	APPM311	H	16
NPHY111	X	12	APPM211	H	8	APPM312	H	16
CMPG111	X	12	APPM212	H	8	MTHS311	H	16
STTN115	X	12	MTHS211	H	8	MTHS312	H	16
MTHS111	H	12	MTHS212	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	APPM221	H	8	MTHS321	H	16
CMPG122	X	12	APPM222	H	8	MTHS322	H	16
STTN125	X	12	STTN225	X	16	***Select 2 of the following modules/ **Kies 2 van die volgende modules****		
APPM122	H	12	MTHS221	H	8	APPM321	H	16
MTHS121	H	12	MTHS222	H	8	APPM322	H	16
			WVNS221	X	12	APPM323**	H	16
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.18.5 BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES WITH APPLIED MATHEMATICS AND MATHEMATICS

Qualification Code/ *Kwalifikasiekode*			**2FG H03 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	APPM212	H	8	APPM311	H	16
APPM111	H	12	APPM213	H	8	APPM313	H	16
CMPG111	X	12	MTHS211	H	8	MTHS311	H	16
NPHY111	X	12	MTHS212	H	8	MTHS312	H	16
MTHS111	H	12	NPHY211	X	8			
			NPHY212	X	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	APPM222	H	8	APPM322	H	16
APPM122	H	12	APPM223	H	8	APPM323	H	16
CMPG121	X	12	MTHS221	H	8	MTHS321	H	16
MTHS121	H	12	MTHS222	H	8	MTHS322	H	16
NPHY121	X	12	NPHY221	X	8			
			NPHY222	X	8			
			WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.19 BACHELOR OF SCIENCE IN THE CENTRE FOR BUSINESS MATHEMATICS AND INFORMATICS / *BACCALAUREUS SCIENTIAE IN DIE SENTRUM VIR BEDRYFSWISKUNDE EN INFORMATIKA*

NAS.1.19.1 ARTICULATION POSSIBILITIES / *ARTIKULASIEMOONTLIKHEDE*

The programme grants admission to postgraduate studies in Hons BSc (BMI) programmes, and may also grant admission to honours studies in Economics, Statistics or Computer Science. The honours BSc (BMI) programmes are subject to the following requirements: /

Die program gee toelating tot nagraadse studie in die Honneurs BSc (BWI)-programme, en kan ook toelating gee tot honneursstudie in Ekonomie, Statistiek of Rekenaarwetenskap. Die Honneurs BSc (BWI) programme is onderhewig aan die volgende vereistes:

Honours curriculum / *Honneurs kurrikulum*	**Graduate curriculum / *Voorgraadse kurrikulum***
BSc Hons in Financial Mathematics / *Finansiële Wiskunde*	Financial Mathematics / *Finansiële Wiskunde*
BSc Hons in Quantitative Risk Management / *Kwantitatiewe Risikobestuur*	Quantitative Risk Management / *Kwantitatiewe Risikobestuur* **OR / *OF*** Financial Mathematics / *Finansiële Wiskunde* **OR / *OF*** Actuarial Science / *Aktuariële Wetenskap*
BSc Hons in Business Analytics/ *Besigheidsanalise*	Quantitative Risk Management / *Kwantitatiewe Risikobestuur* **OR / *OF*** Financial Mathematics / *Finansiële Wiskunde* **OR / *OF*** Business Analytics/ *Besigheidsanalise* **OR / *OF*** Actuarial Science / *Aktuariële Wetenskap*
BSc Hons in Actuarial Science / *Aktuariële Wetenskap*	Actuarial Science / *Aktuariële Wetenskap* (with five exemptions / *met vyf vrystellings)*

NAS.1.19.2 ADMISSION REQUIREMENTS OF THE QUALIFICATION/ *TOELATINGSVEREISTES VIR DIE KWALIFIKASIE*

See paragraph NAS.1.16.3 / *Kyk paragraaf NAS.1.16.3*

Mathematics Refresher course / *Wiskunde Opknapkursus*

Before the classes start in the beginning of the year, there will be a refresher course for Mathematics. All students that enrol for curriculums where the module MTHS111 appears, are strongly recommended to complete the refresher course. /

Voor die aanvang van klasse aan die begin van die jaar, word ’n opknapkursus vir Wiskunde aangebied. Alle studente wat inskryf vir kurrikulums waarin die module MTHS111 voorkom, word sterk aanbeveel om die opknapkursus te voltooi.

Permission requirements for all Business Mathematics and Informatics courses (Actuarial Science, Financial Mathematics, Business Analytics, Quantitative Risk Management), Mathematics 70-79% (level 6), APS Score 32. /

Toelatingsvereistes vir alle Bedryfswiskunde en Informatika-programme (Aktuariële Wetenskap, Finansiële Wetenskap, Bedryfsanalise, Kwantitatiewe Risikobestuur): Wiskunde 70% – 79% (vlak 6), APS Telling 32.

The following is only relevant to students in the Actuarial Science programme/

Die volgende het slegs betrekking op studente in die Aktuariële Wetenskapprogram:

- If a student does not pass all first year modules AND obtain a final mark of at least 60% for both BWIA121 and STTN125 in the first year of registration, then the student may not continue with the Actuarial Sciences, 2nd year curriculum. /

  Indien 'n student nie alle eerstejaar modules slaag EN 'n finale punt van ten minste 60% vir beide BWIA121 en STTN125 in die eerste jaar van studie behaal nie, mag 'n student nie voortgaan met die 2de jaar kurrikulum van Aktuariële Wetenskap nie.

- If a 2nd year student does not pass both BWIA272 and STTN225 in the first year of registration, then the student may not continue with the Actuarial Sciences, 3rd year curriculum. /

  Indien 'n 2e jaar student nie beide BWIA272 en STTN225 in die eerste jaar van registrasie slaag nie, mag die student nie voortgaan met die 3de jaar kurrikulum van Aktuariële Wetenskap nie.

- If a 3rd year student has 2 or more 1st and 2nd year modules outstanding at the start of his/her 3rd year, the student may not continue with the Actuarial Sciences, 3rd year curriculum. /

  Indien 'n 3e jaar student 2 of meer 1e en 2e jaar modules uitstaande het aan die begin van sy/haar 3e jaar, mag die student nie voortgaan met die 3de jaar kurrikulum van Aktuariële Wetenskap nie.

- If a 3rd year student fails or discontinues any of the following modules: BWIA313, BWIA314, BWIA324, BWIA371 in the first year of registration, then the student may not continue with the Actuarial Sciences curriculum. /

  Indien 'n 3e jaar student enige van die volgende modules: BWIA313, BWIA314, BWIA324, BWIA371 in die eerste jaar van registrasie staak of nie slaag nie, mag die student nie voortgaan met die Aktuariële Wetenskap kurrikulum nie.

In any of the above events the student must discuss the matter with either the Nominated Accreditation Actuary or Director of the Centre for BMI. /

In enige van bogenoemde gevalle, moet die student die Direkteur of die Genomineerde Akkreditasie Aktuaris van die Sentrum vir BWI, oor die saak spreek.

NAS.1.19.3 BACHELOR OF SCIENCE IN FINANCIAL MATHEMATICS / *BACCALAUREUS SCIENTIAE IN FINANSIËLE WISKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2FS H01 - N301P** **2FS H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH – See NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCS111 **OR/*OF*** ACCF111	H	16	ECON211	H	16	BWIA313	H	24
ECON112	H	12	EKRP211	H	16	STTN316	H	24
CMPG111	X	12	STTN215	H	16	STTN317	H	8
STTN115	H	12	MTHS211	H	8	MTHS311	H	16
MTHS111	H	12	MTHS212	H	8	WVES312	X	12
BWIA111	H	12						
Total 1st/ Totaal 1ste Semester		**76**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**84**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCS121 **OR/*OF*** ACCF121	H	16	EKRP221	H	16	BWIN321	H	16
ALDE122 / ALDA112*	X	12	STTN225	H	16	STTN326	H	16
BWIA121	H	12	APPM222	X	8	STTN327	H	16
ECON122	H	12	MTHS221	H	8	EKRP321	H	16
CMPG122	X	12	MTHS222	H	8			
STTN125	H	12	WVES222	X	12			
MTHS121	H	12						
Total 2nd/ Totaal 2de Semester		**88**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module / Jaarmodule								
			BWIA273	H	16			
Total Year Level 1/ Totaal Jaarvlak 1		**164**	**Total Year Level 2/ Totaal Jaarvlak 2**		**148**	**Total Year Level 3/ Totaal Jaarvlak 3**		**148**
Total Credits for the Programme/ Totale Krediete vir die Program								**460**

*Afrikaans-speaking students take **ALDA112** in the 1st semester, if TALL test is passed /

Afrikaanse studente neem **ALDA112 in die 1st semester, as TAG toets geslaag is.*

NAS.1.19.4 BACHELOR OF SCIENCE IN QUANTITATIVE RISK MANAGEMENT / *BACCALAUREUS SCIENTIAE IN KWANTITATIEWE RISIKOBESTUUR*

Qualification Code/ *Kwalifikasiekode*	**2FT H01 - N301P** **2FT H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH - See NAS 1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCF111	H	16	ECON211	H	16	BWIA313	H	24
BWIA111	X	12	EKRP211	H	16	EKRP311	H	16
ECON112	H	12	STTN215	H	16	STTN316	H	24
CMPG111	X	12	MTHS211	X	8	STTN317	H	8
STTN115	H	12	MTHS212	X	8	WVES312	X	12
MTHS111	X	12						
Total 1st/ Totaal 1ste Semester		**76**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**84**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCF121	H	16	EKRP221	H	16	BWIN321	H	16
ALDE122 / ALDA112*	X	12	STTN225	H	16	EKRP321	H	16
BWIA121	H	12	APPM222	X	8	STTN326	H	16
ECON122	H	12	MTHS222	X	8	STTN327	H	16
CMPG122	X	12	WVES222	X	12			
STTN125	H	12						
MTHS121	X	12						
Total 2nd/ Totaal 2de Semester		**88**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module / Jaarmodule								
			BWIA273	H	16			
			FINM271	H	18			
Total Year Level 1/ Totaal Jaarvlak 1		**164**	**Total Year Level 2/ Totaal Jaarvlak 2**		**158**	**Total Year Level 3/ Totaal Jaarvlak 3**		**148**
Total Credits for the Programme/ Totale Krediete vir die Program								**470**

*Afrikaans-speaking students take **ALDA112** in the 1st semester, if TALL test is passed /
Afrikaanse studente neem **ALDA112 in die 1st semester, as TAG toets geslaag is.*

NAS.1.19.5 BACHELOR OF SCIENCE IN BUSINESS ANALYTICS / *BACCALAUREUS SCIENTIAE IN BESIGHEIDSANALISE*

Qualification Code/ *Kwalifikasiekode*	**2FR H01 - N301P** **2FR H01 - N301V**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH – See NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCS111 **OR/*OF*** ACCF111	H	16	CMPG211	H	16	CMPG311	H	16
BWIA111	H	12	CMPG213	H	16	CMPG312	H	16
ECON112	H	12	STTN215	H	16	CMPG313	H	16
CMPG111	H	12	MTHS211	X	8	STTN316	H	24
STTN115	H	12	MTHS212	X	8	STTN317	H	8
MTHS111	X	12				WVES312	X	12
Total 1st/ Totaal 1ste Semester		**76**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**92**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCS121 **OR/*OF*** ACCF121	H	16	CMPG221	H	8	CMPG321	H	16
ALDE122 / ALDA112*	X	12	STTN225	H	16	CMPG322	H	16
BWIA121	H	12	APPM222	X	8	STTN326	H	16
CMPG121	H	12	MTHS222	X	8	STTN327	H	16
CMPG122	H	12	WVES222	X	12			
STTN125	H	12						
MTHS121	X	12						
Total 2nd/ Totaal 2de Semester		**88**	**Total 2nd/ Totaal 2de Semester**		**52**	**Total 2nd/ Totaal 2de Semester**		**64**
Year Module / *Jaarmodule*								
			BWIA273	H	16			
Total Year Level 1/ Totaal Jaarvlak 1		**164**	**Total Year Level 2/ Totaal Jaarvlak 2**		**132**	**Total Year Level 3/ Totaal Jaarvlak 3**		**156**
Total Credits for the Programme/ Totale Krediete vir die Program								**452**

*Afrikaans-speaking students take **ALDA112** in the 1st semester, if TALL test is passed /

Afrikaanse studente neem **ALDA112 in die 1st semester, as TAG toets geslaag is.*

NAS.1.19.6 BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE/ *BACCALAUREUS SCIENTIAE IN AKTUARIËLE WETENSKAP*

NAS.1.19.6.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program (see / sien 1.21.1)*

Qualification Code/ *Kwalifikasiekode*			**2FQ H01 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCF111	H	16	ECON211	H	16	BWIA313	H	24
BWIA111	H	12	EKRP211	H	16	BWIA314	H	12
ECON112	H	12	STTN215	H	16	STTN316	H	24
CMPG111	X	12	MTHS211	X	8	STTN317	H	8
STTN115	H	12	MTHS212	X	8	WVES312	X	12
MTHS111	X	12						
Total 1st/ Totaal 1ste Semester		**76**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**80**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ACCF121	H	16	EKRP221	H	16	BWIN321	H	16
ALDE122 / ALDA112*	X	12	STTN225	H	16	STTN326	H	16
BWIA121	H	12	APPM222	X	8	STTN327	H	16
ECON122	H	12	MTHS222	X	8	BWIA324	H	12
CMPG122	X	12	WVES222	X	12			
STTN125	H	12						
MTHS121	X	12						
Total 2nd/ Totaal 2de Semester		**88**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**60**
Year Module / *Jaarmodule*								
			BWIA272	H	24	BWIA371	H	32
			FINM271	H	18			
Total Year Level 1/ Totaal Jaarvlak 1		**164**	**Total Year Level 2/ Totaal Jaarvlak 2**		**166**	**Total Year Level 3/ Totaal Jaarvlak 3**		**172**
Total Credits for the Programme/ Totale Krediete vir die Program								**502**

*Afrikaans-speaking students take **ALDA112** in the 1st semester, if TALL test is passed /
Afrikaanse studente neem **ALDA112 in die 1st semester, as TAG toets geslaag is.*

NAS.1.20 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY / *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE*

NAS.1.20.1 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY - CONTACT/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE – KONTAK*

***Note**: For MTHS111 a minimum requirement of Gr 12 Maths, Level 5, is required.
For MTHS113 a minimum requirement of Gr 12 Maths, Level 4, is required.

Qualification Code/ *Kwalifikasiekode*	**2DX H01 - N302P (Contact/*Kontak*)** **2DX H01 - N302V (Contact/*Kontak)***
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH), Vanderbijlpark (ENGLISH see NAS1.7)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
STTN111	X	12	CMPG212	H	8	CMPG312	H	16
BMAN111	X	12	CMPG213	H	16	CMPG313	H	16
MTHS111 **OR/*OF*** MTHS113	X	12	CMPG214	H	8	CMPG315	H	16
ACCS111 **OR/*OF*** ACCF111		16	CMPG215	H	8			
			WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**68**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG121	H	12	CMPG221	H	8	CMPG321	H	16
CMPG122	H	12	CMPG222	H	8	CMPG322	H	16
STTN121	X	12	CMPG223	H	16	CMPG323	H	16
ACCS121 **OR/*OF*** ACCF121	X	16	BMAN223	X	16	CMPG324	H	16
ALDE/A122	X	12	WVNS221	X	12			
			MTHS225	X	8			
Total 2nd/ Totaal 2de Semester		**64**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**128**	**Total Year Level 2/ Totaal Jaarvlak 2**		**136**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**392**

NAS.1.20.2 DISTANCE LEARNING

The School of Computer Science and Information Systems offers the degree Bachelor of Science in Information Technology through the Unit for Open Distance Learning (UODL) at the Potchefstroom Campus. This degree is equivalent to the full time three year BSc Computer Science and Information Technology degree, offered by the faculty on the NWU Potchefstroom and Vanderbijlpark Campus.

The following principles and guidelines are of importance in the BSc in IT distance programme:

a. Students register through the UODL for each academic year and enrol for modules according to the BSc in IT distance programme indicated in the Yearbook.
b. Capacity for distance learning is limited. Students are registered on a first-come first-served basis and it is therefore important that students pay the minimum registration fee as soon as possible.
c. Switching between contact and distance are allowed only at the start of an academic year. Approval of such requests are subject to capacity limitations and academic performance.
d. The degree comprises a total of 392 credits, with roughly 65 credits per semester over three year levels. One credit is equivalent to 10 notional hours. (Credits are the number of notional study hours required for achieving the learning outcomes. Notional hours include study time, assignments and examinations.)
e. Students are allowed to complete the three-year degree over a maximum period of 6 years, given that module prerequisites and academic rules are adhered to. Studying full time (completing the degree over three years) will require about 40 hours per week of students' time, while completing the degree over 6 years will require about 20 hours per week.
f. It is very important that students plan their available study time and only enrol (register and pay) for modules they intend to actively participate in, in a specific academic year.
g. Students have two assessment opportunities (examinations) per module as prescribed by the General Academic Rules, of which the student must utilise at least the first exam opportunity at the end of the semester the student was enrolled in the module.
h. A valid participation mark will give the student access to two consecutive examination opportunities, after which, if both were failed, a student must obtain a new participation mark for the module. This means a student will have to re-register for the module in a subsequent academic year and repeat it in its entirety.
i. A registered student must actively participate in the teaching, learning and assessment of every module for which such a student is enrolled in.
j. Students are supported by means of eFundi (a virtual learning environment) and communication with lecturers and facilitators, as well as the UODL Contact Centre and UODL Support Services, Library services, and various NWU self-help services.
k. Lectures and tutorial lessons are mainly presented by means of asynchronous online videos and activities. All lessons are saved on the Internet/ eFundi for students to access at their convenience.
l. It is compulsory, and the responsibility of the student to ensure that he/she has access to, or obtain the necessary technology that meet the minimum specifications of the NWU. Access to a computer with Windows 10 or higher as well as an Internet connection of at least 2Mbps (4Mbps or higher is recommended), is required for the BSc in IT degree. Note that a high data cap is required as students have to download or watch online instructional material.

m. It remains the responsibility of the student to ensure that assignments are submitted on time and electronic examination scripts are saved correctly.

Kindly note that from 2022 the module ALDE111 will be a compulsory additional module, for all students in the distance programme.

NAS.1.20.2.1 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY – DISTANCE/ *BACCALAUREUS SCIENTIAE IN INLIGTINGSTEGNOLOGIE – AFSTAND*

Qualification Code/ *Kwalifikasiekode*			**2HA H01 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Distance/ *Afstand*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
STTN111	X	12	CMPG212	H	8	CMPG312	H	16
BMAN111	X	12	CMPG213	H	16	CMPG313	H	16
MTHS113	X	12	CMPG214	H	8	CMPG315	H	16
ACCS111	X	16	CMPG215	H	8			
ALDE111*	A	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**64**	**Total 1st/ Totaal 1ste Semester**		**68**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
CMPG121	H	12	CMPG221	H	8	CMPG321	H	16
CMPG122	H	12	CMPG222	H	8	CMPG322	H	16
STTN121	X	12	CMPG223	H	16	CMPG323	H	16
ACCS121	X	16	BMAN223	X	16	CMPG324	H	16
ALDE122	X	12	WVNS221	X	12			
			MTHS225	X	8			
Total 2nd/ Totaal 2de Semester		**64**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**128**	**Total Year Level 2/ Totaal Jaarvlak 2**		**136**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**392**
*Distance students do not write the TAG/TALL test. **ALDE111** is compulsory as an additional module.								

NAS.1.21 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE*

NAS.1.21.1 FACULTY-SPECIFIC RULES FOR THE PROGRAMME / *FAKULTEITSPESIFIEKE REËLS VIR DIE PROGRAM*

The Faculty of Agricultural and Natural Science has a number of approved curricula that have a good basic training in environmental sciences. In compiling the programme/curricula work possibilities and manpower needs of our country are also considered. This programme/curriculum prepares the student for postgraduate studies (Honours in Environmental Sciences), recommended in order to register with the South African Council for Natural Scientific Professions (SACNASP). /

Die Fakulteit van Natuur- en Landbouwetenskappe het 'n aantal programme/kurrikulums goedgekeur wat 'n goeie basiese opleiding in die omgewingswetenskappe bied. By die samestelling van die programme/kurrikulums is ook oorweging geskenk aan beroepsmoontlikhede en die mannekragbehoeftes van ons land. Hierdie programme/kurrikulums berei die student ook voor vir nagraadse studie (Honneurs in Omgewingswetenskappe), wat aanbeveel word met die oog op registrasie by die Suid-Afrikaanse Raad vir Natuurwetenskaplike Professies (SARNAP)

NAS.1.21.2 FACULTY SPECIFIC ADMISSION REQUIREMENTS/ *FAKULTEITSPESIFIEKE TOELATINGSVEREISTES*

See paragraph NAS.1.16.3 / *Kyk paragraaf NAS.1.16.3*

Students that register for programmes/curriculums that include DRKS311, PLKS324, GDKN221 and GLGN321, should be aware that a compulsory field excursion forms part of this module. /

Studente wat vir programme/kurrikulums aansoek doen waarin DRKS311, PLKS324 asook GDKN221 en GLGN321 voorkom, moet bewus wees daarvan dat ’n verpligte veld-ekskursie deel vorm van hierdie modules

NAS.1.21.3 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH BOTANY AND CHEMISTRY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET PLANTKUNDE EN CHEMIE*

NAS.1.21.3.1 Specific programme outcomes/ *Spesifieke programuitkomste*

This programme represents an aligned programme, which replaces the Biology containing programmes on the MC. /

Hierdie program verteenwoordig 'n belynde program wat die Biologie-programme op die MC vervang.

*Can only be taken on the Potchefstroom campus/ *Kan slegs op die Potchefstroomkampus geneem word.*

**Can only be taken on the Mahikeng Campus/ *Kan slegs op die Mahikeng kampus geneem word*

NAS.1.21.3.2 **Bachelor of Science in Environmental Sciences with Botany and Chemistry/**
Baccalaureus Scientiae in Omgewingswetenskappe met Plantkunde en Chemie

Qualification Code/ ***Kwalifikasiekode***	**2DJ H03 - N302P** **2DJ H03 - N301M**
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Potchefstroom (AFRIKAANS, ENGLISH); Mahikeng (ENGLISH)
Delivery Mode/ ***Metode van Aflewering***	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
NCHE111	H	12	NCHE211 **&** NCHE212	H	8 8	NCHE311	H	16
MTHS114	X	12	BCHN213	X	16	NCHE312	H	16
MCBN111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
NCHE121	H	12	NCHE221 **&** NCHE222	H	8 8	NCHE321	H	16
MTHS124	X	12	BCHN222	X	16	NCHE322	H	16
MCBN121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.3.3 **Bachelor of Science in Environmental Sciences with Microbiology and Chemistry /**
Baccalaureus Scientiae in Omgewingswetenskappe met Mikrobiologie en Chemie

Qualification Code/ *Kwalifikasiekode*			**2DJ H10 - N301P 2DJ H10 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH), Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	BCHN213	X	16	NCHE311	H	16
MCBN111	X	12	NCHE211	H	8	NCHE312	H	16
MTHS114	X	12	NCHE212	H	8	MKBS313* **OR/*OF*** MKBS316**	H	16
NCHE111	H	12	MKBN211	H	16	MKBS314* **OR/*OF*** MKBS317**	H	16
FLGX113* **OR/*OF*** FSKS113* **OR/*OF*** NPHY111**	X	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	BCHN222	X	16	NCHE321	H	16
MCBN121	X	12	NCHE221	H	8	NCHE322	H	16
MTHS124	X	12	NCHE222	H	8	MKBS325* **OR/*OF*** MKBS326**& MKBS327**	H H H	32 16 16
NCHE121	H	12	MKBS221	H	16			
FSKS123* **OR/*OF*** FLGX123* **OR/*OF*** NPHY121**	X	12	WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*Can only be taken on the Potchefstroom campus/ *Kan slegs op die Potchefstroomkampus geneem word.*
** Can only be taken on the Mahikeng Campus/ *Kan slegs op die Mahikengkampus geneem word*

NAS.1.21.3.4 **Bachelor of Science in Environmental Sciences with Zoology and Chemistry /**
Baccalaureus Scientiae in Omgewingswetenskappe met Dierkunde en Chemie

Qualification Code/ *Kwalifikasiekode*			**2DJ H04 - N302P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
NCHE111	H	12	NCHE211 **&** NCHE212	H	8 8	NCHE311	H	16
FLGX113 **OR/*OF*** MCBN111	X	12	BCHN213 **OR/*OF*** FLGX213	X	16	NCHE312	H	16
MTHS114	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
NCHE121	H	12	NCHE221 **&** NCHE222	H	8 8	DRKS322	H	16
FLGX123 **OR/*OF*** MCBN121	X	12	BCHN222 **OR/*OF*** FLGX223 **&** FLGX224	X	16	NCHE321	H	16
MTHS124	X	12	WVNS221	X	12	NCHE322	H	16
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

***MCBN111** and **MCBN121** must be taken in the 1st year if **BCHN** is to be taken in the 2nd year. /
****MCBN111*** *en* ***MCBN121*** *moet in die 1ste jaar geneem word indien* ***BCHN*** *in die 2de jaar geneem wil word.*

NAS.1.21.4 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET CHEMIE EN GEOLOGIE*

NAS.1.21.4.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program*

A compulsory soil mapping camp takes place for second-year soil science students (i.e. students who have registered for GDKN 221) during the winter recess. Second-year students will hand in a soil map and a report, of which the mark will contribute to the practical mark for GDKN221. Third-year Geology students (i.e. students who have registered for GLGN 321) will attend a compulsory geology mapping camp in the spring recess period. A geological map and a report will be handed in during the second semester, of which the mark contributes to laboratory mark for GLGN 321. NO excuses for absence from the mapping camp will be accepted. In the event of illness, the onus is on the student to catch up with the work and to hand in the required assignments, maps and reports, as applicable, to be considered for admission to the examination. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination.

This programme prepares the student for admission to the Honours in Environmental Sciences with specialisation in Environmental Geology. The programme is compiled for a niche market in South Africa in Environmental Geology, presented at the NWU. /

'n Grond-karteringskamp, wat tydens die winterreses plaasvind, is verpligtend vir tweedejaar Grondkundestudente (dit is studente wat geregistreer het vir GDKN221). Tweedejaarstudente moet 'n grondkaart en 'n verslag inhandig waarvan die punt deel sal uitmaak van die praktiese punt vir GDKN221. Derdejaar Geologiestudente (dit is studente wat geregistreer het vir GLGN321) moet in lente reses periode 'n verpligte geologie-karteringskamp bywoon. 'n Geologiekaart en verslag moet tydens die tweede semester ingehandig word en die punt daarvoor sal deel uitmaak van die praktiese punt vir GLGN321. GEEN verskonings vir afwesigheid van hierdie karteringskamp sal aanvaar word nie. In die geval van siekte, berus die onus op die student om die werk in te haal en die vereiste werkopdragte, kaarte en verslae, soos van toepassing, in te handig om in aanmerking te kom vir toelating tot die eksamen. Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen. Hierdie program berei die student vir toelating tot die Honneurs in Omgewingswetenskappe, met spesialisering in Omgewingsgeologie, voor. Die program is saamgestel vir 'n nismark in Suid-Afrika in Omgewingsgeologie, wat by die NWU aangebied word.

NAS.1.21.4.2 Bachelor of Science in Environmental Sciences with Chemistry and Geology/ *Baccalaureus Scientiae in Omgewingswetenskappe met Chemie en Geologie*

There will be a limited intake of students majoring in Geology due to capacity restrictions. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination. /

Daar sal 'n beperkte inname wees van studente met Geologie as hoofvak vanweë kapasiteitsbeperkings. Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen.

Qualification Code/ *Kwalifikasiekode*			**2DJ H07 - N302P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (Afrikaans, English)					
Delivery Mode/ *Metode van Aflewering*			FULL TIME / *VOLTYDS*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GLGN112	H	12	GLGN211	H	16	GLGN311	H	32
NCHE111	H	12	NCHE211 **&** NCHE212	H	8 8	NCHE311	H	16
MTHS114	X	12	GDKN211	X	16	NCHE312	H	16
FSKS113	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GLGN122	H	12	GLGN221	H	16	GLGN321	H	32
NCHE121	H	12	NCHE221 **&** NCHE222	H	8 8	NCHE321	H	16
GDKN121	X	12	GDKN221	X	16	NCHE322	H	16
MTHS124	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.5 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND GEOGRAPHY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN GEOGRAFIE*

NAS.1.21.5.1 Faculty-specific rules for the programme / *Fakulteitspesifieke reëls vir die program (See also/ Sien ook NAS1.20.8.1)*

There will be a limited intake of students majoring in Geology due to capacity restrictions. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination. /

Daar sal 'n beperkte inname wees van studente met Geologie as hoofvak vanweë kapasiteitsbeperkings Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen.

Qualification Code/ *Kwalifikasiekode*			**2DJ H01 - N302P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GLGN112	H	12	GLGN211	H	16	GLGN311	H	32
GEOG111	H	12	GEOG211	H	16	GEOG311	H	32
NCHE111	X	12	GDKN211	X	16			
FSKS113	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GLGN122	H	12	GLGN221	H	16	GLGN321	H	32
GEOG121	H	12	GEOG221	H	16	GEOG321	H	32
GDKN121	X	12	GDKN221	X	16			
NCHE121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.6 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND BOTANY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN PLANTKUNDE*

There will be a limited intake of students majoring in Geology due to capacity restrictions. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination. /

Daar sal 'n beperkte inname wees van studente met Geologie as hoofvak vanweë kapasiteitsbeperkings. Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen.

Qualification Code/ ***Kwalifikasiekode***	**2DJ H02 - N301P** **200118 - N148P** **(Pipeline only / *Slegs Pyplyn*)** BSc in Environmental and Biological Sciences/ *BSc in Omgewings- en Biologiese Wetenskappe*
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ ***Metode van Aflewering***	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
GLGN112	H	12	GLGN211	H	16	GLGN311	H	32
NCHE111	X	12	GDKN211	X	16			
FSKS113	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
GLGN122	H	12	GLGN221	H	16	GLGN321	H	32
GDKN121	X	12	GDKN221	X	16			
NCHE121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.7 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOLOGY AND MICROBIOLOGY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOLOGIE EN MIKROBIOLOGIE*

There will be a limited intake of students majoring in Geology due to capacity restrictions. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination. /

Daar sal 'n beperkte inname wees van studente met Geologie as hoofvak vanweë kapasiteitsbeperkings. Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen.

Qualification Code/ ***Kwalifikasiekode***	**2DJ H09 - N301P** **200118 - N181P** **(Pipeline only / *Slegs Pyplyn*)** BSc in Environmental and Biological Sciences/ *BSc in Omgewings- en Biologiese Wetenskappe*
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Potchefstroom (AFRIKAANS, ENGLISH),
Delivery Mode/ ***Metode van Aflewering***	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester		
Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr	Module Code/ Modulekode	Core/ Kern	Cr/ Kr
GLGN112	H	12	GLGN211	H	16	GLGN311	H	32
NCHE111	X	12	GDKN211	X	16	MKBS313	H	16
FSKS113	X	12	MKBN211	H	16	MKBS314	H	16
PLKS111 **OR/*OF*** DRKS111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GLGN122	H	12	GLGN221	H	16	GLGN321	H	32
GDKN121	X	12	GDKN221	X	16	MKBS325	H	32
NCHE121	X	12	MKBS221	H	16			
PLKS122 **OR/*OF*** DRKS121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.8 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH ZOOLOGY AND GEOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET DIERKUNDE EN GEOLOGIE*

There will be a limited intake of students majoring in Geology due to capacity restrictions. The practical examination of each Geology and Soil Science module is compulsory to be considered for admission to the examination. /

Daar sal 'n beperkte inname wees van studente met Geologie as hoofvak vanweë kapasiteitsbeperkings. Die praktiese eksamen in elke Geologie en Grondkunde module is verpligtend vir alle studente om in aanmerking te kom vir toelating tot die eksamen.

Qualification Code/ *Kwalifikasiekode*			**2DJ H08 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
GLGN112	H	12	GLGN211	H	16	GLGN311	H	32
NCHE111	X	12	GDKN211	X	16			
PLKS111 **OR/*OF*** FSKS113	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
GLGN122	H	12	GLGN221	H	16	DRKS322	H	16
GDKN121	X	12	GDKN221	X	16	GLGN321	H	32
NCHE121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.9 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH ZOOLOGY AND GEOGRAPHY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET DIERKUNDE EN GEOGRAFIE*

Qualification Code/ *Kwalifikasiekode*	**2DJ H05 - N302P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
GEOG111	H	12	GEOG211	H	16	GEOG311	H	32
NCHE111	X	12	PLKS211 **OR/*OF*** FLGX213	X	16			
FLGX113 **OR/*OF*** PLKS111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
GEOG121	H	12	GEOG221	H	16	DRKS322	H	16
NCHE121	X	12	PLKS223 **OR/*OF*** FLGX223 **&** FLGX224	X	16	GEOG321	H	32
FLGX123 **OR/*OF*** PLKS122	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.10 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND BOTANY/ *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOGRAFIE EN PLANTKUNDE*

Qualification Code/ ***Kwalifikasiekode***	**2DJ H06 - N302P** **2DJ H06 - N301M**
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Potchefstroom (AFRIKAANS, ENGLISH) and Mahikeng (ENGLISH)
Delivery Mode/ ***Metode van Aflewering***	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GEOG111	H	12	GEOG211	H	16	GEOG311	H	32
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
NCHE111	X	12	*DRKN211 **OR/*OF*** GDKN211 **OR/*OF*** **MKBN211	X	16			
*DRKS111 **OR/*OF*** *GLGN112 **OR/*OF*** **MCBN111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GEOG121	H	12	GEOG221	H	16	GEOG321	H	32
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
NCHE121	X	12	*DRKS221 **OR/*OF*** GDKN221 **OR/ *OF*** **MKBS221	X	16			
*DRKS121 **OR/*OF*** GDKN121 **OR/*OF*** **MCBN121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

***DRKS/GLGN** Can only be taken at the Potchefstroom campus/ *Kan slegs op die Potchefstroomkampus geneem word.*

*****MCBN; MKBN/S;*** Can only be taken at the Mahikeng Campus/ *Kan slegs op Mahikengkampus geneem word.*

NAS.1.21.11 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH CHEMISTRY AND GEOGRAPHY

Qualification Code/ *Kwalifikasiekode*			**2DJ H18 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	NCHE211	H	8	NCHE311	H	16
NCHE111	H	12	NCHE212	H	8	NCHE312	H	16
MTHS111	X	12	NPHY211**&** NPHY212 **OR/ *OF*** MTHS211**&** MTHS212	X X X X	8 8 8 8	GEOG311	H	32
NPHY111	X	12	GEOG211	H	16			
GEOG111	H	12	WVNS211	X	12			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	GEOG221	H	16	NCHE321	H	16
NCHE121	H	12	NPHY221**&** NPHY222 **OR/ *OF*** MTHS221**&** MTHS222	X X X X	8 8 8 8	NCHE322	H	16
MTHS121	X	12	NCHE221	H	8	GEOG321	H	32
NPHY121	X	12	NCHE222	H	8			
GEOG121	H	12	WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.12 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH GEOGRAPHY AND COMPUTER SCIENCE / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET GEOGRAFIE EN REKENAARWETENSKAP*

(See also/*sien ook* NAS.1.21.2.1)

Qualification Code/ *Kwalifikasiekode*			**2DJ H14 - N301P 2DJ H14 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH), Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GEOG111	H	12	GEOG211	H	16	GEOG311	H	32
CMPG111	H	12	CMPG211	H	16	CMPG311	H	16
GLGN112* **OR/*OF*** MTHS114**	X	12	PLKS211 **OR/*OF*** GLGN211*	X	16	CMPG313** **OR/*OF*** CMPG315*	H	16
*STTN111 **OR/*OF*** PLKS111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
GEOG121	H	12	GEOG221	H	16	GEOG321	H	32
CMPG121	H	12	CMPG221	H	8	CMPG324	H	16
GLGN122* **OR/*OF*** MTHS124**	X	12	CMPG222* **OR/*OF*** CMPG224**	H	8	CMPG321* **OR/*OF*** CMPG325**	H	16
*STTN121 **OR/*OF*** PLKS122	X	12	PLKS223 **OR/*OF*** GLGN221*	X	16			
ALDE/A122	X	12	WVNS221	X	12			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

Take note: *=PC and **=MC

* **STTN111/121** only for PC students - No elective is available at level 2 for STTN.

****MTHS114/124** Only for MC students and ***GLGN** (Geology) only for PC students

CMPG222*/224**- PC does **222*** and MC does **224****.

***CMPG315** and ***CMPG313** are electives on PC, but MC should take ****CMPG313**

In the 2nd semester of the 3rd yr. PC does **CMPG321*** and MC does **CMPG325***

NAS.1.21.13 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND ZOOLOGY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN DIERKUNDE*

Qualification Code/ *Kwalifikasiekode*			**2DJ H15 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
TMBP111	H	12	TMBP211	H	16	TMBP313	H	16
GEOG111 **OR/*OF*** PLKS111	X	12	GEOG211 **OR/*OF*** PLKS211	X	16	TMBP312	H	16
NCHE111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
BMAN121	H	12	TMBP221	H	16	TMBP321	H	16
GEOG121 **OR/*OF*** PLKS122	X	12	GEOG221 **OR/*OF*** PLKS223	X	16	TMBP322	H	16
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
NCHE121	X	12	WVNS221	X	12	DRKS322	H	16
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.14 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND GEOGRAPHY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN GEOGRAFIE*

Qualification Code/ *Kwalifikasiekode*	**2DJ H16 - N301P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
TMBP111	H	12	TMBP211	H	16	TMBP313	H	16
GEOG111	H	12	GEOG211	H	16	TMBP312	H	16
PLKS111 **OR/*OF*** DRKS111	X	12	PLKS211 **OR/*OF*** DRKN211	X	16	GEOG311	H	32
NCHE111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
BMAN121	H	12	TMBP221	H	16	TMBP321	H	16
GEOG121	H	12	GEOG221	H	16	TMBP322	H	16
PLKS122 **OR/*OF*** DRKS121	X	12	PLKS223 **OR/*OF*** DRKS221	X	16	GEOG321	H	32
NCHE121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.21.15 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES WITH TOURISM AND BOTANY / *BACCALAUREUS SCIENTIAE IN OMGEWINGSWETENSKAPPE MET TOERISME EN PLANTKUNDE*

Qualification Code/ *Kwalifikasiekode*			**2DJ H17 - N301P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
TMBP111	H	12	TMBP211	H	16	TMBP313	H	16
DRKS111 **OR/*OF*** GEOG111	X	12	DRKN211 **OR/*OF*** GEOG211	X	16	TMBP312	H	16
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
NCHE111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
BMAN121	H	12	TMBP221	H	16	TMBP321	H	16
DRKS121/ **OR/*OF*** GEOG121	X	12	DRKS221 **OR/*OF*** GEOG221	X	16	TMBP322	H	16
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
NCHE121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES/ BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE

NAS.1.22.1 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BIOCHEMISTRY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN BIOCHEMIE*

Qualification Code/ *Kwalifikasiekode*	**2DK H11 - N301P** **2DK H11 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH) Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
NCHE111	H	12	MKBN211	H	16	MKBS313* **OR/*OF*** MKBS316**	H	16
MTHS114	X	12	BCHN213	H	16	MKBS314* **OR/*OF*** MKBS317**	H	16
NPHY111** **OR/*OF*** FLGX113* **OR/*OF*** PLKS111	X	12	NCHE211 **&** NCHE212	X	16	BCHS316	H	16
MCBN111	X	12	WVNS211	X	12	BCHS317	H	16
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
NCHE121	H	12	MKBS221	H	16	BCHS321	H	16
MTHS124	X	12	BCHN222	H	16	BCHS322	H	16
NPHY121** **OR/*OF*** FLGX123* **OR/*OF*** PLKS122	X	12	NCHE221 **&** NCHE222	X	16	MKBS325* **OR/*OF*** MKBS326** **&** MKBS327**	H H H	32 16 16
MCBN121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*Can only be taken on Potchefstroom campus / * *Kan slegs by Potchefstroomkampus geneem word.*
**Can only be taken on Mahikeng Campus / ** *Kan slegs by die Mahikengkampus geneem word.*

NAS.1.22.2 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND BOTANY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN PLANTKUNDE*

This programme represents an aligned programme, which replaces the programmes containing Biology on the MC. /

Hierdie program verteenwoordig 'n belynde program wat die Biologie-bevattende programme op die MC vervang.

Qualification Code/ *Kwalifikasiekode*	**2DK H10 - N302P** **2DK H10 - N301M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH); Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS111	H	12	MKBN211	H	16	MKBS313* **OR/*OF*** MKBS316**	H	16
NCHE111	X	12	PLKS211	H	16	MKBS314* **OR/*OF*** MKBS317**	H	16
*DRKS111 **OR/*OF*** GEOG111 **OR/*OF*** ***MCBN111	X	12	DRKN211* **OR/*OF*** GEOG211 **OR/*OF*** BCHN213***	X	16	PLKS314	H	32
*FSKS113 **OR/*OF*** **NPHY111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
NCHE121	X	12	MKBS221	H	16	MKBS325* **OR/*OF*** MKBS326** **&** MKBS327**	H H H	32 16 16
*DRKS121 **OR/*OF*** GEOG121 **OR/*OF*** ***MCBN121	X	12	DRKS221* **OR/*OF*** GEOG221 **OR/*OF*** BCHN222***	X	16			
*FSKS123 **OR/*OF*** **NPHY121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

*Can only be taken on the Potchefstroom campus/ *Kan slegs op die Potchefstroomkampus geneem word.*

**Can only be taken on the Mahikeng Campus/ *Kan slegs op die Mahikengkampus geneem word.*

*** **MCBN111** and **MCBN121** has to be taken in the first year in order to select **BCHN213** and **BCHN222** in the second year. / ***MCBN111*** *en* ***MCBN121*** *moet in die eerste jaar geneem word, indien* ***BCHN213*** *en* ***BCHN222*** *op jaarvlak twee geneem wil word.*

NAS.1.22.3 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND MICROBIOLOGY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN MIKROBIOLOGIE*

Qualification Code/ *Kwalifikasiekode*	**2DK H08 - N301P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
NCHE111	H	12	MKBN211	H	16	MKBS313	H	16
FLGX113	X	12	BCHN213* **OR/*OF*** PLKS211 **OR/*OF*** FLGX213	X	16	MKBS314	H	16
PLKS111 **OR/*OF*** MCBN111*	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
NCHE121	H	12	MKBS221	H	16	DRKS322	H	16
FLGX123	X	12	BCHN222* **OR/*OF*** PLKS223 **OR/*OF*** FLGX223 **&** FLGX224	X	16	MKBS325	H	32
PLKS122 **OR/*OF*** MCBN121*	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

MCBN111* and MCBN121* has to be taken in the first year in order to select BCHN213 and BCHN222 in the second year.

NAS.1.22.4 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH MICROBIOLOGY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET MIKROBIOLOGIE EN FISIOLOGIE*

Qualification Code/ *Kwalifikasiekode*	**2DK H04 - N302P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	NCHE211	X	8	FLGX312	H	8
NCHE111	X	12	NCHE213	X	8	FLGX313	H	8
DRKS111	X	12	FLGX213	H	16	FLGX317	H	8
FLGX113	H	12	MKBN211	H	16	MKBS313	H	16
FSKS113	X	12	WVNS211	X	12	MKBS314	H	16
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	BCHN222	X	16	FLGX325	H	16
NCHE121	X	12	FLGX223	H	8	FLGX328	H	8
DRKS121	X	12	FLGX224	H	8	FLGX329	H	8
FLGX123	H	12	MKBS221	H	16	MKBS325	H	32
FSKS123	X	12	WVNS221	X	12	FKLT331	H	8
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22.5 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND BIOCHEMISTRY/ *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN BIOCHEMIE*

Qualification Code/ *Kwalifikasiekode*			**2DK H07 - N302P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
NCHE111	H	12	BCHN213	H	16	BCHS316	H	16
MCBN111	X	12	NCHE211 **&** NCHE212	X	8 8	BCHS317	H	16
MTHS114	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
NCHE121	H	12	BCHN222	H	16	DRKS322	H	16
MCBN121	X	12	NCHE221 **&** NCHE222	X	8 8	BCHS321	H	16
MTHS124	X	12	WVNS221	X	12	BCHS322	H	16
ALDA/E122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22.6 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH BOTANY AND BIOCHEMISTRY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET PLANTKUNDE EN BIOCHEMIE*

This programme represents an aligned programme, which replaces the programmes containing Biology on the MC. To reflect the fields of expertise on the two campuses, the third year Botany modules are electives, which are campus specific. /

Hierdie program verteenwoordig 'n belynde program wat die Biologie-bevattende programme op die MK vervang. Om die vakkundigheid op die twee kampusse te weerspieël, is die derdejaar Plantkunde-modules keusemodules, wat kampusspesifiek is.

Qualification Code/ *Kwalifikasiekode*			**2DK H02 - N302P; 2DK H02 - N301M**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH); Mahikeng (ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / *Voltyds*					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
NCHE111	X	12	BCHN213	H	16	BCHS316	H	16
MTHS114	X	12	NCHE211 **&** NCHE212	X	8 8	BCHS317	H	16
MCBN111	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
PLKS122	H	12	PLKS223	H	16	PLKS324	H	32
NCHE121	X	12	BCHN222	H	16	BCHS321	H	16
MTHS124	X	12	NCHE221 **&** NCHE222	X	8 8	BCHS322	H	16
MCBN121	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22.7 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN FISIOLOGIE*

Qualification Code/ *Kwalifikasiekode*	**2DK H03 - N302P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	DRKN211	H	16	DRKS311	H	32
NCHE111	X	12	FLGX213	H	16	FLGX312	H	8
DRKS111	H	12	MKBN211	X	16	FLGX313	H	8
FLGX113	H	12	WVNS211	X	12	FLGX317	H	8
FSKS113 **OR/*OF*** PLKS111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**56**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	DRKS221	H	16	DRKN321	H	16
NCHE121	X	12	FLGX223	H	8	DRKS322	H	16
DRKS121	H	12	FLGX224	H	8	FLGX325	H	16
FLGX123	H	12	MKBS221	X	16	FLGX328	H	8
FSKS123 **OR/*OF*** PLKS122	X	12	WVNS221	X	12	FLGX329	H	8
						FKLT331	H	8
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**72**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22.8 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH CHEMISTRY AND PHYSIOLOGY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET CHEMIE EN FISIOLOGIE*

Qualification Code/ *Kwalifikasiekode*			**2DK H06 - N302P**					
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Potchefstroom (AFRIKAANS, ENGLISH)					
Delivery Mode/ *Metode van Aflewering*			Full Time / Voltyds					
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM								
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A111	X	12	BCHN213	X	16	NCHE311	H	16
NCHE111	H	12	NCHE211	H	8	NCHE312	H	16
FLGX113	H	12	NCHE212	H	8	FLGX312	H	8
MCBN111	X	12	FLGX213	H	16	FLGX313	H	8
MTHS114	X	12	WVNS211	X	12	FLGX317	H	8
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**56**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
ALDE/A122	X	12	BCHN222	X	16	NCHE321	H	16
NCHE121	H	12	NCHE221	H	8	NCHE322	H	16
FLGX123	H	12	NCHE222	H	8	FLGX325	H	16
MCBN121	X	12	FLGX223	H	8	FLGX328	H	8
MTHS124	X	12	FLGX224	H	8	FLGX329	H	8
			WVNS221	X	12	FKLT331	H	8
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**72**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

NAS.1.22.9 BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES WITH ZOOLOGY AND BOTANY / *BACCALAUREUS SCIENTIAE IN BIOLOGIESE WETENSKAPPE MET DIERKUNDE EN PLANTKUNDE*

Qualification Code/ *Kwalifikasiekode*	**2DK H09 - N301P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS111	H	12	DRKN211	H	16	DRKS311	H	32
PLKS111	H	12	PLKS211	H	16	PLKS314	H	32
NCHE111	X	12	BCHN213* **OR/OF** GDKN211 **OR/*OF*** MKBN211	X	16			
FLGX113 **OR/*OF*** GLGN112 **OR/*OF*** MCBN111*	X	12	WVNS211	X	12			
ALDE/A111	X	12						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Modulekode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Modulekode**	**Core/ Kern**	**Cr/ Kr**
DRKS121	H	12	DRKS221	H	16	DRKN321	H	16
PLKS122	H	12	PLKS223	H	16	DRKS322	H	16
NCHE121	X	12	BCHN222* **OR/*OF*** GDKN221 **OR/*OF*** MKBS221	X	16	PLKS324	H	32
FLGX123 **OR/*OF*** GDKN121 **OR/*OF*** MCBN121*	X	12	WVNS221	X	12			
ALDE/A122	X	12						
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**120**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program								**368**

MCBN111* and **MCBN121*** has to be taken in the first year in order to select BCHN213 and BCHN222 in the second year.
Take note: **FLGX** is not available as an option in Year Level 2.

NAS.1.23 RULES FOR THE DEGREE BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING / *REËLS VIR DIE BACCALAUREUS SCIENTIAE IN STADS- EN STREEKBEPLANNING GRAAD*

NAS.1.23.1 PROGRAMME OUTCOMES / *PROGRAMUITKOMSTE*

The Faculty Board of Natural and Agricultural Sciences has approved this programme that offers professional training in urban and regional planning. In compiling this programme, possible career opportunities and our country's demand for human resources were also considered. This programme also conforms to the requirements of the South African Council for Planners (SACPLAN) and prepares the student for admission to the degree MSc Urban and Regional Planning. /

Die Fakulteitsraad Natuur- en Landbouwetenskappe het hierdie program goedgekeur, wat professionele opleiding in Stad – en streekbeplanning bied. Met die samestelling van hierdie kurrikulum is beroepsmoontlikhede asook ons land se behoefte aan menslike hulpbronne oorweeg. Hierdie program voldoen ook aan die vereistes van die Suid-Afrikaanse Raad vir Beplanners (SACPLAN) en berei die student voor vir toelating tot die graad MSc Stad- en Streekbeplanning.

On completing this programme, the student should be able to/

Na voltooiing van hierdie program behoort die student:

- demonstrate a broad and systematic knowledge of, and engagement in, urban and regional planning, as well as an understanding of the practical application of relevant urban and regional planning techniques and other subject-specific content presented in the programme; /

  'n breë en sistematiese kennis van en betrokkenheid in Stad- en Streeksbeplanning te demonstreer, asook 'n begrip van die praktiese toepassing van relevante Stad- en Streeksbeplanningtegnieke en ander vakspesifieke inhoud wat in die program aangebied is, ten einde volhoubare ontwikkeling in stedelike en landelike omgewings te bewerkstellig;

- demonstrate the ability to use a range of specialised skills to identify, analyse and argue complex and abstract planning problems by systematically drawing on an appropriate body of knowledge, theoretically-driven arguments and applying proven solutions in an ethically responsible manner; /

  die vermoë te demonstreer om verskeie gespesialiseerde vaardighede te gebruik om komplekse en abstrakte beplanningsprobleme te identifiseer, te analiseer en te beredeneer deur sistematies gebruik te maak van 'n gepaste kennisbasis, teorie-gedrewe argumente en die toepassing van bewese oplossings op 'n eties verantwoordelike wyse;

- demonstrate skills in gathering, critically evaluating, accurately interpreting and managing research, professional or occupational ideas and literature in urban and regional planning, as well as to present and communicate creative findings, recommendations and solutions to problems, graphically, in writing and orally to peers and professionals by making use of appropriate computer-aided software; and

  die vaardighede te demonstreer om navorsing, professionele of beroepsidees en -literatuur op die gebied van Stad- en Streeksbeplanning, te versamel, krities te evalueer, akkuraat te interpreteer en te bestuur, asook om kreatiewe bevindinge, voorstelle en probleemoplossings grafies, skriftelik en mondeling aan die hand van gepaste rekenaargesteunde sagteware aan eweknieë en professionele persone te kommunikeer;

- demonstrate the ability to identify and address ethical issues based on a critical reflection on the applicability of different ethical value systems within the context of urban and regional planning and planning consultation. Duration (minimum and maximum duration) /

die vermoë te demonstreer om etiese kwessies en die toepaslikheid van verskillende etiese waardesisteme binne die konteks van Stad- en Streeksbeplanning en beplanningskonsultasie, te identifiseer en aan te spreek by wyse van kritiese refleksie.

The minimum duration of the studies for this degree is four years and the maximum duration for completing the degree is six years. / (A-Rule 1.14)

Die minimum duur van die studie vir hierdie graad is vier jaar en die maksimum duur vir die voltooiing van die graad is ses jaar. (A-Reël 1.14)

NAS.1.23.2 ADMISSION REQUIREMENTS OF THE QUALIFICATION/ *TOELATINGSVEREISTES VAN DIE PROGRAM*

The requirements of this qualification with regard to prior learning are described in NAS.1.1.1. Students are only admitted to the BSc in Urban and Regional Planning degree if they have been selected for admission. A maximum of 25 candidates, i.e. first-time university students, will be selected annually.

Die vereistes van hierdie kwalifikasie met betrekking tot vorige leer word in NAS.1.1.1 beskryf. Studente word slegs toegelaat tot die BSc in Stad- en Streekbeplanning-graad na aanleiding van keuring. 'n Maksimum van 25 kandidate, d.w.s. eerstejaarstudente, sal jaarliks gekeur word.

NAS.1.23.3 LANGUAGE MEDIUM / *TAALMEDIUM*

The language of instruction for contact students in this curriculum is Afrikaans. Lectures are interpreted into English for students who are not proficient in Afrikaans. In certain modules the language of instruction is English and the lectures are interpreted into Afrikaans if requested. /

Die onderrigtaal vir kontakstudente in hierdie kurrikulum is Afrikaans. Lesings word in Engels getolk vir studente wat nie Afrikaans vaardig is nie. In sekere modules is die onderrigtaal Engels en die lesings word in Afrikaans getolk, indien dit verlang word.

NAS.1.23.4 COMPLETION OF RESEARCH PROJECT / *VOLTOOIING VAN NAVORSINGSPROJEK*

In the final year students must complete a research project (SBES 472) fulltime during the first and second semester, under supervision of personnel in the respective subject group. This research project is supported by the Research Methodology module (SGSS414) as well as other core modules of the Urban and Regional Planning programme. /

In die finale jaar moet studente gedurende die eerste en tweede semester 'n navorsingsprojek (SBES 472) onder toesig van personeel in die onderskeie vakgroep voltooi. Hierdie navorsingsprojek word ondersteun deur die Navorsingsmetodologie module (SGSS414) asook ander kernmodules van die Stad- en Streeksbeplanningsprogram.

Take note: The 2017 program has phased out. All pipeline (senior) students must register on the 2018 program. Recognitions will be handled by the Subject Group. /
Neem kennis: Die 2017 program het uitfaseer. Alle pyplyn- (senior-) studente moet op die 2018 program registreer. Erkennings sal deur die Vakgroep hanteer word.

Replacement of modules: 2017 modules merged, will not be lectured as core modules in 2018.

For transition arrangements, these identified 2018 modules will be recognised in place of 2017 modules:

SBRS211 to be replaced by SANL225.
SSBP221 to be replaced by SRSK323 or SBSS323.
SBRS321 to be replaced by SRSK323 or SBSS323.
SBSS471 to be replaced by SBSS472 and SGSS414.
GGFS222/GEOG221 prerequisite requirement does not apply to GGFS312/GEOG311, for all students enrolled for the BSc Urban and Regional Planning programme. /

Vervanging van modules: 2017-modules wat saamgesmelt het, sal nie in 2018 as kernmodules aangebied word nie.

Vir oorgangs-reëlings word hierdie 2018-modules erken in plaas van 2017 modules.

SBRS211 word vervang deur SANL225.

SSBP221 word vervang deur SRSK323 of SBSS323.

SBRS321 word vervang deur SRSK323 of SBSS323.

SBSS471 word vervang deur SBSS472 en SGSS414.

GGFS222/GEOG221 voorvereistes is nie van toepassing vir GGFS312/GEOG311, vir alle studente ingeskryf vir die BSc Stad- en Streeksbeplanning program nie.

NAS.1.23.5 BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING/ *BACCALAUREUS SCIENTIAE IN STADS- EN STREEKBEPLANNING*

Take note: All the students (1st – 4th yr.) will register for this programme (no pipeline students on old programme) /

Neem kennis: Al die studente (1ste – 4de jaar), sal vir hierdie program registreer (geen pyplynstudente op die ou program nie).

Qualification Code/ *Kwalifikasiekode*	**2FE K01 - N401P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
SBSS111	H	12	SBES212	H	16	SBES313	H	16	SGSS414	H	16
GEOG111	H	12	GEOG211	H	16	SBRS313	H	16	SBRS411	H	16
ECON112	X	12	ECON211	X	16	SBSS313	H	16	SBSS412	H	16
MTHS114	X	12	WVNS211	X	12	GEOG311	H	32	SBSS414	H	16
STTN111	X	12									
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**80**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
SBSS121	H	12	SBSS223	H	16	SBSS323	H	16	SBSS424	H	16
GEOG121	H	12	SBRS221	H	16	ECON322	X	16	SSBP421	H	16
ECON122	X	12	SANL225	H	16	SBSS321	H	16			
STTN124	X	12	ECON325	X	16	SECO321	H	16	**Year module / *Jaarmodule***		
ALDE122/ ALDA112*	X	12	WVNS221	X	12	SRSK323	H	16	SBSS472	H	32
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**76**	**Total 2nd/ Totaal 2de Semester**		**80**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**132**	**Total Year Level 3/ Totaal Jaarvlak 3**		**160**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**544**

*Afrikaans-speaking students take **ALDA112** in the 1st semester, if TALL test is passed /

Afrikaanse studente neem **ALDA112 in die 1st semester, as TAG toets geslaag is.*

NAS.1.24 BACHELOR OF SCIENCE IN AGRICULTURE

NAS.1.24.1 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRICULTURAL ECONOMICS

NAS.1.24.1.1 Programme outcomes

To provide the country with qualified personnel who can work as agricultural economists and are competent in research, appraising, developing, managing and evaluating agricultural development programmes and projects towards the development of the agricultural sector, agricultural business and rural communities.

NAS.1.24.1.2 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules proposed for exemption to students moving from Bachelor of Science in Agriculture with Agricultural Economics (267 100 -N401M) to Bachelor of Science in Agriculture with Animal Science (2FD K03-N401M)

BSc			Exemption		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic literacy	12
AECM111	Introduction to Agricultural Economics	12	**AECM111**	Introduction to Agricultural Economics	12
ANSM121	Intro to Biometry	12	**ANSM121**	Intro to Agricultural Biometry	12
CSPM211	Introduction to Soil Science	16	**CSPM211**	Introduction to Soil Science	16
ANSM211	Intro to Animal Science	16	**ANSM211**	Intro to Animal Science	16
WVNS211	Understanding the Natural World	12	**WVNS211**	Understanding the Natural World	12
CSPM221	Introduction to Crop Production	16	**CSPM221**	Introduction to Crop Production	16
ANSM223	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
WVAS221	Understanding the World of Agriculture	12	**WVAS221**	Understanding the World of Agriculture	12
AECM314	Farm Management and Accounting	8	**AECM314**	Farm Management and Accounting	8
AEXM324	Agricultural Rural Sociology	8	**AEXM324**	Agricultural Rural Sociology	8
Total credits proposed for exemption = 152					

NAS.1.24.1.3 Bachelor of Science in Agriculture with Agricultural Economics

Qualification Code/ *Kwalifikasiekode*			2FD K01 – N401M								
Campus & Language of Instruction/ *Kampus & Onderrigtaal*			Mahikeng (ENGLISH)								
Delivery Mode/ *Metode van Aflewering*			Full Time								
COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester			First/ Eerste Semester		
Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr
MCBN111	X	12	AEXM211	H	16	AECM311	H	16	AECM411	H	8
NCHE111	X	12	AEXM212	H	8	CSPM313	X	16	AECM412	H	16
ALDE111	X	12	CSPM211	X	16	AECM313	H	16	AECM413	H	16
AECM111	H	12	ANSM211	X	16	AECM314	H	8	AECM414	H	16
MTHS114	X	12	WVNS211	X	12	AECM315	H	8	AECM415	H	16
						AECM316	H	16			
Total 1st/ Totaal 1ste Semester		60	Total 1st/ Totaal 1ste Semester		68	Total 1st/ Totaal 1ste Semester		80	Total 1st/ Totaal 1ste Semester		72
Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester			Second/ Tweede Semester		
Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr	Module Code/ Module-kode	Core/ Kern	Cr/ Kr
MCBN121	X	12	AECM221	H	8	AECM321	H	16	AECM421	H	8
NCHE121	X	12	AEXM222	H	8	AECM323	H	8	AECM422	H	16
ALDE122	X	12	CSPM221	X	16	AEXM324	X	8	AECM424	H	8
NPHY123	X	12	ANSM223	X	16	AECM325	H	8	AECM425	H	16
ANSM121	X	12	AECM223	H	8	AECM326	H	8			
			WVAS221	X	12	AECM327	H	8			
Total 2nd/ Totaal 2de Semester		60	Total 2nd/ Totaal 2de Semester		68	Total 2nd/ Totaal 2de Semester		56	Total 2nd/ Totaal 2de Semester		48
Total Year Level 1/ Totaal Jaarvlak 1		120	Total Year Level 2/ Totaal Jaarvlak 2		136	Total Year Level 3/ Totaal Jaarvlak 3		136	Total Year Level 4/ Totaal Jaarvlak 4		120
Total Credits for the Programme/ Totale Krediete vir die Program											512

NAS.1.24.2 BACHELOR OF SCIENCE IN AGRICULTURE WITH ANIMAL HEALTH

NAS.1.24.2.1 Programme outcomes

Animal health technicians will be able to utilize their sound, research-based knowledge of disease surveillance, farm animals and production systems, and be able to identify problems related to the health, breeding, feeding, management and economics of livestock production, thus contributing to animal production whilst maintaining the animals' health and welfare, protecting humans from zoonosis and ensuring high-quality food products of animal origin for human consumption.

NAS.1.24.2.2 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules proposed for exemption to students moving from Bachelor of Science in Agriculture with Animal Health (267 101 -N401M) to Bachelor of Science in Agriculture with Animal Science (2FD K03-N401M)

BSc			Exemption		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic literacy	12
AECM111	Introduction to Agricultural Economics	12	**AECM111**	Introduction to Agricultural Economics	12
ANSM121	Intro to Biometry	12	**ANSM121**	Intro to Agricultural Biometry	12
WVNS211	Understanding the Natural World	12	**WVNS211**	Understanding the Natural World	12
ANSM223	Animal Nutrition	16	**ANSM223**	Animal Nutrition	16
WVAS221	Understanding the World of Agriculture	12	**WVAS221**	Understanding the World of Agriculture	12
ANSM311	Principles of Veld Management	16	**ANSM311**	Principles of Veld Management	16
ANSM226	Animal Breeding and Genetics	12	**ANSM226**	Animal breeding and Genetics	12
AHPM213	Veterinary Microbiology	16	**AHPM211**	Microbiology for Animal Health	16
Total credits proposed for exemption = 132					

Modules exemption to students from Bachelor of Science in Agriculture with Animal Health (267 101-N401M) to Bachelor of Science in Agriculture with Agronomy & Horticulture (2FD K04-N401M)

BSc			Exemption		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
			ALDE111	Academic Literacy	12
			ALDE121	Academic Literacy	12
			AEXM211	Fundamentals of Agric. Extension	16
			AECM111	Intro. to Agric. Economics	12
Total credits proposed for exemption = 52					

NAS.1.24.2.3 New Programme (Phasing In)

Qualification Code/ *Kwalifikasiekode*	**2FD K07 - N401M (1st & 2nd yrs. Phasing In)** Animal Health
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	AHDR211	H	12	AHDR311	H	8	AHDR412	H	8
MCBN111	X	12	AHDR212	H	8	AHDR312	H	8	AHDR413	H	8
NCHE111	X	12	AHDR213	H	8	AHDR313	H	8			
MTHS114	X	12	BCHN214	H	8	AHDR314	H	8			
AECM111	X	12	ANSM214	X	8	AHDR315	H	8	**Second/ Tweede Semester**		
AHDR111	H	8	AEXM211	X	16	AHDR316	H	8	AHDR421	H	8
			WVNS211	X	12	AHDR317	H	8	AHDR422	H	8
Total 1st/ Totaal 1ste Semester		**68**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**56**	**Total**		**32**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year modules/ Jaar modules**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**					
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	AHDR221	H	12	AHDR321	H	8	AHDR471	H	16
ANSM121	X	12	AHDR222	H	12	AHDR322	H	8	AHDR472	H	32
NCHE121	X	12	ANSM226	X	12	AHDR323	H	12	AHDR473	H	16
NPHY123	X	12	ANSM223	X	16	AHDR324	H	8	AHDR474	H	16
AHDR121	H	8	ANSM224	X	8	AHDR325	H	8	AHDR476	H	16
			WVAS221	X	12	AHDR326	H	8			
						AHDR327	H	8			
Total 2nd/ Totaal 2de Semester		**56**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**60**	**Total year modules**		**96**
Total Year Level 1/ Totaal Jaarvlak 1		**124**	**Total Year Level 2/ Totaal Jaarvlak 2**		**144**	**Total Year Level 3/ Totaal Jaarvlak 3**		**116**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**512**

NAS.1.24.2.4 Old Programme (Phasing Out)

Note: For Module Names and Outcomes see 2020 Yearbook

Qualification Code/ *Kwalifikasiekode*	**267 101 N402M (Phasing Out from 2021)** **Pipeline students only** Animal Health
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	AHPM213	H	12	AHPM311	H	16	AHPM411	H	16
MCBN111	X	12	AHPM214	H	12	AHPM313	H	16	AHPM412	H	16
NCHE111	X	12	AHPM216	H	12	AHPM315	H	8	AHPM415	H	16
MTHS114	X	12	ANSM214	X	8	AHPM317	H	8	AHPM416	H	8
AECM111	X	12	AEXM211	X	16	AHPM318	H	8	AHPM417	H	8
			WVNS211	X	12	AHPM319	H	8			
						ANSM311	H	16			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**80**	**Total 1st/ Totaal 1ste Semester**		**64**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	AHPM223	H	12	AHPM321	H	16	AHPM421	H	16
ANSM121	X	12	AHPM224	H	12	AHPM322	H	16	AHPM422	H	16
MCBN121	X	12	AHPM225	H	12	AHPM323	H	16	AHPM424	H	8
NCHE121	X	12	ANSM226	X	12	AHPM325	H	8	AHPM425	H	16
NPHY123	X	12	ANSM223	X	16	AHPM327	H	12	AHPM426	H	8
			ANSM224	X	8	AHPM329	H	12	AHPM427	H	8
			WVAS221	X	12	AHBM321	H	8			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**84**	**Total 2nd/ Totaal 2de Semester**		**88**	**Total year modules**		**72**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**156**	**Total Year Level 3/ Totaal Jaarvlak 3**		**168**	**Total Year Level 4/ Totaal Jaarvlak 4**		**136**
Total Credits for the Programme/ Totale Krediete vir die Program											**580**

NAS.1.24.3 BACHELOR OF SCIENCE IN AGRICULTURE WITH ANIMAL SCIENCE

The main aim of this programme is to offer an opportunity to students from different educational backgrounds to become Professional Animal Scientists within the Agricultural Sector and related industries.

NAS.1.24.3.1 Articulation Pathways

Note: According to A rule 1.1.10.5: In order to receive credits for a specific module a student must be registered for such module and pass it.

Modules exemption to students from Bachelor of Science in Animal Science (267 102-N401M) to Bachelor of Science in Agriculture with Agronomy & Horticulture (2FD K04-N401M)

BSc			Exemption		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
			ALDE111	Academic Literacy	12
			ALDE121	Academic Literacy	12
			AECM111	Intro to Agric. Economics	12
			ANSM211	Into. to Animal Sci.	16
			AEXM211	Fundamentals of Agric. Extension	16
			CSPM221	Intro to Crop Production	12
			AECM314	Farm Management & Accounting	8
Total credits proposed for exemption = 88					

Modules proposed for exemption to students moving from Bachelor of Science in Agriculture with Crop Science (267 103-N401M) to Bachelor in Science in Agriculture with Animal Science (2FD K03-N401M)

BSc			Exemption		
Module Code	**Description**	**Credits**	**Module Code**	**Description**	**Credits**
ALDE111	Introduction to Academic Literacy	12	**ALDE111**	Introduction to Academic literacy	12
ALDE122	Academic Literacy	12	**ALDE122**	Academic literacy	12
AECM111	Introduction to Agricultural Economics	12	**AECM111**	Introduction to Agricultural Economics	12
ANSM121	Intro to Biometry	12	**ANSM121**	Intro to Agricultural Biometry	12
CSPM211	Introduction to Soil Science	16	**CSPM211**	Introduction to Soil Science	16
ANSM211	Intro to Animal Science	16	**ANSM211**	Intro to Animal Science	16
WVNS211	Understanding the Natural World	12	**WVNS211**	Understanding the Natural World	12
CSPM221	Introduction to Crop Production	16	**CSPM221**	Introduction to Crop Production	16
WVAS221	Understanding the World of Agriculture	12	**WVAS221**	Understanding the World of Agriculture	12
AECM314	Farm Management and Accounting	8	**AECM314**	Farm Management and Accounting	8
ANSM312	Applied Agricultural Biometry	16	**ANSM312**	Applied Agricultural Biometry	16
Total credits proposed for exemption = 88					

NAS.1.24.3.2 BSc in Agriculture with Animal Science

Qualification Code/ ***Kwalifikasiekode***	**2FD K03 - N401M** Animal Science
Campus & Language of Instruction/ ***Kampus & Onderrigtaal***	Mahikeng (ENGLISH)
Delivery Mode/ ***Metode van Aflewering***	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
NCHE111	X	12	ANSM211	H	16	AECM314	X	8	ANSM412	H	16
MCBN111	X	12	AHPM212	X	16	ANSM311	H	16	ANSM415	H	12
MTHS114	X	12	CSPM211	X	16	ANSM312	H	16	ANSM416	H	16
AECM111	X	12	AHPM211	X	16	ANSM313	H	8	ANSM479	H	32
ALDE111	X	12	WVNS211	X	12	ANSM314	H	16			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**74**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**76**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
NCHE121	X	12	ANSM223	H	16	ANSM321	H	16	ANSM423	H	8
MCBN121	X	12	AHPM221	X	8	ANSM322	H	8	ANSM426	H	12
NPHY124	X	12	ANSM226	H	12	ANSM323	H	16	ANSM427	H	12
ANSM121	H	12	CSPM221	X	16	ANSM326	H	12	ANSM428	H	12
ALDE122	X	12	WVAS221	X	12	AHPM326	X	8			
						AEXM324	X	8			
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**64**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**44**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**140**	**Total Year Level 3/ Totaal Jaarvlak 3**		**132**	**Total Year Level 4/ Totaal Jaarvlak 4**		**120**
Total Credits for the Programme/ Totale Krediete vir die Program											**512**

NAS.1.24.4 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRONOMY AND HORTICULTURE

Qualification Code/ *Kwalifikasiekode*	**2FD K04 - N401M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN111	X	12	CSPM211	H	16	CSPM311	H	8	CSPM411 **OR/OF** CSPM416	H	8
NCHE111	X	12	AEXM211	X	16	CSPM313	H	16	CSPS411 **OR/OF** CSPM415	H	16
MTHS114	X	12	ANSM211	X	16	CSPM317	H	8	CSPS412 **OR/OF** CSPM419	H	12
ALDE111	X	12	CSPM212	H	12	CSPM319	H	8			
AECM111	X	12	CSPM213	H	8	ANSM312	X	16			
			WVNS211	X	12	AECM314	X	8			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**80**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**36**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
MCBN121	X	12	CSPM221	H	16	CSPM321	H	8	CSPM421	H	16
NCHE121	X	12	CSPM222	H	16	CSPM322	H	16	CSPM425 **OR/OF** CSPM426	H	12
NPHY123	X	12	CSPM223	H	12	CSPM323	H	16			**28**
ALDE122	X	12	CSPM225	H	12	CSPM324	H	16	**Year modules/ Jaar modules**		
ANSM121	X	12	WVAS221	X	12	CSPM325	H	8	CSPM479	H	12
						CSPM326 **OR/OF** CSPM327	H	8	CSPM474	H	32
											44
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**68**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**72**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**148**	**Total Year Level 3/ Totaal Jaarvlak 3**		**136**	**Total Year Level 4/ Totaal Jaarvlak 4**		**108**
Total Credits for the Programme/ Totale Krediete vir die Program											**512**

NAS.1.24.5 BACHELOR OF SCIENCE IN AGRICULTURE WITH AGRICULTURAL ECONOMICS AND AGRONOMY/ *BACCALAUREUS SCIENTIAE IN LANDBOU MET LANDBOU-EKONOMIE EN AGRONOMIE*

Take note level 4 will be active for registration in 2022/
Neem kennis *dat jaarvlak 4 in 2022 aktief sal wees vir registrasie.*

Qualification Code/ *Kwalifikasiekode*	**2FD K05 - N401P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ECON112	H	12	CSPM212	H	12	AECP211	H	16	CSPM411	H	8
FSKS113	X	12	GDKN211	H	16	AECP311	H	16	ECOH611	H	16
NCHE111	X	12	STTK214	X	16	CSPM311	H	8	ECOH617 **OR/*OF*** OMWP411	H	16
PLKS111	X	12	WVNS211	X	12	CSPM313	H	16			
ALDE/ ALDA111	X	12	CSPM315	X	8	GDKN311	H	16			
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**72**	**Total 1st/ Totaal 1ste Semester**		**40**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
FSKS123	X	12	AECP121	H	12	AECP321	H	16	GDKN421	H	24
GDKN121	H	12	AECP223	H	16	AECP322	H	16	OMSA422	X	16
NCHE121	X	12	CSPM221	H	16	CSPM321	H	8	OMSA423	X	16
MTHS123	X	12	GDKN221	H	16	CSPM324	H	16			
ALDE/ ALDA122	X	12	WVNS221	X	12						
Year module / *Jaarmodule*											
									OMSE474	H	32
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**56**	**Total 2nd/ Totaal 2de Semester**		**56**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**136**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**512**

NB: FIELD MAPPING DURING THE DECEMBER HOLIDAY OF THE 3rd YEAR IS A PREREQUISITE FOR 4TH YEAR REGISTRATION

NAS.1.24.6 BACHELOR OF SCIENCE IN AGRICULTURE WITH SOIL SCIENCES AND AGRONOMY/ *BACCALAUREUS SCIENTIAE IN LANDBOU MET GRONDKUNDE EN AGRONOMIE*

Take note level 4 will be active for registration in 2022/
Neem kennis *dat jaarvlak 4 in 2022 aktief sal wees vir registrasie.*

Qualification Code/ *Kwalifikasiekode*	**2FD K06 - N401P**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Potchefstroom (AFRIKAANS, ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time / *Voltyds*

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM

Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ECON112	H	12	CSPM212	H	12	AECP211	X	16	CSPM411	H	8
FSKS113	X	12	GDKN211	H	16	CSPM311	H	8	OMSE411	X	16
NCHE111	X	12	STTK214	X	16	CSPM313	H	16	OMWP411	H	16
PLKS111	X	12	WVNS211	X	12	GDKN311	H	16			
ALDE/ ALDA111	X	12	CSPM315	X	8						
Total 1st/ Totaal 1ste Semester		**60**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**56**	**Total 1st/ Totaal 1ste Semester**		**40**
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
FSKS123	X	12	AECP121	X	12	AECP321	X	16	GDKN421	H	24
GDKN121	H	12	AECP223	X	16	AECP322	X	16	OMSA422	X	16
NCHE121	X	12	CSPM221	H	16	CSPM321	H	8	OMSA423	X	16
MTHS123	X	12	GDKN221	H	16	GDKN322	H	16			
ALDE/ ALDA122	X	12	WVNS221	X	12	CSPM324	H	16			
Year module / *Jaarmodule*											
									OMSE474	H	32
Total 2nd/ Totaal 2de Semester		**60**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**56**
Total Year Level 1/ Totaal Jaarvlak 1		**120**	**Total Year Level 2/ Totaal Jaarvlak 2**		**136**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**	**Total Year Level 4/ Totaal Jaarvlak 4**		**128**
Total Credits for the Programme/ Totale Krediete vir die Program											**512**

NAS.1.25 BACHELOR OF INDIGENOUS KNOWLEDGE SYSTEMS

NAS.1.25.1 PROGRAMME OUTCOMES

This is a multi-disciplinary qualification which has been designed to prepare students with the necessary knowledge, skills and values of Indigenous Knowledge Systems (IKS), in order to enable them to pursue careers as practitioners in various fields and contexts.

The qualification is based on a holistic approach to understanding IKS and lays a solid foundation for learners to gain academic and practical competencies, which will enable them to apply theoretical knowledge and understanding in a range of contexts which, including but not limited to: health sciences, traditional leadership, tourism, communication, agriculture, nature conservation, arts and culture, heritage, education, law, human and social sciences, physical planning and construction.

The multi-disciplinary nature of this qualification will enable learners to promote IKS within various communities of practice, through being conversant with the concepts, theories, philosophies and values of IKS. In addition, the structure of the qualification provides scope for electives in a domain of IKS, relevant to the student`s area of interest or research. The qualification will also equip learners with sufficient research competencies to undertake postgraduate studies

NAS.1.25.2 BACHELOR OF INDIGENOUS KNOWLEDGE SYSTEMS (BIKS)

In the 3rd year first semester the students must select **TWO** or **THREE** elective modules to a total of 32 credits.

(**NB:** those selecting Health electives do **THREE** modules 16 + 8 + 8, while others (Arts, Science & Agric.) do **TWO** modules of 16 + 16)

Qualification Code/ *Kwalifikasiekode*	**2HB K01 N401M** Pipelines are phasing out on old code: **287 100 N402M**
Campus & Language of Instruction/ *Kampus & Onderrigtaal*	Mahikeng (ENGLISH)
Delivery Mode/ *Metode van Aflewering*	Full Time

COMPILATION OF PROGRAMME / SAMESTELLING VAN PROGRAM											
Year Level 1/ Jaarvlak 1			**Year Level 2/ Jaarvlak 2**			**Year Level 3/ Jaarvlak 3**			**Year Level 4/ Jaarvlak 4**		
First/ Eerste Semester			**First/ Eerste Semester**			**First/ Eerste Semester**			**First/ Eerste Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE111	X	12	IKSM211	H	12	WVLS317	X	16	IKSM411	H	16
IKSM111	H	12	IKSM212	H	12	IKSM313	H	16	IKSM412	H	16
IKSM112	H	12	IKSM213	H	12	**Select 2 OR 3 modules from the following to a total of 32 credits:**			**Select 1 module from the following:**		
IKSM113	H	12	IKSM214	H	12	IKSA311	H	16	IKSS413	H	16
IKSM114	H	12	IKSM215	H	12	IKSC311	H	16	IKSA413	H	16
IKSM115	H	12				IKSC312	H	16	IKSC413	H	16
						IKSH311	H	16	IKSH411	H	16
						IKSH312	H	16			
						IKSH314	H	16			
						IKSM313	H	16			
						IKSS311	H	16			
Total 1st/ Totaal 1ste Semester		**72**	**Total 1st/ Totaal 1ste Semester**		**60**	**Total 1st/ Totaal 1ste Semester**		**64**	**Total 1st/ Totaal 1ste Semester**		**48**

Year Level 1/ Jaarvlak 1			Year Level 2/ Jaarvlak 2			Year Level 3/ Jaarvlak 3			Year Level 4/ Jaarvlak 4		
Second/ Tweede Semester			**Second/ Tweede Semester**			**Second/ Tweede Semester**			**Second/ Tweede Semester**		
Module Code/ Module-kode	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**	**Module Code/ Module-kode**	**Core/ Kern**	**Cr/ Kr**
ALDE122	X	12	IKSM221	H	12	IKSS324	H	16	IKSM421	H	64
IKSM121	H	12	IKSM222	H	12	**Select 3 modules from the following:**					
IKSM122	H	12	IKSM223	H	12	IKSA321	H	16			
IKSM123	H	12	IKSM224	H	12	IKSA322	H	16			
IKSM124	H	12	IKSM225	H	12	IKSA323	H	16			
IKSM125	H	12	WVCS223	X	12	IKSC321	H	16			
						IKSC322	H	16			
						IKSC323	H	16			
						IKSH321	H	16			
						IKSH322	H	16			
						IKSH323	H	16			
						IKSS321	H	16			
						IKSS322	H	16			
						IKSS323	H	16			
Total 2nd/ Totaal 2de Semester		**72**	**Total 2nd/ Totaal 2de Semester**		**72**	**Total 2nd/ Totaal 2de Semester**		**64**	**Total 2nd/ Totaal 2de Semester**		**64**
Total Year Level 1/ Totaal Jaarvlak 1		**144**	**Total Year Level 2/ Totaal Jaarvlak 2**		**132**	**Total Year Level 3/ Totaal Jaarvlak 3**		**128**	**Total Year Level 4/ Totaal Jaarvlak 4**		**112**
Total Credits for the Programme/ Totale Krediete vir die Program											**516**

NAS.2.1 DIPLOMA IN ANIMAL HEALTH

AHDM316	Semester 1	NQF Level: 5
Meat Inspection I		
Module outcomes: Students should be able to: • Demonstrate knowledge and understanding of important legislation governing the veterinary and para-veterinary laws in the world and in South Africa; • Demonstrate knowledge of the application of legislation in the control of diseases and the role of animal health technicians; • Demonstrate the ability to formulate and write legal documents; understand the concept of animal welfare and animal welfare assessment of both farm animals and companion animals; understand procedures and legislation and solve problems when dealing with trading, animal protection and insurance.		
Method of delivery: Lectures (Power Point), Videos and Abattoir Training		
Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations		
AHLH111	**Semester 1**	**NQF Level: 5**
Animal Health, Handling and Welfare I		
Module outcomes: After the successful completion of this module, the student must be able to demonstrate: • Basic knowledge and informed understanding of the animal health profession and the legislation framework for this profession. • Detailed knowledge and clear understanding of the principles of animal handling and welfare. • Ability to implement the principles of animal welfare and handling with a view to restrain different species of animals in practices setting.		
Method of delivery: Full Time		
Assessment modes: The student will prove that he/she has attained the outcomes of the module when the student can: • Discuss the profession of animal health technician and its regulatory body (SAVC) and the role of the profession according to the Veterinary and Para-veterinary professions Act no. 19 of 1982. • List the other professions in the veterinary team and state their roles in animal health care. • Discuss the principles of animal handling and welfare applicable to different species and their application in different settings in animal facilities. • Restrain companion and production animals using the techniques applicable to them for different purposes and settings.		

AHLH112	Semester 1	NQF Level: 5
Anatomy and Physiology: Animal Health		

Module outcomes:

At the end of this module students should be able to demonstrate:

- The knowledge and ability to describe the organization of living organisms with respect to the cell, tissues, and organ systems.
- The Ability to identify, distinguish and describe the normal anatomical structure and physiology of domestic animals including birds and fishes with respect to the integumentary, skeletal, muscular, cardiovascular, nervous and digestive systems.
- Ability to identify and recognise possible anatomo-physiological changes.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Identify all anatomical structures, explain the functions different anatomical systems.
- Prepare a presentation of a given topic and present it to the class.
- Recognise possible anatomical defects or physiological changes based on case scenario given.

AHLH121	Semester 1	NQF Level: 5
Animal Health, Handling and Welfare II		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Basic knowledge and informed understanding of animal welfare management systems for domestic and wildlife in capture facilities.
- Basic knowledge and informed understanding of general principles and assessment of animal welfare with an emphasis on farm animals, animals destined for slaughter and household pets.
- Competency in the ability to effectively implement the principles of animal welfare and handling with a view to restrain different species of animals in a practice setting.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the different welfare organisations in the country and how they render services for the "public" for domestic and wildlife animals.
- Discuss the general operational procedures at animal welfare organisation.
- Discuss the general principles and assessment of animal welfare with an emphasis on farm animals, animals destined for slaughter and household pets.
- Restrain companion and production animals using the techniques applicable to them for different purposes and settings.

AHLH122	Semester 2	NQF Level: 5
Anatomy and Physiology: Animal Health		

Module outcomes:

At the end of this module students should be able to demonstrate:

- The knowledge and ability to describe the anatomical.
- The Ability to identify, distinguish and describe the normal anatomical structure and physiology of respiratory, digestive, urinary, reproductive, nervous, and endocrine systems.
- Ability to identify and recognise possible anatomic-physiological change.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Identify all anatomical structures, explain the functions different anatomical systems.
- Prepare a presentation of a given topic and present it to the class.
- Recognise and explain possible anatomical defects or physiological changes based on case scenario given.

AHLH123	Semester 2	NQF Level: 5

Basic Microbiology and Immunology

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge of the classes of microorganisms of veterinary importance (bacteria, viruses, fungi, rickettsia and protozoans etc.).
- Knowledge of general grouping of bacteria and fungi of veterinary importance according to morphology and characteristics using different techniques.
- Recognise and describe the commonly encountered animal bacterial, viral and infections: causative agents, transmission, prevention of transmission, human health implications.
- Ability to correctly use acquired knowledge for the use of general laboratory procedures in microbiology including but not limited to staining and viewing of bacteria under the microscope, culturing of bacteria, use of different media, sensitivity testing, etc. especially as related to animal diseases. Case studies may also be used.

Method of delivery: Full time

Assessment modes:

After the successful completion this programme, the student must be able to:

- Correctly give and recognise through their characteristics, morphological different bacteria, virus and fungi. Between different bacteria and fungi.
- Use the acquired knowledge and apply it to recognise the on microscope different bacteria and fungi.
- Culture and identify under microscope common bacteria.

AHLH124	Semester 2	NQF Level: 6

Diseases I: Bacterial Diseases

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and clear understanding of commonly occurring bacterial diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases.
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis.
- The ability to select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Give and describe in detail by the epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa for most common bacterial diseases.

- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a simple given case scenario.
- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

AHLH211	Semester 1	NQF Level: 6

Diseases II: Viral and Fungal Diseases

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and clear understanding of commonly occurring viral diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases.
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis.
- The ability to select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Give and describe in detail for most common viral and fungal diseases, the respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.
- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a simple given case scenario.
- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

AHLH212	Semester 1	NQF Level: 6

Parasitology

Module outcomes:

At the end of this module students should be able to demonstrate:

- Ability to identify in detail classes of the commonly encountered helminths (nematodes, trematodes, cestodes), external parasite including ticks, mites, insects and lice of veterinary importance.
- Ability to describe in detail the life cycles stages of internal and external parasites.
- Detailed understanding and ability to apply knowledge acquired to propose basic control of both internal and external.
- Use acquired knowledge to practically Identify of helminths, and/ or eggs from faecal samples.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Correctly differentiate between internal and external parasites and describe their stages and life cycles.
- To identify in detail all classes of commonly encountered helminths (nematodes, trematodes, cestodes).
- Correctly name and give basic descriptions of classes of the commonly encountered internal and external parasites such as ticks, mites, insects and lice of veterinary importance.
- Apply the recommended treatment and control for external parasites.
- Correctly do a faecal flotation, use a microscope, Identify of different helminths, and/ or eggs.

- Correctly Identify external parasites; including ticks, tick counts, mites, insects and lice dipping for external parasite.

AHLH213	Semester 1	NQF Level: 6
Pathology I: General Pathology		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge of common concepts of general pathology of the cells, blood circulation, inflammation and causes of diseases.
- Detailed knowledge of post mortem procedures and write the report using correct terminology and practical recognition of basic pathological lesions and their systematic description.
- Detailed knowledge of correct collection, packaging and dispatch of specimen.
- Ability to implement learned knowledge to properly dispose and disinfect carcasses and polluted sites respectively in accordance to the legislation in place in South Africa.
- Use acquired knowledge to provide logical basic pathological, anatomical diagnosis and propose a tentative etiological differential diagnosis.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Identify correctly common general pathological of the cells, blood circulation, inflammation and causes of diseases.
- Give, explain and perform in sequence a post mortem and write a basic report using correct terminology and practical recognition of basic pathological lesions and their systematic description.
- Correctly collect, package and dispatch of specimens.
- Correctly dispose and disinfect carcasses and polluted sites respectively in accordance to the legislation in place in South Africa.
- Provide logical basic pathological, anatomical diagnosis and propose a tentative etiological differential diagnosis.

AHLH221	Semester 2	NQF Level: 6
Diseases III: Metabolic Diseases		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and clear understanding of commonly occurring metabolic diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases.
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis.
- The ability to select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Give and describe in detail for most common metabolic diseases, the respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.

- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a simple given case scenario.
- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.

AHLH222	Semester 2	NQF Level: 6

Obstetrics and Genital Diseases

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and clear understanding of the female reproductive cycles of domestic animals, and the factors which influence them.
- Detailed knowledge, clear understanding and description of the diseases and conditions causing infertility in production and companion animals.
- Detailed understanding and ability to describe basic physiological aspects of gestation and parturition, and its related problems.
- Implement acquired knowledge in practice by assisting the veterinarian with clinical cases involving obstetrical procedures for relieving dystocia, treatments associated with dystocia, assisting with dystocia, retained placentas, fertility examinations, semen evaluations, sheath washes, and other clinical cases related to obstetrics and reproductive diseases.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Give all anatomical structures of the female reproductive systems of different species, describe stages and characteristics of the female reproductive cycles of domestic animals
- Name and give basic clinical signs and common pathological signs, differential diagnosis, and propose control.
- Name and describe all stages gestation and parturition.

AHLH223	Semester 2	NQF Level: 6

Pathology II: Organ Pathology

In addition to knowledge acquired in Pathology I.

- At the end of this module students should be able to demonstrate:
- Detailed knowledge, understanding, recognition and description of abnormal findings of the 10 organ systems in the body (integumentary system, musculoskeletal, cardiovascular, respiratory, Gastrointestinal, urinary, reproductive, haemopoietic, endocrine and nervous system).
- Implement acquired knowledge and use it to identify pathological changes and come up with a differential and tentative diagnosis.
- Ability to write and present a detailed report on attended case or case scenario.

Method of delivery: Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Correctly identify explain all pathological changes occurring in different systems.
- Give with a differential and tentative diagnosis from pathological changes o observed and come up with a tentative diagnosis.
- To write and present a detailed report from an attended case or proposed case scenario.

AHLH224	Semester 2	NQF Level: 6
Pharmacology and Toxicology		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and understanding of basic pharmacokinetic and toxicokinetic concepts of medicines, toxic plants and common poisons.
- Detailed Explain the basic modes of action of the toxins, and relate them to the respective clinical signs.
- Explain the basic diagnostic methods and treatments in cases of poisoning.
- Apply learned knowledge to assist the veterinarian in the treatment of sick animals using the various medications, as well as in the treatment of common intoxications.

Method of delivery: Full time

Assessment modes:

After the successful completion this programme, the student must be able to:

- Give details and explain basic pharmacokinetic and toxicokinetic concepts of medicines, toxic plants and common poisons.
- Explain in detail the basic modes of action of the toxins, and relate them to the respective clinical signs.
- Explain the basic diagnostic methods and treatments in cases of poisoning.
- Assist the veterinarian in the treatment of sick animals using the various medications, as well as in the treatment of common intoxications.

AHLH225	Semester 2	NQF Level: 6
Meat Inspection I		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and clear understanding of meat inspection and abattoir processes, as well as an ability to correctly evaluate and apply meat safety legislation framework to abattoir processes and design.
- Detailed knowledge and clear understanding of abattoir hygiene as per the meat safety legislation framework.
- Ability to apply knowledge and understanding of animal diseases to evaluate and make judgement of pathological conditions that present at abattoirs.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss meat safety in the context a national and international stakeholders and its relationality to the “one health “concept.
- Describe the abattoir process and design as stipulated by the Meat Safety Act 40 of 2000.
- Evaluate basic abattoir plans on paper and identify shortcomings of the plans.
- Discuss the different hygiene management systems and process that are applicable at abattoirs.
- Evaluate using pictures, cases of pathological conditions that present at the abattoir to identify the organs or body parts.

AHLH226	Semester 2	NQF Level: 6
Clinical Laboratory Techniques		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of laboratory techniques and biosecurity to different animal diseases within the field of animal health.
- Ability to effectively perform basic laboratory investigation samples.
- Ability to effectively collect, preserve and package laboratory samples in the view of dispatching them for further specialised diagnostic test.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Identify and explain the use of basic and specialized laboratory equipment used in diagnostic test of animal diseases.
- Explain basic laboratory techniques used for investigate common diseases occurring in animals.
- Explain basic principles of laboratory safety and biosecurity.
- Perform basic laboratory diagnostic techniques and interpret the results.
- Competently collect, preserve and package laboratory samples such as bacterial colonies, histology tissue, etc. in the view of dispatching them for further specialised diagnostic test.

AHLH312	Semester 2	NQF Level: 6
Epidemiology for Animal Health		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge, understanding of basic epidemiological concepts in veterinary field
- Explain the importance of epidemiology in disease surveillance, prevention and control.
- Explain and demonstrate epidemiologic concepts as they relate to disease surveillance, prevention and control. Describe the laws that pertain to veterinary practice.
- Practically be able to resolve epidemiological cases if allocated to them.

Method of delivery: Full time

Assessment modes: Assignments, Quizzes, Tests, Examinations

AHLH313 (Diploma)	Semester 2	NQF Level: 6
Environmental and Public Health for Animal Health		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- A well-rounded, systematic and integrated knowledge and understanding of veterinary public health and the related legislation framework and the application in zoonotic, environmental health and animal products safety and “one health” context.
- The ability to investigate and critically reflect and apply the principles of veterinary public health to identify and solve or expose food safety, zoonotic and one health.
- Ability to communicate effectively in orally and in writing to the general public and farmer for various purposes in the promotion of “one health”.

Method of delivery: Full time

Assessment modes:
The student will prove that he/she has attained the outcomes of the module when the student can:

- Use an integrated knowledge approach to discuss the principles and challenges of "one health", environmental health, animal product food safety, and water safety and current trends in veterinary public health.
- Discuss the current trends in veterinary public health problems in relation to pandemics and endemic disease occurrence.
- Investigate using quantitative research methods in a community to investigate food safety knowledge, attitude and practice and write and present the findings in a form of a report.
- Analyse complex case studies of zoonotic and foodborne diseases and be able to integrate diversity of veterinary public health related knowledge to suggest the approach of solving the problems.
- Perform some laboratory test to evaluate milk hygiene and water quality.
- Effectively communicate through a presentation to either children, adults or farmers on veterinary public health issues that are most relevant to promote "one health".

AHLH321	**Semester 2**	**NQF Level: 6**
Meat Inspection II		

Module outcomes:
After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding in clinical and para-clinical fields relevant to meat inspection and abattoir hygiene.
- Ability apply meat inspection techniques to perform an ante-mortem and primary meat inspection at abattoirs.
- Ability to monitor abattoir hygiene practice at abattoirs.
- Ability to evaluate an abattoir's structure and plan and give recommendation for improvement.
- Ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to meat inspection and abattoir hygiene.

Method of delivery: Full time

Assessment modes:
The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss meat safety and hygiene practices problems and solutions in the field of meat safety to ensure health of both animals and human.
- Conduct ante-mortem inspection and give judgment and also enforce quarantine and other guidelines for animals arriving to lair ages.
- Conduct primary meat inspection and judgements and also implement remedial procedures for conditional passed carcasses.
- Conduct laboratory test to carcasses and organs where necessary.
- Use the government Hygiene Assessment System to monitor hygiene practice at abattoirs.
- Use the Meat Safety Act 40 of 2000 and regulations to evaluate abattoir plans and structure in the view of giving recommendations for improvement.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in meat inspection and abattoir hygiene.

AHLH322	**Semester 2**	**NQF Level: 6**
Scheduled Diseases, Quarantine and Biosecurity		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge of all controlled diseases and the legislation regulation their control, management and implied biosecurity, of general concepts of Scheduled Diseases and current disease outbreaks.
- Ability to describe and perform procedures relating to controlled diseases such as: Tuberculosis (TB) and Contagious Abortion (CA), FMD, eradication schemes as prescribed by the National Department of Agriculture.
- Ability to practically demonstrate skills on performing prescribed field tests, sampling procedures using relevant materials and equipment and interpretation of results.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Name and give details-controlled diseases and the legislation their control, management and implied biosecurity, of general concepts of Scheduled Diseases and current disease outbreaks.
- Describe and perform procedures relating to controlled diseases such as: Tuberculosis (TB) and Contagious Abortion (CA), FMD, eradication schemes as prescribed by the National Department of Agriculture.
- Performing prescribed field tests, sampling procedures using relevant materials and equipment and interpretation of results.

AHLH323	**Semester 2**	**NQF Level: 6**

Management and Entrepreneurship

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of different aspects of animal health fields applicable to business, project and facility management and entrepreneurship for animal health professional.
- Ability to apply the production-based learning model to develop a business plan and critically judge the effectiveness of the implementation by application of the SWOT analysis with a view to develop an effective business plain.
- Ability to articulate a clear vision and goals of the business, and/or project, and to motivate others, such as employers, employees and funders to achieve them.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss of the nature of business and facility management, establishment issues of a new business, the different business functions and the basic elements of a business plan in animal health and sources of funding.
- Describe the process of planning and the differences between strategic and business planning.
- Define SWOT analysis and how it relates to the market and competition within a business plan.
- Explain and use the production-based learning model to develop a business plan for a new business venture.
- Apply the principles of the SWOT analysis to determine the future prospects of the business.
- Orally present a business plan for purposes of securing financial bucking and also to motivate stakeholders in the business.

AHLH371	Year module	NQF Level: 6
WIL I: Companion Animal Medicine and Surgery		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of clinical and para-clinical fields relevant to companion animal health, handling and welfare.
- Ability to effectively perform diagnostic, preventative and curative medicine, and other procedures in the scope of an Animal Health Technician to administer companion animal health care in a workplace with professional integrity.
- Ability to interact and collaborate effectively with others, and to work as part of a team, to successfully complete a task related to companion animal health care.
- Ability to communicate effectively in oral and written formats to clients and supervisor about animal health care and welfare.

Method of delivery: Full time

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the different modalities and systems that is used to ensure health of both animals and human related to companion animal health at a workplace.
- Apply the ethical principles of animal welfare and professionalism to restrain animals and conduct clinical examination on animals in a hospital or ambulatory settings.
- Collect and preserve samples that diagnostics procedures and perform basic further diagnostic test.
- Correctly and with consideration to animal welfare to administer first-aid protocols, vaccination, medical drugs and veterinary remedies of companion animals.
- Assist veterinarians to prepare and perform surgical procedure on companion.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in the animal hospital activities and critically review group activity processes, and give recommendations for improvement.
- Offer effective communication to clients; about home care of sick animals, nutrition and other preventative and curative measures to ensure health of both animal and human, practicing profession integrity.

AHLH372	Year module	NQF Level: 6
WIL II: Production Animal Clinical Care for Animal Health		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of clinical and para-clinical fields relevant to production animal health, handling, and welfare.
- Ability to effectively perform diagnostic, preventative and curative medicine, and other procedures the scope of an Animal Health Technician to administer production animal health care in a workplace with professional integrity.
- Ability to provide primary animal health care to subsistence and semi-commercial farmers especially those living in areas where veterinary services are not available.
- Ability to interact and collaborate effectively with others, and to work as part of a team, to successfully complete a task related to production animal health care.
- Ability to communicate effectively in oral and written formats to clients and supervisors about animal health care and welfare.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse production animal health problems and discuss solutions that integrate different modalities and systems in the field of animal health production to ensure the health of both animals and human at a workplace.
- Apply the ethical principles of animal welfare and professionalism to restrain animals and conduct clinical examination on production animals in a hospital, community-outreach activities and ambulatory settings.
- Competently collect and preserve samples that diagnostics procedures and perform basic further diagnostic tests.
- Apply the ethical principles of animal welfare and professionalism to restrain animals and conduct clinical examination on production animals in a hospital, community-outreach activities and ambulatory settings.
- Competently collect and preserve samples that diagnostics procedures and perform basic further diagnostic tests.
- Administer first-aid protocols, vaccination, medical drugs and veterinary remedies of production animals correctly with consideration for animal welfare.
- Assist veterinarians to prepare and perform surgical procedures on production in a hospital, farm, community-outreach activities, and ambulatory settings.
- Implement or assist in the implementation of designed herd health management plans for farmers in different communities and perform herd health and production improvement procedures on their own, for farmers in different communities.
- Show professional, responsible and cooperative behaviour while acting in different roles to perform group tasks in the animal hospital activities and be able to critically the review group activity processes, own and peer's performance in the tasks and give recommendations for improvement.
- Offer effective communication to clients; about farm care of sick animals, nutrition, production, economics and other preventative and curative measures to ensure the health of both animal and human, practicing profession integrity.

AHLH373	**Year module**	**NQF Level: 6**

WIL III: Pathology and Laboratory Practice

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of clinical and para-clinical fields relevant to post-mortem and laboratory investigations at a workplace.
- Ability to effectively perform basic post-mortem examination on different animal species in a workplace.
- Ability to effectively perform basic laboratory investigation of diseases for different samples in a workplace.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to post mortem and laboratory practice.

Method of delivery: Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the different modalities and systems that is used to ensure health of both animals and human related to companion animal health at a workplace.

- Apply necropsy technique to conduct basic post-mortem examination and collect, label and submit suitable and correctly preserved and package samples for further laboratory investigations from necropsy cases at the workplace.
- Perform basic microbiological, serological and others procedures to investigate diseases aetiology and process in samples presenting a laboratory.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in the animal hospital activities.

AHLH374	**Year module**	**NQF Level: 6**

WIL IV: Applied Biosecurity for Animal Health

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of clinical and para-clinical fields relevant in the biosecurity at facilities harbouring animals and ports of entry in to the country.
- Ability to investigate, identify and resolve breaches in the control of animal diseases at all ports of entries of the country and all animal facilities.
- Ability to communicate effectively in oral and written formats to clients and supervisors about biosecurity measures for different animal facilities.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to biosecurity at facilities harbouring animals and ports of entry in to the country.

Method of delivery: Full time

The student will prove that he/she has attained the outcomes of the module when the student can:

- Identify and discuss the different biosecurity problems and solutions that that is used to ensure health of both animals and human at farms, auction and breeding stations.
- Investigate and identify breaches in the control of Scheduled diseases using the legislation framework as per Animal Disease Act 35 of 1984 at animal facilities and ports of entries into the country.
- Investigate and identify breaches in biosecurity and implement solutions to the control animal diseases at animal facilities.
- Offer effectively communicate to advice farm, auction and breeding station owners on application of biosecurity measures to ensure health of both animal and human at animal facilities.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks for biosecurity at facilities harbouring animals and ports of entry in to the country.

AHVM111	**Semester 1**	**NQF Level: 5**

Anatomy and Physiology: Animal Health I

Module outcomes:

Students should be able to:

- Describe the basic organization of living organisms with respect to the cell, tissues and organ systems;
- Describe the basic anatomy and physiology of domestic animals, including birds, with respect to the integumentary, musculoskeletal, nervous and endocrine systems.

Method of delivery: Full time. Lectures (Power Point), Videos and Practical Visit on Farms

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

AHVM122	Semester 2	NQF Level: 5
Anatomy and Physiology: Animal Health II		

Module outcomes:

Students should be able to:

- Describe, differentiate the anatomy and physiology of domestic animals, including birds, with respect to the respiratory, circulatory, gastrointestinal, urinary, and reproductive systems;
- In practical sessions, be able to identify and differentiate normal tissues and anatomical organs in domestic animals.

Method of delivery: Full time. Lectures (Power Point), Videos, Practical and Dissection

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

AHVM211	Semester 1	NQF Level: 5
Diseases I		

Module outcomes:

Students should be able to:

- Describe the basic concepts of the commonly occurring viral and bacterial diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases;
- Evaluate lists of differential diagnoses and come up with tentative diagnosis;
- In practical sessions, students will be involved in assisting the veterinarian in the examination, diagnosis and treatment as well as prevention of the diseases;
- When specific disease conditions are not seen in the live animals, videos will be used to supplement the student practical learning.
- Students will be guided in the use of epidemiological surveys and investigations, including the collection and recording of data related to the diseases studied.

Method of delivery: Lectures (Power Point), Videos and Practical Visit on Farms

Assessment modes: Assignments, Quizzes, Tests, Examinations

AHVM226	Semester 2	NQF Level: 5
Basic Microbiology for Animal Science		

Module outcomes:

Students should be able to give a functional description of the classes of microorganisms of animal health importance (bacteria, viruses, fungi, rickettsia and protozoans etc.);

- Give a functional description of the general principles of pathogenesis by microbiological agents;
- Give a general grouping of bacteria and fungi of animal health importance according to staining results, morphology and characteristics;
- Describe microbes causing important diseases of animals;
- Describe the commonly encountered animal health infections: causative agents, transmission, prevention of transmission, human health implications;
- In practical sessions, learners will participate in the use of general laboratory procedures in microbiology, including but not limited to, staining and viewing of bacteria under the microscope, culturing of bacteria, use of different media, sensitivity testing, etc., especially as related to animal diseases (case studies may also be used);
- Make use of practical microbiological procedures to help differentiate common microbiological pathogens.

Method of delivery: Lectures (Power Point), Videos and Practical Visit on Farms

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

NAS.2.2 BSC AGRICULTURE - ANIMAL HEALTH

AHDR111	**Semester 1**	**NQF Level: 6**
Animal Health, Handling and Welfare I		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of the animal health profession and the legislative framework for the profession, and the principles of animal handling and welfare.
- The ability to practical undertake professional activities in conformity with national and international animal welfare management systems.
- Ability to effectively implement the principles of animal welfare and handling with a view to restrain different species of animals in practical.

Method of delivery: Contact- Full time

The student will prove that he/she has attained the outcomes of the module when the student can:

- Comprehensively discuss the profession of animal health technician and its regulatory body (SAVC) and the role of the profession in the veterinary team according to the Veterinary and Para-veterinary professions Act no. 19 of 1982.
- Discuss extensively the other professions in the veterinary team (e.g. veterinary technologist) and their roles to animal health care.
- Discuss the principles of animal handling and welfare applicable to different species and their application in different settings in animal facilities.
- Explain the national legislation framework and the OIE terrestrial code and compare them to determine if there are shortcomings in the country's framework for certain animal species.
- Restrain companion and production animals using the techniques applicable to them for different purposes and settings.

AHDR121	**Semester 2**	**NQF Level: 6**
Animal Health, Handling and Welfare II		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of animal welfare management systems for domestic and wildlife in capture facilities.
- Understanding of multiple sources of general principles and assessment of animal welfare with an emphasis on farm animals, animals destined for slaughter and household pets.
- Ability to evaluate of animal welfare of different species of animal in animal facilities and households.
- Increased competency in the ability to effectively implement the principles of animal welfare and handling with a view to restrain different species of animals in practice.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the different welfare organisations in the country and that welfare render services for the for domestic and wildlife animals.

- Discuss the general operational procedures at animal welfare organisations.
- Discuss animal welfare for laboratory and animal in experimental research.
- Explicitly discuss the general principles and assessment of animal welfare with an emphasis on farm animals, animals destined for slaughter and household pets.
- Evaluate animal welfare and animal facilities and give recommendations for improvement if necessary.
- Completely restrain companion and production animals using the techniques applicable to them for different purposes and settings.

AHDR211	Semester 1	NQF Level: 6

Anatomy and Physiology I: Animal Health

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and of the anatomy and clear understanding of animal physiology of describe the organization of living organisms with respect to the cell, tissues, and skeletal system, muscular, cardiovascular, nervous and digestive system of domestic animals including fishes and birds.
- Ability to identify and analyse possible anatomo-physiological changes and explain the cause of the change.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Identify, name and give detail all anatomical structures, explain the functions different anatomical systems.
- Correctly recognise possible anatomical defects or physiological changes based on case scenario given and explain metabolic changes inducing them.

AHDR212	Semester 1	NQF Level: 6

Ethno veterinary Medicine

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge, clear understanding and appreciation of the indigenous ways of knowing in the field of ethno veterinary medicine including knowledge transfer and methods of treatment of animal diseases.
- Detailed knowledge and clear understanding of pharmacological and photochemical testing procedures of medicinal plants and also implementation of some in-vitro and in-vivo techniques with a view to compare efficacy of different medicinal plants used in ethno veterinary medicine.
- The ability to distinguish discipline-specific methods and techniques and code of conduct of scientific enquiry appropriate for implementation in ethno veterinary research.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the history, medicinal plants use, procedures and knowledge transfer and used in indigenous animal health care.
- Discuss using examples the contribution of traditional medicinal plant knowledge to modern medicine.
- Debate the value of an integrated animal health care systems when evidence shows critical thing and literature interrogation.
- Discuss medicinal plant efficacy and toxicity testing and methods of phytochemical isolation methods used in the field of phytomedicine.

- Perform and explain some in-vivo and in-vitro experiment including anti-microbial, TLC and animal experiments used in efficacy studies.
- Conduct an ethno veterinary survey using appropriate ethical conduct, methods and technique to document knowledge of ethno veterinary medicine from practitioners.

AHDR213	**Semester 1**	**NQF Level: 6**

Fundamentals of Aquaculture

Module outcomes:

At the end of this module students should be able to demonstrate:

- Fundamental knowledge of biology of aquatic living resources.
- Demonstrate fundamental knowledge marine and freshwater environmental science and oceanography.
- Fundamental Aquaculture and fisheries practices for major species worldwide and locally.
- Fundamental knowledge of aquaculture systems for major species locally and worldwide.
- Knowledge of elements of water quality important to aquaculture.
- Advanced knowledge Principles of health management for aquatic species. aspects of nutrition important to growth and health of aquatic species.
- Critical assessment and analysis of the Impacts of aquaculture and fisheries on society, the economy, and the natural environment.
- Knowledge Basic principles of marketing and food science.
- Fundamental knowledge of fishing methods and technology.
- The fundamental knowledge and principles of fisheries science and ecosystem-based fisheries management and principles of sustainability.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Name and explain all practices of aquaculture and fisheries for major species worldwide and locally.
- Recognise and identify the major species locally and worldwide.
- Determine the elements of water quality important to aquaculture.
- Give and explain basic principles of health management for aquatic species. Aspects of nutrition important to growth and health of aquatic species.
- Acknowledge and explain of the Impacts of aquaculture and fisheries on society, the economy, and the natural environment.
- Develop and use the fishing technology and methods.
- Explain the principles of fisheries science and ecosystem-based fisheries management and principles of sustainability.

AHDR221	**Semester 2**	**NQF Level: 6**

Anatomy and Physiology: Animal Health

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and of the anatomy and clear understanding of animal physiology of respiratory, digestive, urinary, reproductive, system of domestic animals including fishes and birds.
- Ability to identify and analyse possible anatomo-physiological changes and explain the cause of the change.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Correctly identify, name and give detail all anatomical structures, explain the functions different digestive, urinary, reproductive, system of domestic animals including fishes and birds.
- Research and prepare a presentation of a given topic and present it to the class.
- Correctly recognise possible anatomical defects or physiological changes based on case scenario given and explain metabolic changes inducing them.

AHDR222	Semester 2	NQF Level: 6

Microbiology and Immunology for Animal Health

Module outcomes:

At the end of this module students should be able to demonstrate:

- Advanced knowledge and understanding of veterinary microbiology, immunology and basic molecular microbiology concepts.
- Advanced knowledge and mastering of classes of microorganisms of veterinary importance (bacteria, viruses, fungi, rickettsia and protozoans etc.) and link them to major diseases.
- Ability to Group bacteria, fungi of veterinary importance according to staining results, morphology and characteristics.
- Ability to describe the commonly encountered animal health infections: causative agents, transmission, prevention of transmission, animal health implications.

Method of delivery: Contact- Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Give detailed characteristics, morphological differences between bacteria, virus and fungi. Between different bacteria and fungi.
- Correctly use the acquired knowledge and apply it to recognise the on microscope different bacteria and fungi and explain the differences between them.
- Give in detail steps for DNA extraction and molecular application and Polymerase Chain Reaction.

AHDR311	Semester 2	NQF Level: 7

Diseases I: Bacterial Diseases

Module outcomes:

At the end of this module students should be able to demonstrate:

- Integrated knowledge and critical understanding of bacterial diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis for a given case scenario.
- Advanced ability to effectively implement, use and apply the knowledge acquired to propose correct treatment and preventative methods for different diseases as per given scenario cases.
- Advanced ability to effectively implement learned knowledge to research on diseases learned and acquire new knowledge.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Show mastering of concepts by giving in detail and explaining for most common bacterial in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.

- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a complicated given case scenario.
- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.
- Come up with a preventative protocol for the farm.

AHDR312	Semester 1	NQF Level: 7

Diseases II: Viral and Fungal Diseases

Module outcomes:

At the end of this module students should be able to demonstrate:

- Integrated knowledge and critical understanding of viral and fungal diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis for a given case scenario.
- Advanced ability to effectively implement, use and apply the knowledge acquired to propose correct treatment and preventative methods for different diseases as per given scenario cases.
- Advanced ability to effectively implement learned knowledge to research on diseases learned and acquire new knowledge.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Show mastering of concepts by giving in detail and explaining for viral and fungal diseases of veterinary importance l in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.
- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a complicated given case scenario.
- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.
- Come up with a preventative protocol for the farm.

AHDR313	Semester 1	NQF Level: 7

Epidemiology for Animal Health

Module outcomes:

At the end of this module students should be able to demonstrate:

- An integrated knowledge and critical understanding of the common veterinary epidemiological concepts.
- Explain the importance of epidemiology in disease surveillance, prevention and control.
- Critically explain epidemiologic concepts as they relate to disease surveillance, prevention and control. Describe the laws that pertain to veterinary practice.
- Ability to effectively implement, use and apply acquired knowledge to practically resolve epidemiological cases if allocated to them.
- Ability to apply acquired knowledge to implement epidemiological surveys, collect data, analyse and propose understandable solutions mostly for controlled diseases.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Correctly identify and explain in detail all common veterinary epidemiological concepts such as agent, host, environment.
- Explain the importance of epidemiology in disease surveillance, prevention and control.
- Explain and demonstrate epidemiologic concepts as they relate to disease surveillance, prevention and control. Describe the laws that pertain to veterinary practice.
- Resolve epidemiological cases scenario if allocated to them.
- Resolve epidemiological cases allocated to him using acquired knowledge.
- Undertake epidemiological surveys, collect data analyse and propose understandable solutions mostly for controlled diseases.

AHDR314	**Semester 1**	**NQF Level: 7**
Pathology I: General pathology		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Advanced knowledge and mastering of general pathology of the cells, blood circulation, inflammation and causes of diseases and ability to explain them.
- Advanced knowledge and skills of post mortem procedures and write the report using correct terminology.
- Advanced ability to critically evaluate presented cases or case scenario, implement acquired knowledge and implement it to correctly collect, correctly package and dispatch specimens,
- Properly dispose and disinfect carcasses and polluted sites respectively in accordance to the legislation.
- Advanced ability to recognize and explain basic pathological lesions and their systematic description, apply knowledge and come up with advanced pathological, anatomical diagnosis.
- Provide the final etiological diagnosis or list differential diagnosis.

Method of delivery: Contact- Full time

Assessment modes:

After the successful completion this module, the student must be able to:

- Identify, explain pathological changes of the cells, blood circulation, inflammation and causes of diseases and ability to explain them.
- Describe in detail and perform a post mortem procedure and write the report using correct terminology.
- Advanced ability to critically evaluate presented cases or case scenario, implement acquired knowledge and implement it to correctly collect, correctly package and dispatch specimens,
- Properly disposing and disinfecting carcasses and polluted sites respectively in accordance to the legislation and recognising basic pathological lesions and their systematic description.
- Providing the tentative etiological diagnosis or list differential diagnosis.
- Write of pathological report and Keep records of pathological investigation and to justify and explain the findings.

AHDR315	**Semester 1**	**NQF Level: 7**
Obstetrics and Genital Diseases		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Describe the advanced concepts of the reproductive cycles of domestic animals, and the factors which influence them.
- Describe and explain the diseases and conditions causing infertility in production and companion animals and know how to prevent them.

- Advanced ability to effectively describe the physiology of gestation and parturition, and its related problems.
- Advanced ability to effectively apply learned knowledge to assist the veterinarian with clinical cases involving obstetrical procedures for relieving dystocia, treatments associated with dystocia, assisting with dystocia, retained placentas, fertility examinations, semen evaluations, sheath washes,
- and other clinical cases related to obstetrics and reproductive diseases.
- Provide basic advises and explain possible complications to the owner or the farmer.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Give in detail all anatomical structures of the female reproductive system, differentiate between species, identify and correctly explain stages of the reproductive cycles of different species of domestic animals, and the factors influencing them.
- Identify and explain most common diseases and conditions causing infertility in production and companion animals and know how to prevent them.
- Correctly identify and describe basic characteristics of different stages gestation and parturition.
- Name, identify and describe the use of all equipment and drugs needed for obstetrical procedures for relieving dystocia, treatments associated with dystocia, assisting with dystocia, retained placentas, fertility examinations, semen evaluations, sheath washes, and other clinical cases related to obstetrics and reproductive diseases.
- Provide basic advises and explain possible complications to the owner or the farmer.

AHDR316	**Semester 1**	**NQF Level: 7**

Parasitology

Module outcomes:

At the end of this module students should be able to demonstrate:

- An advanced knowledge of aspects of the commonly encountered internal and external parasites.
- Advanced knowledge and ability to Identify and describe the main classes of the commonly encountered helminths (nematodes, trematodes, cestodes).
- Advanced knowledge and ability to Identify and describe the classes of the commonly encountered ticks, mites, insects and lice of veterinary importance.
- Advanced ability to effectively to recommend, apply and evaluate basic parasite control protocol and in application of legislation regarding dip tank management treatment and control of external and internal parasites.
- Advanced ability to effectively apply learned techniques to practically identify helminths, and/ or eggs from faecal samples Identification of external parasites;
- Advanced ability to identify problems related to parasitology in domestic animals and apply acquired knowledge to conduct research and propose solutions.

Method of delivery: Contact- Full time

Assessment Methods:

- After the successful completion this Module, the student must be able to:
- Name and correctly explain the differences commonly encountered internal and external parasites.
- Ability to identify basic classes of the commonly encountered helminths (nematodes, trematodes, cestodes).
- Correctly name and give basic descriptions of classes of the commonly encountered internal and external parasites such as ticks, mites, insects and lice of veterinary importance
- Apply the recommended treatment and control for external parasites.

- Detailed understanding and ability to apply knowledge acquired to propose the treatment and control of helminths using both oral and injectable medication in presented case scenario.
- Correctly do a faecal flotation, use a microscope, Identify of different helminths, and/ or eggs.

AHDR317	Semester 1	NQF Level: 7
Introduction to Game and Wildlife		

Module outcomes:

At the end of this module students should be able to demonstrate:

- An advanced knowledge of aspects of the understanding of the principles, habitat, game capture, physiology & chemistry; nutrition, disease, toxic plants & soil; vegetation, carrying capacity & game reserve management;
- Knowledge and understanding of clinical techniques, preventions and considerations used in game and wildlife care; identify, analyse and solve problems in the context of game and wild life care; and communicate and debate information and solutions to problems in this particular field of study.
- Advanced ability to develop a research topic, collect data, interpretation and solution approach.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Give details of the habitat, game capture, physiology & chemistry; nutrition, disease, toxic plants & soil; vegetation, carrying capacity
- Explain with details no game reserve management principles;
- Give and explain in detail clinical techniques, preventions and considerations used in game and wildlife care; identify, analyse and solve problems in the context of game and wild life care; and communicate and debate information and solutions to problems in this particular field of study.
- Develop a research topic, collect data, interpretation and solution approach.

AHDR321	Semester 2	NQF Level: 7
Diseases III: Metabolic Diseases		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Integrate knowledge and critical understanding of Metabolic and rickettsial diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa
- The ability to identify, analyse and evaluate lists of differential diagnoses and come up with tentative diagnosis for a given case scenario.
- Advanced ability to effectively implement, use and apply the knowledge acquired to propose correct treatment and preventative methods for different diseases as per given scenario cases.
- Advanced ability to effectively implement learned knowledge to research on diseases learned and acquire new knowledge.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Show mastering of concepts by giving in detail and explaining for Metabolic and rickettsial diseases in respect to epidemiology, clinical signs, post-mortem, diagnostic methods, treatment, and preventative measures with emphasis on the notifiable diseases occurring in South Africa.
- To apply the acquired knowledge and give differential diagnoses and come up with tentative diagnosis for a complicated given case scenario.

- To select, implement and evaluate the correct treatment and preventative methods for different diseases as per given scenario cases.
- Come up with a preventative protocol for the farm.

AHDR322	Semester 2	NQF Level: 7
Meat Inspection I		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge and clear logical understanding of meat inspection and abattoir processes, as well as an ability to correctly evaluate and apply meat safety legislation framework to abattoir processes and design.
- Detailed knowledge and clear understanding of abattoir hygiene as per the meat safety legislation framework.
- Apply the meat safety legislation framework to practically evaluate hygiene practices at an abattoir.
- Ability to apply the integrated knowledge and understanding of animal diseases to evaluate and make judgements of pathological conditions that present at abattoirs.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse and explain meat safety in the context a national and international stakeholders and its relationality to the “one health “concept”.
- Discuss, describe and explain the abattoir process and design as stipulated by the meat safety act 40 of 2000.
- Critically evaluate complex abattoir plans on paper and identify shortcomings of the plans and give recommendation.
- Discuss the different hygiene management systems and process that are applicable at abattoirs.
- Evaluated hygiene practices of an abattoir during a visit using the hygiene assessment system (has).
- Use pictures evaluate cases of pathological conditions that present at the abattoir to identify the organs or body parts, give judgements and justifications for the judgements.

AHDR323	Semester 2	NQF Level: 7
Pharmacology and Toxicology		

Module outcomes:

At the end of this module students should be able to demonstrate:

- An advanced knowledge of aspects of the understanding of the principles pharmacokinetic and toxicokinetic concepts of medicines, toxic plants and common poisons.
- Mastering and explaining the modes of action of the toxins, and relate them to the respective clinical signs and explain and perform the most common diagnostic field tests and treatments in cases of poisoning.
- Integrate and implement acquired knowledge to assist the veterinarian or under supervision in the treatment of sick animals using the various medications, as well as in the treatment of common intoxications.
- Advanced knowledge of administration of medication including subcutaneous, intramuscular, intravenous, intraperitoneal, epidural, intermammary, sub conjunctival, topical and oral.
- Integrate and implement acquired knowledge to restraint and the assistance of the veterinarian in drug administration. Identification of common toxic plants, poisons, heavy metals, organophosphates, rodenticides and others.

- Demonstrate advanced knowledge and application of legislation of drugs and farm remedies and be able to advise farmers on their use.
- Apply the knowledge acquired to conduct an experimental research project in field conditions.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Give and explain detailed principles pharmacokinetic and toxicokinetic concepts of medicines, toxic plants and common poisons.
- Explain in detail the modes of action of the toxins, and relate them to the respective clinical signs, explain perform the most common diagnostic field tests and treatments in cases of poisoning.
- Correctly assist the veterinarian or under supervision in the treatment of sick animals using the various medications, as well as in the treatment of common intoxications.
- Correctly use different routes of administration of medication including subcutaneous, intramuscular, intravenous, intraperitoneal, epidural, inframammary, sub conjunctival, topical and oral.
- Restraint and the assistance of the veterinarian in drug administration. Identification of common toxic plants, poisons, heavy metals, organophosphates, rodenticides and others.
- Identify and explain all legislations related to drugs and farm remedies in South Africa.
- Conduct using the knowledge acquired experimental research project in field conditions.

AHDR324	**Semester 2**	**NQF Level: 7**

Pathology II: Organ Pathology

Module outcomes:

In addition to knowledge acquired in Pathology I

At the end of this module students should be able to demonstrate:

- Demonstrate advanced knowledge, understanding, recognition and description of abnormal findings of the 10 organ systems in the body (integumentary system, musculoskeletal, cardiovascular, respiratory, Gastrointestinal, urinary, reproductive, haemopoietic, endocrine and nervous system).
- Advanced Analyse and interpreted the findings in a logical and scientific manner.
- Propose recommendations to the owner and preventative measures.
- Initiate an epidemiological investigation and give report.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Demonstrate advanced knowledge, understanding, recognition and description of abnormal findings of the 10 organ systems in the body (integumentary system, musculoskeletal, cardiovascular, respiratory, Gastrointestinal, urinary, reproductive, haemopoietic, endocrine and nervous system).
- Advanced Analyse and interpreted the findings in a logical and scientific manner.
- recommend to the owner preventative measures after assessing a case.
- Initiate an epidemiological investigation and give report for a case attended to.

AHDR325	Semester 2	NQF Level: 7
Clinical Laboratory Techniques		

Module outcomes:

At the end of this module students should be able to demonstrate:

- An advanced knowledge of aspects of the understanding of the principles pharmacokinetic and toxicokinetic concepts of medicines, toxic plants and common poisons.
- Mastering and explaining the modes of action of the toxins, and relate them to the respective clinical signs.
- Explain the most common diagnostic field tests and treatments in cases of poisoning.
- Assist the veterinarian or under supervision in the treatment of sick animals using the various medications, as well as in the treatment of common intoxications.
- Advanced knowledge of administration of medication including subcutaneous, intramuscular, intravenous, intraperitoneal, epidural, intermammary, sub conjunctival, topical and oral.
- Restraint and the assistance of the veterinarian in drug administration. Identification of common toxic plants, poisons, heavy metals, organophosphates, rodenticides and others.
- Demonstrate advanced knowledge and application of legislation of drugs and farm remedies and be able to explain them.
- To organize scientific outreach to farmers on drugs and poisoning plants.
- Conduct experimental research project in field conditions.
- Ability to effectively perform basic laboratory investigation samples.
- Advanced ability to effectively collect, preserve and package laboratory samples in the view of dispatching them for further specialised diagnostic test.
- Ability to perform basic molecular laboratory techniques that are used for research purpose.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Identify and explain the use of basic and specialised laboratory equipment used in diagnostic test of animal diseases
- Explain basic laboratory, molecular and clinical chemistry techniques used for investigate common diseases and disease processes
- Comprehensively explain basic principles of laboratory safety and biosecurity
  perform laboratory diagnostic techniques and interpret the results of samples that present at the laboratory.
- Competently collect, preserve and package laboratory samples such as bacterial colonies, histology tissue, PCR products etc. in the view of dispatching them for further specialised diagnostic test.
- Perform basic molecular laboratory techniques including DNA extraction, PCR and gel electrophoresis and interpret the results.

AHDR326 (Degree)	Semester 2	NQF Level: 7
Veterinary Jurisprudence		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Integrated knowledge and understanding and application of legislations governing the veterinary and para-veterinary laws in the world and in South Africa.
- Advanced knowledge of the application of legislation in the control of diseases and the role of animal health technicians;
- The ability to formulate and write legal documents;

- The understanding of the concept of animal welfare and animal welfare assessment of both farm animals and companion animals; and apply knowledge of procedures and legislation to deal with trading, animal protection and insurance and critically reflect and communicate theory driven arguments.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Name and give detailed explanation of all legislations governing the veterinary and para-veterinary laws in the world and in South Africa;
- Apply correctly and explain legislation used in the control of diseases and the role of animal health technicians;
- Correctly formulate and write legal documents;
- Use learned knowledge to promote animal welfare and asses animal welfare for both farm animals and companion animals; and apply knowledge of procedures and legislation to deal with trading, animal protection and insurance and critically reflect and communicate theory driven arguments.

AHDR327	**Semester 2**	**NQF Level: 7**

Research Methodology

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate in supervised research:

- Integrated knowledge, clear and critical understanding of research methodology including ethical consideration used in the field of animal health to ensure health for human, animals and environment.
- Ability to interrogate and evaluate multiple sources of scientific literature in the view of gaining understanding of the process of knowledge production and possible gaps of knowledge in the field of animal health.
- Ability to write and present a literature review and research proposal based of a prescribe format in the field of animal health.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss the fundamental concepts of qualitative, quantitative and mixed-method research and be able to differentiate and choose methods and design that are applicable to each type.
- Demonstrate basic knowledge of data quality, statistical analysis and interpretation
- Discuss the ethic of research for different types of research in animal health and explain the process of ethics approval.
- Critical read and critical evaluate multiple scientific literature on an animal topic and identify and discuss the contribution of the studies to the body of knowledge.
- Evaluate scientific literature in the view to identify weaknesses in the studies and also suggest gaps in the body of knowledge.
- Write and present a literature review and research proposal in the field of animal health and that shows cognition of methods and ethics appropriate for the study.

AHDR412	Semester 1	NQF Level: 8
Scheduled Diseases, Quarantine and Biosecurity		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Integrated fundamental knowledge of and engagement in controlled diseases and implement the legislation regulation for their control, management and implied biosecurity.
- Ability of mastering and description procedures relating to controlled diseases such as: Tuberculosis (TB) and Contagious Abortion (CA), FMD, eradication schemes as prescribed by the legislation in South Africa.
- Ability to practically demonstrate advanced skills on performing prescribed field tests, sampling procedures using relevant materials and equipment and interpretation of results.
- Advanced ability to effectively implement, use, apply acquired knowledge to be able to collect, analyse, interpret and provide solution during outbreaks.

Method of delivery: Contact- Full time

Assessment modes:

After the successful completion this programme, the student must be able to:

- Name, give details and explain challenges faced with controlled diseases and implementation of the legislation for their control, management and implied biosecurity.
- Describe and implement procedures related to controlled diseases such as: Tuberculosis (TB) and Contagious Abortion (CA), FMD, eradication schemes as prescribed by the South African Legislation on Animal Disease Control.
- Performing and explaining prescribed field tests, sampling procedures using relevant materials and equipment and interpretation of results.
- Effectively collect, analyse, interpret and provide solution during outbreaks or a case scenario and undertake a research and provide solution.

AHDR413	Semester 1	NQF Level: 8
Environmental and Public Health for Animal Health		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- A well-rounded, systematic and integrated knowledge and understanding of veterinary public health and the related legislation framework and the application in zoonotic, environmental health and animal products safety and “one health” context.
- The ability to investigate and critically reflect and apply the principles of veterinary public health to identify and solve or expose food safety, zoonotic and one health.
- Ability to communicate effectively in orally and in writing to the general public and farmer for various purposes in the promotion of “one health”.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Use an integrated knowledge approach to discuss the principles and challenges of “one health”, environmental health, animal product food safety, and water safety and current trends in veterinary public health.
- Discuss the current trends in veterinary public health problems in relation to pandemics and endemic disease occurrence.
- Investigate using quantitative research methods in a community to investigate food safety knowledge, attitude and practice and write and present the findings in a form of a report.

- Analyse complex case studies of zoonotic and foodborne diseases and be able to integrate diversity of veterinary public health related knowledge to suggest the approach of solving the problems.
- Perform some laboratory test to evaluate milk hygiene and water quality.
- Effectively communicate through a presentation to either children, adults or farmers on veterinary public health issues that are most relevant to promote "one health".

AHDR421	**Semester 2**	**NQF Level: 8**

Meat Inspection II

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge of and engagement in clinical and para-clinical fields and critical understanding and application of methods and techniques relevant to meat inspection and abattoir hygiene.
- Advanced ability applies meat inspection techniques to perform an ante-mortem and primary meat inspection at abattoirs.
- Advanced ability to implement and monitor abattoir hygiene practice at abattoirs.
- Ability to design and evaluate an abattoir's structure and plan and give recommendation for improvement.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to meat inspection and abattoir hygiene.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse animal health and associated human health problems and hygiene practices and discuss solutions that integrates different modalities and systems in the field of meat safety to ensure health of both animals and human.
- Competently conduct ante-mortem inspection and give judgment and enforce quarantine and other guidelines for animals arriving to lair ages.
- Competently conduct primary meat inspection and judgements and also implement remedial procedures for conditional passed carcasses.
- Conduct laboratory test to carcasses and organs where necessary.
- Competently implement the hygiene management system at abattoirs and also use the government Hygiene Assessment System to monitor hygiene practice at abattoirs.
- Use the Meat Safety Act 40 of 2000 and regulations to draw a schematic design a red meat abattoir and also evaluate abattoir plans and structure in the view of giving recommendations for improvement.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in meat inspection and abattoir hygiene and critically review group activity processes, and give recommendations for improvement.

AHDR422	Semester 2	NQF Level: 8
Management and Entrepreneurship		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge and logical understanding of the different aspects of animal health, as well as an ability to correctly evaluate and apply the principles of management to business, project and facility management and entrepreneurship within the field of animal health.
- The ability to apply the production-based learning model to develop a business plan and critically judge the effectiveness of the implementation by application of the SWOT analysis with a view to develop an effective business plain.
- Ability to identify, analyse and evaluate complex situations and problems related to related to a business and offer solutions.
- Ability to articulate a clear vision and goals of the business, and/or project, and to motivate others, such as employers, employees and funders to achieve them.

Method of delivery: Contact- Full time

The student will prove that he/she has attained the outcomes of the module when the student can:

- Discuss of the nature of business and facility management, and t issues of a new business, the different business functions and the basic elements of a business plan in animal health and sources of financing.
- Describe the process of planning and the differences between strategic and business planning.
- Define SWOT analysis and how it relates to the market and competition within a business plan.
- Develop new business plans using production-based learning model for a new business venture.
- Apply the principles of the SWOT analysis to determine the future prospects of the business.
- Apply principles of business performance evaluation to analyse case studies related to agri-business's aspects of human resource management, productivity and the budgeting process, work performance and financial management and make recommendations for improvement.
- Orally present a business plan for purposes of securing financial bucking and also to motivate stakeholders in the business.

AHDR471	Year Module	NQF Level: 8
WIL I: Companion Animal Medicine and Surgery		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge of and engagement in clinical and para-clinical fields and critical understanding and application of techniques relevant to companion animal health handling and welfare.
- Advanced ability to effectively perform diagnostic, preventative and curative medicine, and other procedures covering the scope of an Animal Health Technician to administer companion animal health care in a workplace with professional integrity.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to companion animal health care.
- Ability to communicate effectively in oral and written formats to clients and supervisors about animal health care and welfare.

Method of delivery: Contact- Full time

Assessment Methods:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse companion animal health problems and discuss solutions that integrates different modalities and systems in the field of companion animal health to ensure health of both animals and human at a workplace.
- Apply ethical principles of animal welfare and professionalism to restrain animals and conduct clinical examination on animals in a hospital or ambulatory settings.
- Competently collect and preserve samples that diagnostics procedures and perform basic further diagnostic test.
- Administer first-aid protocols, vaccination, medical drugs and veterinary remedies of companion animals in a correct manner with considerations given to animal welfare.
- Assist veterinarians to prepare and perform surgical procedure on companion animals.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in the animal hospital activities and critically review group activity processes, and give recommendations for improvement.
- Offer effective communication to clients; about home care of sick animals, nutrition and other preventative and curative measures to ensure health of both animal and human, practicing profession integrity.

AHDR472	**Year Module**	**NQF Level: 8**

WIL II: Production Animal Clinical Care for Animal Health

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge of and engagement in clinical and para-clinical fields and understanding and application of techniques relevant to production animal health, handling, and welfare at a workplace.
- Ability to effectively perform diagnostic, preventative and curative medicine, and other procedures the scope of an Animal Health Technician to administer production animal health care in a workplace with professional integrity.
- Ability to provide sustainable and affordable primary animal health care to subsistence and semi-commercial farmers especially those living in areas where veterinary services are not available.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to production animal health care, taking co- responsibility for learning progress and outcome realisation team and system.
- Ability to communicate effectively in oral and written formats to clients and supervisors about animal health care, production, and welfare for animals in different systems.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse production animal health problems and discuss solutions that integrate different modalities and systems in the field of production animals to ensure the health of both animals and human at a workplace.
- Apply the ethical principles of animal welfare and professionalism to restrain animals and conduct a clinical examination on production animals in a hospital, community-outreach activities and ambulatory settings.
- Collect and preserve samples that diagnostics procedures and perform basic further diagnostic tests which may be used in diagnosing animal diseases.
- Administer first-aid protocols, vaccination, medical drugs and veterinary remedies of production animals correctly with consideration for animal welfare.
- Assist veterinarians to prepare and perform surgical procedures on production in a hospital, farm, community-outreach activities, and ambulatory settings.

- Analyse production disease occurrence data of an area and design individualised and community-based herd health management plan and implement or assist farmers to implement.
- Perform herd health and production improvement procedures on their own, for farmers in different communities.
- Suggest and /or incorporate ethno veterinary medicine for the treatment of animals as an alternative to modern medicine to attain a sustainable agriculture.
- Show professional, responsible and cooperative behaviour while acting in different roles to perform group tasks in the animal hospital related-activities and be able to critically the review group activity processes, own and peer's performance in the tasks and give recommendations for improvement.
- Offer effective communication skills to hospital client when giving advice on vaccination, home care of sick animals, nutrition, production and other preventative measures to ensure the health of both animal and human, practicing profession integrity.

AHDR473	**Year Module**	**NQF Level: 8**

WIL III: Pathology and Laboratory Practice

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge of and engagement in clinical and para-clinical fields and critical understanding and application of techniques relevant to post-mortem and laboratory investigation of animal cases at a workplace.
- Advanced ability to effectively perform basic post-mortem examination on different animal species in a workplace.
- Advanced ability to effectively perform basic laboratory investigation of diseases for different samples in a workplace.
- The ability to analyse, and critically reflect on animal health problems based on evidence gathered at post-mortem and laboratory examination and present possible judgement and solutions at a workplace.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to post mortem and laboratory practice.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Analyse animal health problems presenting at laboratory or post-mortem and discuss solutions that integrates different modalities and systems in the field of animal health to ensure health of both animals and human at a workplace.
- Apply necropsy technique to conduct basic post-mortem examination and collect, label and submit suitable and correctly preserved and package samples for further laboratory investigations from necropsy cases at the workplace.
- Perform basic microbiological, serological and others procedure to investigate diseases aetiology and process in samples presenting a laboratory.
- Use logical and systematic pathways to critically analyse history, clinical presentation, laboratory or/and post mortem evidence of animal cases to come up with tentative judgements and solution for clients at a workplace.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in the animal hospital activities and critically review group activity processes, and give recommendations for improvement.

AHDR474	Year Module	NQF Level: 8
WIL IV: Applied Biosecurity for Animal Health		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Integrated knowledge of and engagement in clinical and para-clinical fields and critical understanding and application of methods and techniques relevant to biosecurity at animal facilities and ports of entry in to the country.
- Advanced ability to investigate, identify and resolve breaches in the control of animal diseases at all ports of entries of the country and all animal facilities.
- Advanced ability to apply epidemiological principles to investigate animal disease occurrences and to enhance disease control.
- The ability to operate as part of a team and system and make appropriate contributions to successfully complete a task related to biosecurity at facilities harbouring animals and ports of entry in to the country.

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Identify, detect, discuss and analyse biosecurity problems at animal facilities including farms, auction and breeding stations and discuss solutions that integrates different sources of knowledge in the field of animal health to ensure health of both animals and human.
- Investigate and identify breaches in the control of Scheduled diseases using the legislation framework as per Animal Disease Act 35 of 1984 at animal facilities and ports of entries into the country.
- Investigate and identify breaches in biosecurity and implement solutions to the control animal diseases at animal facilities.
- Plan, and systematically undertake epidemiological surveys and surveillances of animal diseases in order to determine disease situation in a certain area through determination of incidence and prevalence.
- Show professional, responsible and cooperation behaviour while acting in different roles to perform group tasks in biosecurity of animal facilities and ports of entry in to the country and critically review group activity processes, and give recommendations for improvement.

AHDR476	Year Module	NQF Level: 8
Research Project		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate in supervised research:

- Ability to interrogate multiple sources of knowledge in the area of animal health and to evaluate knowledge and the processes of knowledge production to write a literature review and write and present research proposal.
- Ability to implement methods/procedures with ethical integrity to effectively execute a planned research design in the area of animal health.
- Ability to report research findings and produce conclusions in an acceptable academic format (name type, e.g. research report/data sheet/new formula etc.).

Method of delivery: Contact- Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the module when the student can:

- Conduct a literature search and then use a scientific writing format and referencing style to write a literature review and research proposal that shows a comprehensive and critical interrogation of a diverse and multiple sources of information.

- Orally present and defend a research proposal in a manner that shows comprehensive understanding of the research topic and design.
- Choose designated ethics committee and correctly complete an application for ethical approval of the research in the area of the study.
- Organise and conduct data and/or sample collection for the research following the correct methods, techniques and appropriate ethical conduct.
- Use the appropriate methods (e.g. statistical analysis) to analyse data generated by the research study.
- Report the findings of the research in a form of a mini-dissertation.
- Orally present the finding at a "mini" viva voce and suitably make corrections on identified weakness in the writing of the finding and finalise the document for external examination.

AHPM211	**Semester 1**	**NQF Level: 6**
Microbiology for Animal Health		

Module outcomes:

- Students should be able to describe the classes of microorganisms of veterinary importance (bacteria, viruses, fungi, rickettsia and protozoans etc).
- Group bacteria and fungi of veterinary importance according to staining results, morphology and characteristics
- Describe the general principles of pathogenesis by microbiological agents.
- Describe the commonly encountered animal health infections: causative agents, transmission, prevention of transmission, human health implications.
- In practical sessions, learners will participate in the use of general laboratory procedures in microbiology including but not limited to staining and viewing of bacteria under the microscope, culturing of bacteria, use of different media, sensitivity testing, etc. especially as related to animal diseases. Case studies may also be used.
- Use of practical microbiological procedures to help differentiate common microbiological pathogens.
- Ability to apply the above acquired knowledge to conduct research

Method of delivery: Lectures (Power Point), Videos and Practicals in Laboratory

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

AHPM212	**Semester 1**	**NQF Level: 6**
Anatomy and Physiology I		

Module outcomes:

At the end of this module students should be able to demonstrate:

- Detailed knowledge and of the anatomy and clear understanding of animal physiology of describe the organization of living organisms with respect to the cell, tissues, and skeletal system, muscular, cardiovascular, nervous and digestive system of domestic animals including fishes and birds.
- Ability to identify and analyse possible anatomo-physiological changes and explain the cause of the change.

Method of delivery: Lectures (Power Point), Videos and Practicals in Laboratory

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

AHPM221	Semester 2	NQF Level: 6
Anatomy and Physiology II		
Module outcomes: At the end of this module students should be able to demonstrate: • Detailed knowledge and of the anatomy and clear understanding of animal physiology of respiratory, digestive, urinary, reproductive, system of domestic animals including fishes and birds. • Ability to identify and analyse possible anatomo-physiological changes and explain the cause of the change.		
Method of delivery: Lectures (Power Point), Videos and Practicals		
Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations		
AHPM225	**Semester 2**	**NQF Level: 6**
Animal Welfare, Handling and Equipment II		
After the successful completion of this module, the student must be able to demonstrate: • Detailed knowledge and clear understanding of animal welfare management systems for domestic and wildlife in capture facilities • Understanding of multiple sources of general principles and assessment of animal welfare with an emphasis on farm animals, animals destined for slaughter and household pets • Ability to evaluate of animal welfare of different species of animal in animal facilities and households • Increased competency in the ability to effectively implement the principles of animal welfare and handling with a view to restrain different species of animals in practice		
Method of delivery: Lectures (Power Point), Videos and Practicals		
Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations		
AHPM319	**Semester 2**	**NQF Level: 7**
Epidemiology for Animal Health Technicians		
At the end of this module students should be able to demonstrate: • An integrated knowledge and critical understanding of the common veterinary epidemiological concepts • Explain the importance of epidemiology in disease surveillance, prevention and control. • Critically explain epidemiologic concepts as they relate to disease surveillance, prevention and control. Describe the laws that pertain to veterinary practice. • Ability to effectively implement, use and apply acquired knowledge to practically resolve epidemiological cases if allocated to them. • Ability to apply acquired knowledge to implement epidemiological surveys, collect data, analyse and propose understandable solutions mostly for controlled diseases		
Method of delivery: Lectures (Power Point), Videos and Practicals		
Assessment modes: Assignments, Quizzes, Tests, Examinations		

AHPM326	Semester 2	NQF Level: 5
Livestock Diseases (For Animal Science)		

Module outcomes:

Students should be able to:

- Define the common terms used to describe diseases and conditions in farm animals;
- Describe the fundamental concepts of diseases in farm animals;
- Discuss the main bacterial, viral, rickettsial, and protozoal infections of farm animals;
- Describe the influence of nutrition, genetics, and environment on disease occurrence;
- Describe the important toxic principles and metabolic diseases of farm animals;
- Most of the practicals will involve the students in assisting the veterinarian in the examination, diagnosis, and treatment, as well as prevention of the diseases studied in the theory (when specific disease conditions are not seen in the live animals, video tapes will be used to supplement the students practical learning);
- Students will be guided in the use of epidemiological surveys and investigations, including the collection and recording of data related to the diseases studied.

Method of delivery: Lectures (Power Point), Videos and Practicals

Assessment modes: Assignments, Quizzes, Tests, Examinations

AHPM416	Semester 1	NQF Level: 8
Public Health for AHTII		

Method of delivery: Lectures (Power Point), Videos and Practicals

Assessment modes: Assignments, Quizzes, Tests, Written and Practical Examinations

AHPM417	Semester 1	NQF Level: 8
Work Integrated Learning		

Module outcomes:

At the end of this module students should be able to:

- Relate what they learnt during the entire curriculum with the actual field situations under supervision of professionals in various fields of animal health and production. Modalities; students will be required to spend 2 weeks in the field (outside the University) in an approved laboratory, registered veterinary clinic, state veterinary office, wildlife park and other such stations under the supervision of qualified veterinarians, game rangers or game veterinarian. The period will fall during the vacation.
- Work at the University farm under the supervision of the farm sectional managers, the farm manager and animal health staff members at prescribed times during the semester. One of the two sessions (between PRACTICAL EXPERIENTIAL LEARNING I and II should be conducted under a veterinarian or an animal health technician working first hand with treatment and control of animal diseases.

Method of delivery: Full time

Assessment modes:

AHPM427	Semester 2	NQF Level: 8
Work Integrated Learning		
At the end of this module students should be able to: • Further relate what they learnt during the entire curriculum with the actual field situations under supervision of professionals in various fields of animal health and production. Modalities students will be required to spend 2 weeks in the field (outside the University) in an approved laboratory, registered veterinary clinic, state veterinary office, wildlife park and other such stations under the supervision of qualified veterinarians, game rangers or game veterinarian. The period will fall during the vacation. • Work at the University farm under the supervision of the farm sectional managers, the farm manager and animal health staff members at prescribed times during the semester. One of the two sessions (between PRACTICAL EXPERIENTIAL LEARNING I and II should be conducted under a veterinarian or an animal health technician working first hand with treatment and control of animal diseases.		
Method of delivery: Full time		
Assessment modes:		
MCHE115	**Semester 1**	**NQF Level: 5**
Introductory Chemistry		
Module outcomes: This module should enable students to: • Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made; • Work effectively with others as a member of a team; • Organize and manage ones learning activities responsibly and effectively; • Collect, analyse, organize and critically evaluate information; • Communicate effectively using visual, mathematical and language skills in oral and written presentations; • Use science and technology effectively and critically, showing responsibility towards the environment and health of others; • Reflect on and explore a variety of strategies to learn more effectively.		
Method of delivery: Full time		
Assessment modes:		
WVAS221	**Semester 1**	**NQF Level: 6**
Understanding the world of Agriculture		
Module outcomes: Students should be able to: **OUTSTANDING**		
Method of delivery: Full time		
Assessment modes:		

NAS.2.3 DIPLOMA IN ANIMAL SCIENCE

ANDM121	Semester 2	NQF Level: 5
Introduction to Animal Science		
Module outcomes: Students should be able to: • Describe the South African animal science industry overview; • Explain the role of animal science to economic and human development; • Classify farm animals based on climate, size, gastro-intestinal tract, feeding behaviour and production; • Differentiate between breeds of farm animals; • Discuss location of animals to different geographical areas based on their adaptability; • Explain the basic introductory principles of the physiology of growth and development, reproduction, breeding, nutrition and health of farm animals.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANDM122	**Semester 2**	**NQF Level: 5**
Non–Ruminant Production		
Module outcomes: Students should be able to: • Demonstrate an understanding of the poultry and pig industry, poultry and pig breeds and their contribution to animal agriculture; • Propose strategies on improvement of poultry production system and appropriate breeds; • Develop a comprehensive plan of a poultry production unit health programme; • Apply modern management techniques in efficient feeding and rearing of broilers and layers; • Evaluate and provide recommendation on mono gastric products and their quality and their marketing strategies.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANDM211	**Semester 1**	**NQF Level: 6**
Animal Nutrition		
Module outcomes: Students should be able to: • Compare the roles and functions of different nutrients found in animal feed and explain the importance of animal nutrition; • Discuss the role played by nutrients in the health of animals and digestion in ruminants and non-ruminants; • Describe the requirements of nutrients for growth, maintenance, reproduction and production. • Identify and classify South African feedstuffs based on their nutritive value; • Formulate rations for farm animals and justify the need for evaluating feeds.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		

ANDM212	Semester 1	NQF Level: 6
Animal Genetics and Breeding		

Module outcomes:

Students should be able to:

- Outline the possible deviations from the expected Mendelian ratios and provide comprehensive explanations for them;
- Utilize the concept of sex linkage in farming situations;
- Describe mutations as a source of genetic variation in living organisms;
- Predict genetic change and describe different selection methods and mating system;
- Evaluate the importance of cell division in living organisms.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM213	Semester 1	NQF Level: 6
Ruminant Animal Production		

Module outcomes:

Students should be able to:

- Describe the South African ruminant industry overview and the economic importance of the ruminant industry in human and economic development;
- Identify and describe the physical and production characteristics of different breeds of sheep, goats, beef and dairy cattle;
- Locate different breeds of sheep, goats, beef and dairy cattle to various livestock production systems and climatic conditions;
- Apply management principles such as rearing systems (calves/lambs/kids), breeding and selection, reproduction and feeding (nutrition) in various ruminant production systems.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM221	Semester 2	NQF Level: 6
Small Stock Production and Management		

Module outcomes:

Students should be able to:

- To describe the South African small stock industry overview and the economic importance of the small stock industry in human and economic development;
- Identify and describe the physical and production characteristics of different breeds of sheep and goats;
- Locate different breeds of sheep and goats, to various livestock production systems and climatic conditions;
- Apply management principles such as rearing systems (lambs/kids), breeding and selection, reproduction and feeding (nutrition) in small stock production systems;
- Develop and evaluate breeding, nutrition, reproduction and health programmes in small stock.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM223	Semester 2	NQF Level: 6
Beef Production and Management		

Module outcomes:

Students should be able to:

- Recognise the beef cattle industry in South Africa as integrated industry from farm to market place;
- Characterise beef cattle breeds and their crosses according to their biological types and adaptability to specific environments;
- Develop suitable beef cattle production systems to meet the objective of different farmers;
- Plan, monitor and critically evaluate breeding, reproductive, nutritional and health programmes;
- Manage beef cattle enterprises according to their production systems.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM225	Semester 2	NQF Level: 6
Principles of Veld Management		

Module outcomes:

Students should be able to:

- Explain the basic principles governing the vegetation development;
- Justify the need for the practical application of principles in each of the six biome types;
- Compare and contrast the factors associated with forage quality and how they influence animal performance;
- Describe the problems of increasing bush encroachment in savannah, with proposals on how to deal with the problem;
- Discuss the approach to, and theoretical basis of, veld management on the game ranch;
- Summarise the management of veld in the communal areas of South Africa.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM226	Semester 2	NQF Level: 6
Grazing Management		

Module outcomes:

Students should be able to:

- Explain the basic principles governing the vegetation development;
- Identify number of surveys that one can undertake in veld pasture to better veld management (ecological survey, botanical composition)
- Determine grazing capacity of the veld
- Define a fodder flow and to plan a fodder flow (determine which time of the year a fodder source can be utilized, gives an indication of the period that each fodder source can provide for the animals and gives an indication of the number of LSU that the farm can carry).
- Assess systems and approaches to grazing management based on sound grazing management principles and learn/adopt/adapt a grazing management system/approach and develop associated infrastructure.
- Describe the problems of increasing bush encroachment in savannah, with proposals on how to deal with the problem;
- Summarize the management of veld in the communal areas of South Africa.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM312	Semester 1	NQF Level: 7

Poultry Production and Management

Module outcomes:

Students should be able to:

- Name the sources of breeding material for the different sectors of the poultry industry;
- Illustrate the structure of the poultry, meat and egg industries, and their contribution to the supply of meat and eggs for the South African population;
- Summarize the procedures for the monitoring and management of the environment to ensure ideal conditions during hatching and brooding;
- Select and apply the procedures for the preparation of poultry house to receive broiler chicks.
- Implement disinfection and apply management procedures of the broiler house before chick placement;
- Apply management procedures of the layer house before point-of-lay chickens are placed;
- Justify reasons for feeding different diets to broilers and layers;
- Outline the different types of records kept in poultry production;
- Tabulate and maintain production records on broiler and layer farms, as per company sop's;
- Draw up a vaccination plan for layers and broilers.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM313	Semester 1	NQF Level: 7

Dairy Production and Management

Module outcomes:

Students should be able to:

- Identify dairy cattle breeds, their production characteristics and their economic importance to the South African dairy industry;
- Integrate dairy cattle breeding, feeding and reproduction for total management of the dairy cattle enterprise;
- Plan and implement management practices in dairy cattle herds;
- Formulate, keep and use dairy cattle records system (production and financial);
- Develop, implement and manage health programmes in dairy herds for prevention and the diagnoses of various diseases for assurance of dairy cattle health.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANDM314	Semester 1	NQF Level: 7

Pig Production and Management

Module outcomes:

Students should be able to:

- Differentiate and characterize breeds of pigs and their potential contribution to the Pork Industry in South Africa;
- Integrate pig production systems with components of pork quality and major aspects of producer to consumer chain in the pig industry;
- Develop, plan, implement and manage pig breeding and selection, nutrition, reproduction and health programmes for the breeding herd;

• Evaluate management practices involved in effective feeding, breeding, reproduction, health and housing of pigs as well as their relationship in assuring a profitable pig enterprise.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANDM321	**Semester 2**	**NQF Level: 7**
Practical Animal Production		
Module outcomes: Students should be able to: • Apply practical handling skills and management to handle farm animals; • Observe and be exposed to major livestock and related industries in Southern Africa; • Manage feeding and breeding and keep farm records in assurance of general livestock management; • Evaluate animal breeding, nutrition, reproduction and health programmes; • Assess the viability, economic outlook and current situations of subsistence and commercial livestock farm enterprises; • Write a scientific report about the work experience done.		
Method of delivery: Visits to farm facilities for hands on Practical		
Assessment modes: Assignments and Mentor's Report		

NAS.2.4 BSC AGRICULTURE IN ANIMAL SCIENCE

ANSM121	**Semester 2**	**NQF Level: 5**
Introduction to Agricultural Biometry		
Module outcomes: Students should be able to: • Summarize data in the form of graphs and descriptive statistics; • Solve probability application problems in agriculture; • Differentiate random variables and associated distributions, relationship between population and samples within context of central limit theorem; • Write statistical hypothesis, carryout analyses and test hypotheses based on simple statistical procedures.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANSM211	**Semester 1**	**NQF Level: 6**
Introduction to Animal Science		
Module outcomes: Students should be able to: • Describe the South African animal science industry overview; • Explain the role of animal science to economic and human development; • Distinguish, identify and differentiate breeds of farm animals used in South Africa and modes of animal classification; • Justify why breeds of farm animals are located in different environments based on their adaptability features and mechanism;		

- Summarise the basic introductory principles of the physiology of growth and development, reproduction, breeding, nutrition and health of farm animals.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM214	Semester 1	NQF Level: 6

Ruminant Production Science

Module outcomes:

Students should be able to:

- To describe the South African ruminant industry overview;
- Describe the economic importance of the ruminant industry in human and economic development;
- Identify and describe the physical and production characteristics of different breeds of sheep, goats, beef and dairy cattle;
- Locate different breeds of sheep, goats, beef and dairy cattle to various livestock production systems and climatic conditions;
- Explain the role and application of management principles, such as rearing systems (calves/lambs/kids), breeding and selection, reproduction and feeding (nutrition) in various ruminant production systems.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM223	Semester 2	NQF Level: 6

Animal Nutrition

Module outcomes:

Students should be able to:

- Describe the importance of animal nutrition and explain the processes of digestion, absorption and metabolism in ruminants and non-ruminants and their end products;
- Identify, classify and distinguish the main components of feed of plant and animal origin consumed by farm animals and South African feedstuff according to their nutritive value;
- Summarize role played by nutrients in the health of animals and the importance of enzymes in animal nutrition;
- Solve problems related to the determination of the nutrient content of feeds using proximate system of analysis;
- Justify the importance of conducting digestibility trials.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM224	Semester 2	NQF Level: 6

Non-Ruminant Production

Module outcomes:

Upon completion of this module, the learner(s) should be able to:

- Demonstrate an understanding of the poultry and pig industry, poultry and pig breeds and contribution in agriculture.
- Evaluate and provide recommendation on mono gastric products and their quality and marketing. Develop a comprehensive plan of a poultry production unit health programme.
- Propose strategies on improvement of poultry production system and appropriate breeds.
- Apply modern management techniques in efficient feeding and rearing of broilers and layers.

Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANSM226	**Semester 2**	**NQF Level: 6**
Animal Genetics and Breeding		
Module outcomes: Upon completion of this module, the learner(s) should be able to: • Differentiate the main branches of Animal Genetics and Breeding and their relationship with cell biology and basic molecular mechanisms; • Explain the principles of Mendelian genetics and calculation of probabilities; • Discuss the genetic effects in the population; • Evaluate the methods and tools available for use in genetic improvement of livestock		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANSM311	**Semester 1**	**NQF Level: 7**
Principles of Veld Management		
Module outcomes: Students should be able to: • Describe the growth and developmental morphology of forages; • Compare and contrast the different types of grazing systems in veld management; • Explain the processes of plant succession; • Identify and explain the veld ecosystem components and their functions; • Summarise the procedures for the production of hay and silage, and be able to suggest a fodder production and preservation plan given specific farm condition; • Differentiate grassland management in different veld types and identify the major grouping of veld types in South Africa, and be aware of their nutritional value; • Justify the need for rangeland monitoring and awareness of the behaviour of ruminants on grazing as well as the need for grazing in livestock production.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANSM312	**Semester 1**	**NQF Level: 7**
Applied Agricultural Biometry		
Module outcomes: Students should be able to: • Develop appropriate statistical hypothesis and design for different research problems; • Recognize when and how to apply some widely used hypotheses testing procedures; • Apply analysis of variance (ANOVA) procedures to test hypotheses from widely recognized experimental designs in agriculture; • Critique experimental design of published research articles in agricultural research		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		

ANSM313	Semester 1	NQF Level: 7
Agricultural Biochemistry		

Module outcomes:

Students should be able to:

- Describe the biochemical importance of water and its ionization products in the body;
- Differentiate different solutions into basic or acidic medium solutions based on their pH;
- Differentiate between proteins, carbohydrates, lipids, nucleic acids and vitamins on the basis of their elementary composition and biochemical importance;
- Distinguish the components of DNA & RNA, recognise the genetic implications of several enzymes in key metabolic process and the vital importance of the mechanism of enzyme synthesis within the cell.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM314	Semester 1	NQF Level: 7
Physiology of Reproduction and Growth		

Module outcomes:

Students should be able to:

- Identify reproductive systems of the female and male animals and conceptualise their functions;
- Integrate the physiological mechanisms that regulate reproduction in farm animals;
- Summarise the process of fertilisation, gestation and parturition in farm animals;
- Apply reproductive technologies to improve and manage reproduction in farm animals and solve problems related to reproduction in farm animals;
- Evaluate growth and development in domestic animals;
- Evaluate factors affecting growth (prenatal and postnatal) and technologies to improve growth in farm animals.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM321	Semester 2	NQF Level: 7
Applied Ruminant Nutrition		

Module outcomes:

On completion of the course, students will be able to:

- Classify ruminants based on digestive physiology.
- Present a comparative analysis of the digestion processed of ruminant and non-ruminant herbivores.
- Identify and explain factors that influence nutritive value and quality of forages used by ruminant animals.
- Explain the digestion and metabolism of nutrients in ruminants.
- Explain the role of feed additives and feed processing on the performance of ruminant animals.
- Design nutritional management strategies that reduce the loss of nutrients to the environment causing pollution, reduce metabolic disorders and modify product composition.
- Describe the process of methano-genesis in the rumen and propose dietary and microbial treatments required to reduce methane emissions.
- Explain the relationship between external nutrient supply and animal product quality/composition in ruminants.

- Discuss the effect growth promotants and repartitioning agents on animal growth and development processes.
- Explain the idea of designer animal products and describe how this can be nutritionally achieved in ruminants.
- Identify greenhouse gases generated in ruminant livestock production systems and explain how each of these gas emissions could be reduced through prudent nutritional management practices.
- Explain the concept of Eco nutrition and describe the various feeding approaches that can be employed to attain Eco nutrition.
- Describe the development, symptoms, treatment and possible prevention strategies for common nutritional and metabolic disorders in ruminant animals.

Method of delivery: Contact-Full time

Assessment modes:
Coursework (Quizzes, tests, assignments, practical reports and presentations) **(50%)**
Final Examination (50%)

ANSM322	**Semester 2**	**NQF Level: 7**

Planted Pastures and Fodder Crops

Module outcomes:
Students should be able to:

- Explain and describe the role of planted pastures and crops;
- Evaluate the basic principles concerning establishment of planted pastures;
- Analyse and plan a basic fertilization program for planted pastures and fodder crops;
- Discuss weed control program in establishing cultivated pastures;
- Analyse and choose a specific pasture species for a specific situation.
- Identify species available on market and how species fit into a fodder flow program.

Assessment modes: Continuous Formative and Summative Assessments

Method of delivery: Contact-Full time

ANSM323	**Semester 2**	**NQF Level: 7**

Quantitative Genetics

Module outcomes:
Students should be able to:

- To apply the principles of gene and genotypic frequency determination procedures for economically important traits in livestock population;
- Demonstrate understanding of statistical principles as applied to quantitative traits;
- Use the procedure for testing breeding animals for undesirable genetic defects;
- Know the basic principles, application and procedures of estimating heritability, repeatability, genetic and phenotypic correlations for various economically important traits in livestock;
- Master the procedure of estimating breeding values;
- Respond to selection and dissemination of genetic gain in livestock population.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM326	Semester 2	NQF Level: 7
Small Ruminant Production Science		
Module outcomes: Students should be able to: • Describe the small ruminant industry and its economic importance in human and economic development; • Identify and describe the physical and production characteristics of different breeds of sheep and goats; • Locate different breeds of sheep and goats, to various livestock production systems and climatic conditions; • Explain the role and application of management principles such as rearing systems (lambs/kids), breeding and selection, reproduction and feeding (nutrition) in small ruminant production systems; • Explain the principles of marketing in sheep and goats enterprise		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		
ANSM412 (Phasing Out)	**Semester 1**	**NQF Level: 8**
Applied Animal Breeding		
Module outcomes: Upon completion of this module, the learner(s) should: • demonstrate understanding of fundamental principles, theory, concept and procedures associated with inbreeding and crossbreeding as mating systems in genetic improvement of farm animals, • analyse animal performance and pedigree data to estimate, genetic parameters (heritability and genetic correlations), breeding values, genetic gains, inbreeding effects and crossbreeding outcomes for a given livestock population; • review and summarize scientific publications regarding genetic parameters, breeding values, inbreeding effects and crossbreeding values for economically important traits in livestock.		
Method of delivery: Contact		
Assessment modes: Continuous formative and summative assessments		
ANSM415	**Semester 1**	**NQF Level: 8**
Beef Production Science		
Module outcomes: Students should be able to: • Recognise the economic important role of the large stock industry in South Africa; • Plan, monitor and critically evaluate, breeding, reproductive, nutritional and health programmes; • Design, recommend and use large stock facilities, equipment and buildings; • Develop, plan, implement and manage large stock enterprise according to their production systems; • Implement animal health programmes to assure preventative measures to various diseases.		
Method of delivery: Contact-Full time		
Assessment modes: Continuous Formative and Summative Assessments		

ANSM416	Semester 1	NQF Level: 8
Applied Non-Ruminant Nutrition		

Module outcomes:

Students should be able to:

- Explain and describe the digestive tract of pigs, horses, poultry, horse and rabbits;
- Summarise feeding management of non-ruminants;
- Discuss the use of feed additives classes as drugs;
- Briefly discuss nutritional management and environmental pollution in non-ruminant animals;
- Analyse the gaps and solve problems related to the quality of livestock.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM423	Semester 2	NQF Level: 8
Practical Experience		

Module outcomes:

Students should be able to:

- Apply practical handling skills and management to handle farm animals through observations and exposure to major livestock and related industries in Southern Africa;
- Manage feeding and breeding and keep farm records in assurance of general livestock management;
- Evaluate animal breeding, nutrition, reproduction and health programmes;
- Assess the viability, economic outlook and current situations of subsistence and commercial livestock farm enterprises;
- Write a scientific report about the work experience;
- Integrates academic learning with its application in the workplace that is, combining theory with practice as part of an enrolled program of study (will makes a significant contribution to our graduates' work and industry-readiness);
- Partner with industry, community, government and other educational providers on and offshore.

Method of delivery: Contact-Full time

Assessment modes: Students are to submit a report of all activities done during the time and will carry a cumulative weight of 50%. The assessment by the mentor using a standard assessment tool as approved by the Animal Science department, will also carry a cumulative weight of 50%. The 50% of the report and the 50% of the mentor's assessment tool will then be added to give a final mark. A student will have passed the module if the final mark is 50%.

ANSM426	Semester 2	NQF Level: 8
Pig Production Science		

Module outcomes:

Students should be able to:

- Recognise the potential contribution of the South African Pork industry to animal protein production;
- Integrate pig production systems with components of pork quality and major aspects of producer to consumer chain in the pig industry;
- Develop, plan, implement and manage pig breeding and selection, nutrition, reproduction and health programmes for the breeding herd;
- Develop, plan, implement and manage large stock enterprise according to their production systems;

- Evaluate management practices involved in effective feeding, breeding, reproduction, health and housing of pigs, as well as their relationship in assuring a profitable pig enterprise;
- Integrate pig production practises and the pillars of sustainable pig production, namely environmental, economic and socio-cultural sustainability

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM427	Semester 2	NQF Level: 8

Poultry Production Science

Module outcomes:

Students should be able to:

- Demonstrate understanding of the importance of the external and internal anatomical features and physiology of the chicken;
- Demonstrate the ability to successfully use a hatchery to incubate and hatch eggs;
- Differentiate the methods of housing poultry and be able to match the housing system with the environment and management;
- Describe how poultry waste must be managed;
- Differentiate between feeding methods of layers and broilers;
- Draw a vaccination plan for layers and broilers;
- Outline a marketing strategy for poultry products;
- Apply modern management techniques in efficient feeding and rearing of broilers and layers;
- Develop a poultry production unit health programme.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM428	Semester 2	NQF Level: 8

Dairy Production Sciences

Module outcomes:

Students should be able to:

- Outline the history and development of the South African dairy industries and identify factors affecting production and composition of milk;
- Integrate the principles and factors involved in dairy production;
- Summarise the physiological mechanism mammogenesis, lactogenesis, galactopoesis, milk secretion and involution;
- Analyse quality control and regulations in production and processing of dairy products;
- Evaluate milking parlour and equipment as well as system analysis and operation.

Method of delivery: Contact-Full time

Assessment modes: Continuous Formative and Summative Assessments

ANSM479	Year module	NQF Level: 8

Research Project

Module outcomes:

Students should be able to:

- Demonstrate in-depth knowledge of the research methodology in the field of Animal Science Research, plan and perform investigations and experiments by utilizing scientific modelling techniques, analyse,

interpret and derive information from data and apply appropriate scientific methods to evaluate the results;

- Demonstrate specialist knowledge in the field of Animal Science Research to enable engagement with, and critique of, current research or practices in combination with advanced scholarship or research in specific fields within the Animal Science discipline;
- Identify, evaluate and creatively and innovatively address, under supervision, certain convergent and divergent problems in Animal Science;
- Understand the consequences of solutions or insights generated within the context of Animal Science, be able to make autonomous ethical decisions which affect knowledge production or complex organisational or professional issues, and make critical contributions to the development of ethical standards;
- Communicate and defend ideas and results that are the products of the research in the field of Animal Science and use a range of advanced and specialised skills to communicate to a range of audiences with different levels of knowledge or expertise;
- Operate independently and take full responsibility for his/her own as well as others' work, and, where appropriate, to account for leading and initiating processes and implementing systems.

Method of delivery: Contact-Full time

Assessment modes:

Continuous Formative Assessment (in the form of assignments and oral presentations) is aimed at determining the student's progress towards attaining the stipulated outcomes. The student's ability to use and apply specific methodological skills is furthermore evaluated in his/her critical review of current literature in the subject area and the formulation and execution of a research project. The student is to report on it and generate an integrated dissertation of research findings. The supervisor assesses continuously while the dissertation is being written. Examination of the dissertation is finally done by at least one external examiners, who is an expert in the Animal Science field of specialization. A supervisor is not appointed as an examiner.

This module consists of two components i.e. a *Research Proposal* and a *Research Mini Dissertation*. All of the formative assessment tasks mentioned above (with a cumulative weight of 50%), will be used to calculate the final mark of each student for this module. The external examiner will provide a mark in the form of a percentage that will have a cumulative weight of 50%. The 50% of the research proposal and 50% from the external examiner will be added and will serve as a final mark for this module. A student will have passed the module if the addition of two formative assessments adds up to 50%.

CSDM111	**Semester 1**	**NQF Level: 5**

Botany for Agriculture

Module outcomes:

Students should be able to:

- Describe basic plant taxonomy, morphology, and anatomy and function in plants;
- Learners will be able to outline the principles of classification including concepts of species, genus, family, order, division and kingdom, binomial system of nomenclature;
- Learners will be able to understand the processes of photosynthesis and transpiration;
- Learners will be able to explain the relationship between plant botany, genetics and plant breeding.

Method of delivery: Contact - Lectures, Discussions, Seminars, PowerPoint

Assessment modes: Assignments, Class Tests, Quizzes, Practicals, Term Papers, Final End of Semester Examination

CSDM121	Semester 2	NQF Level: 5
Introduction to Crop Production		
Module outcomes: Students should be able to: • Appreciate the importance of crop plants in human welfare; • Learners will be able to understand the objectives of crop production and be familiar with the basic concepts of crop production strategies relating to yield and quality; • Learners will be knowledgeable about tillage practices and concerns about sustainable crop production and practices aimed at achieving sustainability and are familiar with fertilizer types, rates and methods of application and know the different soil factors affecting crop production.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments And Examination		
CSDM211	**Semester 1**	**NQF Level: 6**
Introduction to Soil Science		
Module outcomes: Students should be able to: • Demonstrate an understanding of soil as a natural entity for sustainable agriculture as they study each of the areas of soil science: soil genesis, soil physics, soil conservation, soil microbiology, soil chemistry, and soil fertility; • Knowledge of these soil properties will enable students to gain basic understanding of soils and their importance and relevance in different areas of agriculture (they will therefore be able to appreciate soils as a natural resource for South Africa and for the world); • Develop an understanding of the role that soils play in the agricultural and economic situation in South Africa and the world.		
Method of delivery: Contact – Teaching, PowerPoint Presentations		
Assessment modes: Tests, Assignments ,Practical Assessments and Examinations		
CSDM212	**Semester 1**	**NQF Level: 6**
Agricultural Climatology		
Module outcomes: Students should be able to: • Describe the basic weather elements in agriculture, their measurement and influence on crop and animal production in the North West Province, South Africa and the world at large. • Collect and summarize the basic weather elements in agriculture.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments and Examinations		
CSDM213	**Semester 1**	**NQF Level: 6**
Farm Machinery		
Module outcomes: Students should be able to: • Take proper care of farm machinery and implements; • Use farm implements and machinery properly; • Do minor repairs of farm implements and machinery;		

- Do budgeting of farm operations;
- Make use of equipment used in the construction of farm buildings;
- Demonstrate an understanding of the construction of farm buildings and the budgeting for construction;
- Produce simple designs of farm buildings.

Method of delivery: Contact-Full time

Assessment modes: Tests, Assignments ,Practical Assessments and Examinations

CSDM215	Semester 1	NQF Level: 6
Vegetable Production		

Module outcomes:

Students should be able to:

- Select and grow vegetables in specific agro-ecological regions of South Africa;
- Be knowledgeable in the agronomy of major vegetables grown in RSA;
- Be competent in organic farming principles;
- Apply theoretical and practical knowledge to guide farmers and gardeners to produce vegetables.

Method of delivery: Contact-Full time

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSDM221	Semester 2	NQF Level: 6
Principles of Crop Improvement		

Module outcomes:

Students should be able to:

- Explain the importance of genetic crop improvement in increasing crop yield and quality and have an appreciation of plant breeder's work;
- Explain the difference between self- and cross-pollinated crops;
- Clarify how genetic principles relate to plant breeding methods;
- Outline and explain seed certification and multiplication principles.

Method of delivery: Contact - lectures, discussions, seminars, PowerPoint

Assessment modes: Formative: Assignments, Class Tests, Quizzes, Practicals, Term Papers; Summative: Final End of Semester Examination

CSDM222	Semester 2	NQF Level: 6
Soil Fertility and Fertilizers		

Module outcomes:

Students should be able to:

- Demonstrate strong knowledge of how soil conditions affect plant growth and suggest possible management practices to increase crop yield;
- Gain knowledge of the 17 essential elements required for plant growth in regards to factors which affect nutrient availability in soils;
- Evaluate the fertility status of soils and make subsequent fertilizer recommendations.

Method of delivery: Contact – Teaching, PowerPoint Presentations, Excursions to Complement Teaching

Assessment modes: Tests, Assignments ,Practical Reports and Examinations

CSDM223	Semester 2	NQF Level: 6
Soil Conservation		

Module outcomes:

Students should be able to:

- Describe various types of land degradation and how they are caused, as well as identify and assess different stages and forms of soil degradation;
- Have an understanding of how different soil management practices affect soil quality and the role that these have on agricultural productivity;
- Identify and describe different strategies used in soil conservation.

Method of delivery: Contact-Full time

Assessment modes: Tests, Assignments, Reports and Examination

CSDM224	Semester 2	NQF Level: 6
Farm Practical II		

Module outcomes:

Students should be able to:

- Demonstrate practical skills in the production of vegetable and field crops;
- Identify weeds, insects and diseases associated with vegetable and field crops;
- Demonstrate the application of appropriate control measures for pests;
- Demonstrate irrigation and fertilizer management in the production of vegetables and field crops;
- Select and correctly use farm implements and machinery for various cultural practices, mainly for field crops;
- Demonstrate harvesting, sorting and grading crop products for marketing;
- Draw up a business plan for field crops;
- Calculate yield estimations for field crops;
- Design crop rotation programmes for field crops.

Method of delivery: Contact - Hands-on Field Activities, Field Trips and Excursions

Assessment modes: Practical and Field Trip Reports

CSDM225	Semester 2	NQF Level: 6
Fruit Production		

Module outcomes:

Students should be able to:

- Identify different fruit crops;
- Apply theoretical and practical knowledge in the production and cultural practices of fruit crops;
- Show competence in the fruit propagation techniques such as budding and grafting, harvesting, grading storage and marketing of fruit produce;
- Be knowledgeable in the role of plant hormones in the growth, flowering and ripening of fruits;
- Demonstrate skills in basic post-harvest fruit processing techniques.

Method of delivery: Contact-Full time

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSDM311	Semester 1	NQF Level: 7
Agronomy of Summer Crops		
Module outcomes: Students should be able to: • Know the origin, economic importance, distribution and morphology, the climatic and soil requirements and the appropriate cultural practices, for each prescribed summer crop.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments and Examination		
CSDM312	**Semester 1**	**NQF Level: 7**
Plant Protection		
Module outcomes: Students should be able to: • Understand and interpret the reports on plant protection; • Identify common garden and field pests and diseases; • Come up with appropriate control measures for the identified pests; • Show competence in knapsack and boom sprayer calibration; • Introduce new information about plant protection to farmers; • Guide and supervise farmers regarding plant protection; • Understand the quarantine /phytosanitory regulations of RSA.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		
CSDM315	**Semester 1**	**NQF Level: 7**
Pedology and Soil Classification		
Module outcomes: Students should be able to: • Describe the factors and processes involved in the formation of soils; • Describe the different categories of horizons; • Explain the principles behind soil classification; • Explain how diagnostic horizons are employed in the classification of soils; • Describe the major systems of soil classification and be able to explain how the South African system of soil classification fits in other global systems.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments and Examination		
CSDM321	**Semester 2**	**NQF Level: 7**
Agronomy of Winter Crops		
Module outcomes: Students should be able to: • Know the origin, economic importance distribution, and morphology, the climatic and soil requirements and the appropriate cultural practices for each prescribed winter crop.		
Method of delivery: Contact-Full time		

Assessment modes: Tests, Assignments ,Practical Assessments and Examination

CSDM322	Semester 2	NQF Level: 7

Weeds and Weed Control

Module outcomes:

Students should be able to:

- Identify weed species and come up with weed control measures;
- To comprehend and interpret literature related to weed control;
- Supervise and guide farmers how to control weeds;
- Introduce to farmer's new technology of weed control;
- Understand the use of selective and non-selective herbicides;
- Show competence in knapsack and boom sprayer calibration.

Method of delivery: Contact-Full time

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSDM323	Semester 2	NQF Level: 7

Elements of Agricultural Microbiology

Module outcomes:

Students should be able to:

- Describe the different groups of microorganisms that are of significance in agriculture;
- Understand distribution of microorganisms and their function in soil.
- Understand microorganisms and cycling of nutrients, carbon and phosphorus cycles.
- Understand the role of rhizosphere microorganisms and their effects of plants.
- Understand microorganisms and contamination of plant food products, microbial food spoilage and preservation.

Method of delivery: Contact – Teaching, Provision of Lecture Notes as PowerPoint Presentation/Slides and Assignment Topics are pasted on EFundi.

Assessment modes: Assessment is through Tests, Assignments, Practical Reports and Examination.

CSDM324	Semester 2	NQF Level: 7

Elementary Irrigation

Module outcomes:

Students should be able to:

- Explain the role of irrigation in agriculture;
- Select an appropriate irrigation system for horticultural and field crops and environment;
- Show diagnostic skills in operation and maintenance of irrigation infrastructure;
- Demonstrate agronomic management of irrigated crops;
- Monitor crop water requirement and schedule irrigation;
- Manage drainage and salinity problems in irrigation.

Method of delivery: Contact-Full time

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSDM371	Year Model	NQF Level: 7
Practical Crop Production		
Module outcomes: Students should be able to: • Show practical skills in the production of vegetable; • Identify weeds, insects and diseases associated with all aspects of crop production, vegetables, field crops and orchards; • Demonstrate the application of appropriate management and control measures for pests and diseases; • Irrigation and fertilizer management in the production of vegetables and field crops; • Select and correctly use farm implements and machinery for various cultural practice; • Understand harvesting, sorting and grading crop products for marketing; • Draw up a business plan for vegetable and field crops; • Calculate yield estimations for vegetables and crops; • Demonstrate design of vegetable and crop production programme; • Layout field trials; • Operate farm machinery properly; • Calibrate implements properly; • Weigh and apply fertilizers properly; • Classify soils at particular site; • Calculate yield and plant population estimates.		
Method of delivery: Contact - Hands-on Field Activities, Field Trips and Excursion		
Assessment modes: Practical and Field Trip Reports		

NAS.2.5 AGRICULTURE – AGRONOMY AND HORTICULTURE SCIENCE

CSPS411	Semester 1	NQF Level: 8
Advanced Plant Breeding		
Module outcomes: Students should be able to: • Develop well defined breeding objectives; • Plan a plant breeding programme; • Demonstrate understanding of conventional and unconventional plant breeding methods for self- and cross-pollinated crops; • Demonstrate understanding of breeding methods for selected crops; • Explain the concepts of classical quantitative genetics in breeding programmes; • Be able to demonstrate practical skills in pollinating plants; • Demonstrate understanding and application of molecular breeding techniques; • Articulate on the societal issues with regard to GMOs.		
Method of delivery: Contact - Lectures, Discussions, Seminars and PowerPoint		
Assessment modes: **Formative** – Assignments, Class Tests, Quizzes, Practical, Term Papers; **Summative** – Final End Of Semester Examination		

CSPS412	Semester 1	NQF Level: 8
Horticultural Science		
Module outcomes: Students should be able to: • Understand the effect of climate on horticultural production; • Demonstrate the ability to comprehend scientific literature related to horticultural production; • Have understanding and practical skills/exposure in scientific propagation techniques such as use of tissue culture, hydroponics in horticulture; • Be equipped with mushroom production technology; • Conduct projects to demonstrate ability of project management; • Add value to horticultural produce in RSA.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		
CSPM211	**Semester 1**	**NQF Level: 6**
Introduction to Soil Science		
Module outcomes: Students should be able to • Demonstrate an understanding of soil as a natural entity for sustainable agriculture; • Gain insight into the genesis, physics, chemistry, biology and microbiology of soils; • Demonstrate basic knowledge of how these soil properties interact to affect soil quality for different purposes will be gained; • Demonstrate the skills and ability to perform basic tests aimed at assessing soil fertility; • Appreciate soils as a natural resource for South Africa and for the world; • Develop an understanding of the role that soils play in the agricultural and economic situation in South Africa and the world.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments, Final 3 hr Written Examination Paper		
CSPM212	**Semester 1**	**NQF Level: 6**
Agricultural Climatology		
Module outcomes: Students should be able to • Summarize and interpret weather data. • Identify the climate variables that may affect agricultural productivity. • Read and measure weather data. • Predict effects of man's activities on climate change.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments and Examination		

CSPM213	Semester 1	NQF Level: 6
Farm Machinery		
Module outcomes: Students should be able to: • Take proper care of farm machinery and implements; • Use farm implements and machinery properly; • Do budgeting of farm operations; • Demonstrate an understanding of how farm buildings are constructed and the budgeting for construction of farm buildings; • Produce simple designs of farm buildings.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments ,Practical Assessments and Examination		
CSPM221	**Semester 2**	**NQF Level: 6**
Introduction to Crop Production		
Module outcomes: Students should be able to: • Understand climatic factors on crop production; • Gain knowledge on organic farming and quality in crop products; • Understand the different management practices on crop production, such as tillage, rotation, intercropping and conservation agriculture.		
Method of delivery: Contact – Teaching, Provision of Lecture Notes through PowerPoint Presentation Slides and Assignment Topics are Pasted on EFundi.		
Assessment modes: Tests, Assignments, Practical Reports and Examinations.		
CSPM222	**Semester 2**	**NQF Level: 6**
Soil Fertility and Fertilizers		
Module outcomes: Students should be able to: • Demonstrate a good knowledge of how soil conditions (such as soil texture, soil pH, clay mineralogy and cation exchange capacity) affect plant growth and suggest possible management practices to increase crop yield; • Gain knowledge of the 17 essential elements required for plant growth in regards to factors which affect nutrient availability in soils; • Evaluate the fertility status of soils and make subsequent fertilizer recommendations.		
Method of delivery: Contact – Teaching, PowerPoint Presentations, Excursions to Complement Teaching		
Assessment modes: Tests, Assignments ,Practical Reports and Examination		

CSPM223	Semester 2	NQF Level: 6
Soil Conservation		
Module outcomes: Students should be able to: • Describe various types of land degradation and how they are caused, as well as identify and assess different stages and forms of soil degradation; • Have an understanding of how different soil management practices affect soil quality and the role that these have on agricultural productivity; • Demonstrate knowledge of the effect of agricultural activities on soil degradation and vice versa; • Identify and describe different strategies and management techniques used in controlling soil degradation.		
Method of delivery: Contact – Teaching, Provision of Lecture Notes Through PowerPoint Presentation Slides and Assignment Topics are Pasted on EFundi.		
Assessment modes: Tests, Assignments, Examination, Practical Reports and Examination.		
CSPM225	**Semester 2**	**NQF Level: 6**
Agricultural Microbiology		
Module outcomes: Students should be able to: • Identify and describe microorganisms that commonly present in soils, plants and animals; • Differentiate beneficial and pathogenic microorganisms in agriculture, and have an understanding of the role that both beneficial and pathogenic microorganisms play in agricultural productivity; • Know the role of these microorganisms in nutrient cycling in agriculture and how to control the dissemination of microorganisms that are pathogenic to plants and animals.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		
CSPM311	**Semester 1**	**NQF Level: 7**
Agronomy of Summer Crops		
Module outcomes: Students should be able to: • Describe origin, economic importance distribution, and morphology of summer crops. • Describe summer crops climatic and soil requirements and their appropriate cultural practices. • Describe the fertilizer requirements of each summer crop. • Understand the planting, harvesting and processing of summer crops.		
Method of delivery: Contact – Teaching, Provision of lecture notes through PowerPoint Presentation Slides and Assignment Topics are pasted on EFundi.		
Assessment modes: Tests, Assignments, Practical Reports and Examination.		

CSPM313	Semester 1	NQF Level: 7
Vegetable Production		
Module outcomes: Students should be able to: • Understand the importance and classification of vegetables and also the vegetable industries; • Gain knowledge on different methods of vegetable propagations; • Understand aspects of vegetable production such as hydroponics and transplanting; • Gain knowledge on different production methods of selected vegetables.		
Method of delivery: Contact – Teaching, Provision of lecture notes through PowerPoint Presentation Slides and Assignment Topics are pasted on EFundi.		
Assessment modes: Tests, Assignments, Practical Reports and Examination.		

CSPM317	Semester 1	NQF Level: 7
Plant Pathology and Nematology		
Module outcomes: Students should be able to: • Carry out disease field and laboratory diagnosis of plant diseases and parasitic nematodes for the commonly cultivated field and horticultural crops; • Identify the non-pathogenic plant diseases; • Comprehend the plant diseases infection processes and development of both polycyclic and monocyclic diseases of various crops (fungal, viral and bacterial diseases); • Comprehend and interpret research data and literature on plant pathology and nematology; • Understand and interpret legislation governing control of diseases and nematodes e.g. Quarantine/phytosanitory control regulations; • Advise the farming community on how to prevent or control plant diseases and nematodes.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignment		

CSPM319	Semester 1	NQF Level: 7
Agricultural Entomology		
Module outcomes: Students should be able to: • Carry out field and laboratory identification of pests (arthropods, insects & vertebrates), for the commonly cultivated field and horticultural crops; • Comprehend the biology and life cycle of arthropods and insect pests of different orders (orthopteran, hemipteran, hemipteran, dipteran); • Comprehend and interpret research data and literature on agricultural pests; • Understand and interpret legislation governing control of pests e.g. Quarantine/phytosanitory control regulations; • Advise the farming community on how to prevent or control agricultural pests, including understanding of regional/international regulations on the management and control of migratory pests such as red locust, fall armyworm and African armyworm.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		

CSPM321	Semester 2	NQF Level: 7
Agronomy of Winter Crops		
Module outcomes: Students should be able to: • Describe origin, economic importance, distribution, and morphology of winter crops. • Describe the climatic and soil requirements of various winter crops. • Describe the different management practices such as fertilization and harvesting of winter crops. • Understand the abiotic and biotic factors limiting the production of winter crops.		
Method of delivery: Contact – Teaching, Provision of lecture notes through PowerPoint Presentation Slides and Assignment Topics are pasted on EFundi.		
Assessment modes: Tests, Assignments, Practical Reports and Examination.		

CSPM322	Semester 2	NQF Level: 7
Weeds and Weed Control		
Module outcomes: Students should be able to: • Have an in-depth understanding of the biology of agricultural weeds; • Identify weed species for water bodies, and ethnobotany; • Identify weed species; • Come up with appropriate weed control measures; • Have scientific knowledge in the use of herbicides, i.e. modes of action and metabolism; • Recommend other non-chemical methods of weed control measures; • Comprehend and interpret literature related to weed control; • Supervise and guide farmers how to control weeds; • Introduce to farmers new technology of weed control.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		

CSPM323	Semester 2	NQF Level: 7
Fruit Production		
Module outcomes: Students should be able to: • Select appropriate fruit crops for specific area; • Apply theoretical and practical knowledge in establishment and management of orchards and vineyards giving particular attention to the following: propagation techniques, pruning and training, processing and marketing of fruit produce.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		

CSPM324	Semester 2	NQF Level: 7
Principles of Irrigation		

Module outcomes:

Students should be able to:

- Know the basic concepts, tools, and skills used to deliver water efficiently and effectively, on both a field and garden scale;
- Identify the most efficient irrigation system to use under various circumstances because they will have an understanding of the movement and cycling of water in agricultural systems, and the environmental factors that influence the type, frequency, and duration of irrigation;
- Calculate the water requirement for irrigation, and specify for determinants of irrigation scheduling based on available irrigation system;
- Conduct a simple evaluation of an existing irrigation system.

Method of delivery: Contact - Lectures, PowerPoint Presentations, Video Shows, Group Task Presentation

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSPM325/315	Semester 2	NQF Level: 7
Plant Physiology		

Module outcomes:

Students should be able to:

- Outline the importance of crop-soil-water relations;
- Explain the physiology and the role of mineral nutrients in plants;
- Outline the nitrogen, carbon, phosphorus and other major biogeochemical cycles;
- Explain photosynthetic processes and the different types of photosynthetic pathways;
- Explain water potential and outline the translocation process;
- Explain the significance of plant hormones in crop production as well as be able to explain dormancy and its significance in crop plants.

Method of delivery: Contact - Lectures, Discussions, Seminars, PowerPoint

Assessment modes: Formative: – Assignments, Class Tests, Quizzes, Practicals, Term Papers; Summative: – Final End of Semester Examination

CSPM326	Semester 1	NQF Level: 7
Principles of Genetics & Plant Breeding		

Module outcomes:

Students should be able to:

- Explain the concept of plant breeding;
- Demonstrate understanding of genetics as the basis of plant breeding;
- Apply Mendel's principles of inheritance in plant breeding;
- Discuss the reproductive systems in plants and their importance/significance in breeding;
- Describe the DNA structure and its importance as a modern tool in plant breeding;
- Discuss the impact of genetic engineering in society with reference to GMO's.

Method of delivery: Contact - Lectures, Discussions, Seminars, PowerPoint

Assessment modes: Assignments, Class Tests, Quizzes, Practicals, Term Papers, Final End of Semester Examination

CSPM327	Semester 2	NQF Level: 7
Soil Survey & Land Use Planning		
Module outcomes: Students should be able to: • Be familiar with and describe the different kinds of soil survey; • Utilize the knowledge of remote sensing and other soil information systems (i.e. Soil physical, chemical, vegetation and geologic) to generate soil map; • Undertake soil evaluation by utilizing soil maps for land use planning purposes; • Describe and apply the knowledge of precision agriculture and concept of management zones.		
Method of delivery: Contact – Lectures and PowerPoint Presentations, Video Shows, Assign Project		
Assessment modes: Formal Class Tests, Reports of Project & Practicals and Assignments		
CSPM411	**Semester 1**	**NQF Level: 8**
Crop Production Systems		
Module outcomes: Students should be able to: • Understand the sustainable crop production, organic farming and categories of different farming systems. • Understand different cropping systems such as mono-cropping, crop rotation and multiple cropping systems. • Understand the tropical cropping system and classification of tropical cropping system. • Understand shifting cultivation and describe different types of shifting cultivation and clearance system. • Understand conservation agriculture, principles, practices, resources conserving technologies and the effects of conservation agriculture on the environment.		
Method of delivery: Contact – Teaching, Provision of lecture notes through PowerPoint Presentation Slides and Assignment Topics are posted on EFundi.		
Assessment modes: Tests, Assignments, Practical Reports and Examination.		
CSPM415	**Semester 1**	**NQF Level: 8**
Pedology and Soil Classification		
Module outcomes: Students should be able to: • Understand soil formation with regards to chemical & physical weathering and the soil pedogenic processes; • Appreciate and understand the relationship between the factors of soil formation and soil formation in different environments; • Describe various soil profiles and determine the environment of formation of each; • Utilize soil field, laboratory, and environmental data to classify soils using different soil classification systems including the South African soil classification system.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Reports of Practicals and Assignments		

CSPM416	Semester 1	NQF Level: 8
Soil Physics		

Module outcomes:

Students should be able to:

- Appreciate the role of the three phases of soil in agriculture and the constraints that they present in plant growth;
- Know the basic concepts of transport and retention of water and solutes in the soil and comprehend transfer processes for water, air, solutes, and heat in soils;
- Perform laboratory and field experiments to measure selected physical properties of soils that affect soil water flow including the transport of heat, air and agrochemicals in soils;
- Apply the principles governing the flow and retention of water and solutes in the root zone to solve practical problems relating to general water management of soil-water-systems used in agriculture.

Method of delivery: Contact - Lectures, PowerPoint Presentations, Video Shows, Group Task Presentation

Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments

CSPM419	Semester 1	NQF Level: 8
Soil Chemistry & Mineralogy		

Module outcomes:

Students should be able to:

- Demonstrate knowledge of the 3-phase soil system as the basis for explaining reaction processes of soil for fertility management;
- Explain and predict the various layer silicates that may be formed in soils using the knowledge of mineral stability diagrams;
- Understand knowledge of mineral solution chemistry including thermodynamic principles in soil system and apply these to explain availability of essential elements to crops;
- Demonstrate knowledge of exchange processes in relation to plant nutrient availability and uptake;
- Explain soil reaction in relation to soil fertility constraints with emphasis on soil acidity and alkalinity, and their management.

Method of delivery: Contact - Lectures, PowerPoint Presentations, Assigned Project

Assessment modes: Formal Class Tests, Reports of Practicals & Assigned Project, Assignments

CSPM421	Semester 2	NQF Level: 8
Crop Physiology		

Module outcomes:

Students should be able to:

- Relate crop growth analysis to practical field crop production;
- Explain the physiological basis of crop yield;
- Demonstrate an understanding of source-sink relationships;
- Apply their knowledge of plant hormones to crop production;
- Apply their knowledge of the physiology of mineral nutrition to better manage crop nutrition.

Method of delivery: Contact, Lectures, Discussions, Seminars, PowerPoint

Assessment modes: Formative - Assignments, Class Tests, Quizzes, Practicals, Term Papers; Summative– Final End of Semester Examination

CSPM425	Semester 2	NQF Level: 8

Applied Crop Protection		
Module outcomes: Students should be able to: • Understand and apply scientific principles in practical crop protection to cover the following: Entomology, Plant Pathology and Nematology; • Have understanding of Principles of Integrated Pest Management Programme; • Under Entomology - have an in-depth knowledge of insect pest classification, focusing on the following important Genera: Hymenoptera, Coleoptera, and Lepidoptera; • Under Plant Pathology - be knowledgeable in Plant Bacteriology, Mycology and Virology, that is, aetiology and epidemiology of the major plant diseases of economic importance; • Have basic understanding of Nematology; • Demonstrate critical and creative thinking in research and development in areas of crop protection.		
Method of delivery: Contact-Full time		
Assessment modes: Formal Class Tests, Practical/Field Reports, Assignments		
CSPM426	**Semester 2**	**NQF Level: 8**
Soil Microbiology		
Module outcomes: Students should be able to: • Classify microorganisms in the soil, and appreciate the soil properties that favour the survival of the vast number and variety of microorganisms that inhabit the soil; • Determine how different soil management techniques affect the diversity and population of microorganisms in the soil; • Conduct measurements in soil microbiology, and apply microbiological technology to improve crop production.		
Method of delivery: Contact – Lectures and PowerPoint Presentations		
Assessment modes: Formal Class Tests, Reports of Practicals and Assignments		
CSPM474	**Year module**	**NQF Level: 8**
Research Project and Seminar		
Module outcomes: Students should be able to: • Conceptualize, prepare and submit research project proposal; • Conduct a critical review of literature review on identified research topic, critique relevant aspects of the literature, synthesize information generated and relate to own study; and present proposal at a departmental review forum for assessment; • Comply with the relevant NWU research ethics; • Successfully undertake the research project upon review as recommended during the presentation; • Collect and collate all data, and subject the data generated into useful and appropriate statistical analysis for interpretation; and draw useful inferences, and carefully document the findings in the form of a research report in an approved format.		
Method of delivery: Contact – Teaching on Research Methodology, Prepare and Submit Draft Research Proposal and Presentation, Supervision of execution of proposed Research, Data Collection, Presentation of results of data collection and writing of Final Report		
Assessment modes: Assessment of Oral Presentations (Research Proposal and Results/Findings), and Submitted Final Research Report.		
CSPM479	**Year Module**	**NQF Level 8**

Practical Crop Production Training		
Module outcomes: Students should be able to: • Layout field trials; • Operate farm machinery properly; • Calibrate implements properly system; • Weigh and apply fertilizers properly; • Classify soils at a particular site; • Calculate yield and plant population estimates.		
Method of delivery: Contact - Hands-on Field Activities, Field Trips and Excursion		
Assessment modes: Practical Reports		
OMSA422 **(Waiting on SCAS approval)**	**Semester 2**	**NQF Level: 8**
Weeds: Interactions and Control		
Module-outcomes: After completion of this module, the student will be able to: • Integrate knowledge of the principles and practices related to weed/problem plant management in agricultural and natural environments, and the general characteristics of plant species that interfere with the growth and development of crops and other desirable vegetation. • Demonstrate detailed knowledge of important noxious weeds, the interactions between weeds and economically and aesthetically important plant species in different environments, and how these interactions determine crop yield and ecological integrity losses – finally, to apply this knowledge in development of integrated weed management strategies. • Evaluate, select and apply a range of different but appropriate weed control methods, with emphasis on efficacy, environmental safety and sustainability, and be able to make recommendations on effective and sustainable weed management strategies. • Demonstrate an awareness of the scope and complexity of ethical and value systems from both the environmental and human perspective regarding weed management decisions in complex agricultural and natural environments. • Produce and communicate scientific information and demonstrate ability to present and communicate academic principles of integrated weed management to stakeholders. ***Module-uitkomste:*** *Na die voltooiing van die module, sal die student die volgende kan demonstreer:* • *Geïntegreerde kennis van die beginsels en praktyke betrokke by onkruid/probleemplant bestuur in landbou en natuurlike omgewings, en die algemene eienskappe van plantspesies wat inmeng met die groei en ontwikkeling van gewasplante en ander gewenste plantegroei.* • *Gedetailleerde kennis van belangrike skadelike plantsoorte, interaksies tussen hierdie en ekonomies- en esteties-belangrike plantspesies in verskillende omgewings, en hoe hierdie interaksies verliese in gewas opbrengs en ekologiese integriteit bepaal – uiteindelik, om hierdie kennis toe te pas vir ontwikkeling van geïntegreerde onkruidbestuur-strategieë.* • *Vermoë om verskillende onkruidbeheermetodes te selekteer, te evalueer en met die oog op effektiwiteit, omgewingsveiligheid en volhoubaarheid die beste aanbevelings te maak vir effektiewe en volhoubare onkruidbestuur-strategieê.* • *Bewustheid van die omvang en kompleksiteit van etiese en waardesisteme vanuit beide 'n omgewings en menslike perspektief rakende onkruidbestuurbesluite in komplekse landbou en natuurlike omgewings.*		

- *Die vermoë om wetenskaplike inligting te produseer en te kommunikeer asook om die akademiese beginsels rakende geïntegreerde onkruidbestuur aan belanghebbendes te kommunikeer.*

Method of delivery: Full time

Assessment methods: Oral presentations, written assignments, examination

OMSA423	**Semester 2**	**NQF-Level: 8**

Plant Pathology

Module-outcomes:
After completion of this module, the student will be able to:

- Integrate knowledge of the principles of taxonomy and general characteristics of plant disease causing organisms and understand types of diseases and disease epidemiology on economically important crops.
- Demonstrate detailed knowledge of disease epidemiology, interactions between pathogens, environment and plants and yield loss determination and apply these in development of integrated disease management strategies.
- Select, evaluate and apply a range of different but appropriate disease management strategies and recommend management strategies.
- Demonstrate an awareness of the scope and complexity of ethical and value systems from both the environmental and human perspective with regard to disease management decisions in complex agricultural environments.
- Plan and conduct research on the effect of diseases on plants, do damage evaluations and interpret data.
- Understand and interpret legislation governing control of plant diseases and nematodes, for example: quarantine / phytosanitary control regulations.
- Produce and communicate information and demonstrate ability to present and communicate academic principles of integrated disease pest management to stakeholders.

Module-uitkomstes:
Na die voltooiing van die module, sal die student die volgende kan demonstreer:

- *Geïntegreerde kennis van die beginsels van taksonomie en algemene eienskappe van plantsiekte-veroorsakende organismes en begrip van die tipes siektes asook siekte-epidemiologie in ekonomies-belangrike gewasse.*
- *Gedetailleerde kennis van epidemiologie, interaksies tussen patogene, omgewing en plante, asook oesverliesbepaling en die toepassing hiervan in ontwikkeling van geïntegreerde plantsiektebestuurstrategieë.*
- *Vermoë om 'n wye reeks toepaslike plantsiektebestuurstrategieë te selekteer, evalueer en toe te pas en aanbevelings te maak in hierdie verband.*
- *Bewustheid van die omvang en kompleksiteit van etiese en waardesisteme vanuit beide 'n omgewings en menslike perspektief rakende siektebeheerbesluite in komplekse lanbou-omgewings.*
- *Vermoë om navorsing op die effek van plantsiektes op plante te beplan, skadebepalings te doen en data te interpreteer.*
- *Verstaan en interpreteer wetgewing op die beheer van plantsiektes en nematodes, byvoorbeeld: kwarantyn / fitosanitêre beheerregulasies.*
- *Vermoë om inligting te produseer en te kommunikeer asook om die akademiese beginsels rakende geïntegreerde siektebestuur aan belanghebbendes te kommunikeer.*

Method of delivering: Full time

Assessment methods: Oral presentations, written assignments, examination

OMSE411	Semester 1	NQF Level: 8
Agroecology		

Module outcomes:

After completion of module OMSE411, the student will demonstrate:

- An understanding of the concept of agroecology as a science applying ecological concepts and principles to the design and management of sustainable food systems.
- Knowledge on the techniques and practices applied in the grain crop production sector to promote sustainable agriculture and sustainable intensification.
- Knowledge on the applicability and relevance of agroecology in plot/field, agroecosystem landscape and food system scales.
- Differentiate between the progression levels on the transformation of food systems and the integration of agro ecological principles.
- An understanding of the concepts of ecosystem functions and services and the assessment and monitoring of environmental health in agricultural systems.

Method of delivery: Contact-Full time

Assessment modes:

The student will prove that he/she has attained the outcomes of the OMSE411 module when he/she can:

- interpret and apply concepts of agroecology, sustainable agriculture, environmental health and ecosystem functions and services.
- summate and relay information on agricultural techniques and principles that is focused,
- coherent and appropriate for identified readership groups.
- critically evaluate the sustainability of food production systems from both environmental and economic perspectives.
- evaluate the progression status of a food production system in achieving sustainable
- production and sustainable intensification based on agro ecological principles.
- present the basic skills to perform field surveys, as well as sample processing and analysis

OMSE474 (Waiting on SCAS approval)	Semester 1 & 2	NQF-Level: 8
Research Report and Seminar / ***Navorsingsverslag en Seminaar***		

Module outcomes:

After completion of the module, the student should demonstrate:

- Understanding of the theories, research methods and techniques relevant to the particular research project including how to gather and interrogate multiple sources of scientific information and critically review such information for inclusion in project and seminar.
- Understanding of the complexities and uncertainties of selecting and applying standard techniques to the unfamiliar problem of the research project.
- Ability to use a range of specialised skills to identify, analyse and address complex or abstract problems as part of resolving the research question.
- Ability to present and communicate scientific, professional or occupational ideas and concepts effectively to a range of audiences through seminar presentation on a topic related to the research project.
- Ability to apply, in a self-critical manner, learning strategies which effectively address own professional and ongoing learning needs as a researcher with integrity: integrity towards his/her own conduct as a researcher, but also treating the environment and biota with respect.

Module uitkomste:

By die afhandeling van die module, moet die student kan demonstreer dat hy/sy:

- *Die teorieë, navorsingsmetodes en tegnieke relevant tot die besondere navorsingsprojek begryp en 'n verskeidenheid bronne vir toepaslike wetenskaplike inligting krities kan ontgin en evalueer vir inkorporering in die projek en seminaar.*
- *Die kompleksiteite en onsekerhede betrokke by die keuse en toepassing van standaardtegnieke op die onbekende probleem van die navorsingsprojek begryp.*
- *'n Reeks gespesialiseerde vaardighede kan gebruik om komplekse of abstrakte probleme te identifiseer, te analiseer en aan te spreek in die oplossing van die navorsingsvraag.*
- *Wetenskaplike, professionele en beroepsgerigte idees en konsepte effektief m.b.v. seminaar-aanbieding aan 'n verskeidenheid gehore kan kommunikeer.*
- *Op 'n selfkritiese wyse, leerstrategieë sy/haar eie professionele en voortgesette leerbehoeftes as 'n navorser met integriteit kan toepas: integriteit teenoor sy/haar eie optrede as wetenskaplike, maar ook deur die omgewing en biota met respek te behandel.*

Method of delivery: Full Time and Part Time

Assessment methods:

Presentation of seminar at mini-conference, as well as marks for research-related skills training, e.g. project proposal, literature review, statistics assignment that are finally incorporated in a project report. Research report to be written in the prescribed format.

OMWP411 (Waiting on SCAS approval)	**Semester 1**	**NQF-Level: 8**

Pest Phenology and Damage Symptoms

Module outcomes:

After completion of this module, the student will be able to:

- Integrate knowledge of host plant resistance and biological-, cultural- and chemical control and critically understand the principles of integrated pest management.
- Applied knowledge of pest phenology and damage symptoms and demonstrate an understanding of the research methodologies, methods and techniques, to interrogate multiple sources of knowledge and to evaluate knowledge relevant to the fields of entomology and nematology, as well as an understanding of how to apply such knowledge in a particular context.
- Integrate knowledge of the economic principles of pest management and be able to integrate these into pest management strategies.
- Understand the impact of pest management measures in complex agricultural systems.
- Select, evaluate and apply a range of different and appropriate pest management strategies to solve problems encountered in the field of pest management.
- Produce and communicate information and demonstrate ability to present and communicate academic principles of pest phenology and management to stakeholders.

Module uitkomste:

Na voltooiing van die module, sal die student die volgende kan demonstreer:

- *Geïntegreerde kennis van gasheerplantweerstand en biologiese-, kulturele- en chemiese beheer asook ’n kritiese begrip van die beginsels van geïntegreerde plaagbestuur.*
- *Toegepaste kennis van plaagfenologie en skade simptome, en begrip van navorsingsmetodologie, metodes en tegnieke om veelvuldige bronne van kennis te ondersoek en kennis rakende entomologie en nematologie te evalueer, en begrip te toon van hoe om hierdie kennis binne spesifieke konteks te gebruik.*
- *Geïntegreerde kennis van die ekonomiese beginsels van plaagbestuur en die vermoë om hierdie beginsels te integreer binne bestuursstrategieë.*
- *Begrip van die impak van plaagbestuursmaatreëls in komplekse landboustelsels.*
- *Die vermoë om ’n reeks verskillende en toepaslike plaagbestuurstrategieë te selekteer, te evalueer en toe te pas om sodoende probleme wat in die veld van plaagbestuur voorkom, op te los.*

• *Die vermoë om inligting te produseer en hierdie inligting asook akademiese beginsels rakende plaagfenologie en plaagbestuur aan belangegroepe te kommunikeer.*
Method of delivery: Full Time
Assessment methods: Oral presentations, written assignments, examination

NAS.2.6 AGRICULTURAL ECONOMICS

AEDM111	**Semester 1**	**NQF Level: 5**
Introduction to Agricultural Economics		
Module outcomes: Students should be able to: • Provide an understanding of the main economic issues, concepts and tools of agricultural economics; • Develop an understanding of solving basic economic problems, outlining the potential solutions to those problems and describing the major types of economic system.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, assignments, examination		
AEDM314	**Semester 1**	**NQF Level: 7**
Farm Management and Accounting		
Module outcomes: Students should be able to: • Demonstrate understanding of farm management functions; • Apply farm management principles and perform farm management and farm accounting tasks; • Demonstrate understanding of financial planning, analysis and control in farming; • Apply and analyse financial planning and control tasks in farming environment.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, assignments, examination		
AECM111	**Semester 1**	**NQF Level: 5**
Introduction to Agricultural Economics		
Module Outcomes: Students should be able to: • Provide a sound understanding of the basic economic relationship amongst household, firms, government and to provide solutions to global economic challenges; • Interpret and analyse tables (demand, supply schedules etc.) and graphs in agricultural economics; • Manage and handle economic data and tasks.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM221	**Semester 2**	**NQF Level: 6**
Land Reform and Agricultural Development		
Module outcomes: Students should be able to: • Fathom the achievement of South Africa's Land Reform as from 1994 to date		

- Understand the possible effects/consequences of “land grabbing” on the economy of South Africa.
- Able to link Land Reform and food security: local and international perspective
- Recognize Constraints of Land Reform: local and international perspective
- Rationally critic or converse “the willing buyer-willing seller policy” of South Africa’s Land Reform.
- Appreciate the consequences of “Land expropriation with and without compensation”.
- Understand Land Restitution programme.
- Comprehend SLAG Sub programme of South Africa’s Land Reform.
- Comprehend LRAD Sub programme of South Africa’s Land Reform.
- Understand PLAS Sub programme of South Africa’s Land Reform.
- Understand Recapitalization and Development Programme and its importance (RADP)
- Understand Impact of land reform on women empowerment
- Understand socio-economic & political effects of land reform
- Understand land tenure programme
- Recognize Factors affecting land reform beneficiary’s accessibility to credit
- Able to link corruption and rural development: Land reform perspective
- Comprehend Factors affecting living conditions of farm workers- land reform perspective
- Rationally argue or Understand better ways in which Land Reform in South Africa can be implemented
- Understand how the following factors influence land reform beneficiaries’ accessibility to credit in South Africa:
  - Title deed (LRAD and PLAS perspective)
  - Market access
  - Farm size (LRAD perspective)
  - Owners’ equity (LRAD perspective)

Method of delivery: Contact-Full time

Assessment modes: Tests, Assignments and Examination

AECM223	**Semester 2**	**NQF Level: 6**

Farm Accounting

Module Outcomes:

Students should be able to:

- Demonstrate an understanding of the importance and the use of farm accounting for farm management;
- Make use of records and accounts as a tool of farm management;
- Understand and apply important depreciation and tax decisions.

Method of delivery: Contact-Full time

Assessment modes: Tests, Assignments and Examination

AECM311	**Semester 1**	**NQF Level: 7**

Agricultural Micro-Economics

Module outcomes:

Students should be able to:

- Have knowledge and demonstrate an understanding of relevant terms, rules, concepts, principles and theories to describe microeconomics and be able to apply this knowledge and principles in the real world situations;
- Conduct economic analysis in agricultural and related enterprises;
- Advise agricultural stakeholders on micro-economic matters.

Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM312 (Closed)	**Semester 1**	**NQF Level: 7**
International Agricultural Trades		
Module outcomes: Students should be able to: • Have knowledge and demonstrate an understanding of relevant terms, rules, concepts, principles and theories to describe international agricultural trade and be able to apply this knowledge and principles in the real world situations.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM313	**Semester 1**	**NQF Level: 7**
Agricultural Statistics for Research I		
Module outcomes: Students should be able to: • Demonstrate the use and application of linear regression and general linear model to economic data; • Demonstrate the use and interpretation of at least two econometric software for data analysis; • Discuss the problems of estimation when classical assumption of linear regression is violated and application of chi-square analysis; • Demonstrate estimation of index numbers and time series analysis in the agricultural sector.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM314	**Semester 1**	**NQF Level: 7**
Farm Management and Accounting		
Module outcomes: Students should be able to: • Demonstrate an understanding of the farm management function; • Apply farm management principles and perform farm management and farm accounting tasks; • Demonstrate understanding of financial planning, analysis and control in farming; • Apply and analyse financial planning and control tasks in farming environment.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM315	**Semester 1**	**NQF Level: 7**
Food Security Analysis		
Module outcomes: Students should be able to: • Demonstrate an understanding of the meaning and concepts of food security; • Analyse and identify the indicators of food security; • Discuss the influence on household types and food security; • Describe food security situations in terms of South African agricultural policy and explain the determinants of food security.		

Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM316	**Semester 1**	**NQF Level: 7**
Agricultural Production Economics		
Module outcomes: Students should be able to: • Optimize the objective function of the farming community or the nation within a framework of limited resources; • Provide guidance to individual farmers in using their resources in most efficient way; facilitate the most efficient use of resources from an economic point of view.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM321	**Semester 2**	**NQF Level: 7**
Land Resource and Environmental Economics		
Module outcomes: Students should be able to: • Demonstrate an understanding of theories of land resource economics and the framework of land resource management; • Application of economic tools to resources use and environmental issues; • Discuss the interrelationship between environment, economic growth and public policy on environmental issues and quality and discuss environmental problems in South Africa.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM322	**Semester 2**	**NQF Level: 7**
Agricultural Production Economics		
Module outcomes: Students should be able to: • Optimize the objective function of a farming community or a nation within a framework of limited resources; • Provide guidance to individual farmers in using their resources in the most efficient way and facilitate the most efficient use of resources from an economic point of view.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM323	**Semester 2**	**NQF Level: 7**
Agricultural Marketing		
Module outcomes: Students should be able to: • Demonstrate an understanding of the principles of agricultural marketing and price analysis; • Apply agricultural marketing and risk management principles; • Understand the role of agricultural marketing and risk management in South Africa and a wide variety of settings.		

Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM325	**Semester 2**	**NQF Level: 7**
Agricultural Macro- Economics		
Module outcomes: Students should be able to: • Show knowledge and demonstrate an understanding of relevant terms, rules, concepts, principles and theories to describe macro-economics and be able to apply this knowledge and principles in the real world situations; • Advise agricultural stakeholders, i.e. organized agriculture, government, NGO's etc., on macro-economic matters.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM326	**Semester 2**	**NQF Level :7**
Agricultural Finance		
Module outcomes: Students should be able to: • Apply financial principles to the farming environment and be familiar with numerous management functions, regardless of the size of the farm business; • Learn about and apply the basic concepts and practices of modern agricultural finance principles as they are used in a wide variety of settings; • Use the techniques of financial and economic analysis to assess economic viability and loan repayment ability of a farm.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		

AECM327	Semester 2	NQF Level: 7
International Agricultural Trade		
Module outcomes: Students should be able to: • Have knowledge and demonstrate an understanding of relevant terms, rules, concepts, principles and theories to describe international agricultural trade, and be able to apply this knowledge and principles in the real world situations.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM411	**Semester 1**	**NQF Level: 8**
Agricultural Project Appraisal and Management		
Module outcomes: Students should be able to: • Be an efficient, competent agricultural project manager, who understands project appraisal and management principles and can use the knowledge acquired practically; • Contribute towards improvement of project appraisal and management locally and nationally and be able to function within a group for mutual support and sustenance to peers for professional growth and development.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		
AECM412	**Semester 1**	**NQF Level: 8**
Research Project and Seminar I		
Module outcomes: Students should be able to: • Demonstrate knowledge and understanding of research problems creation and identification in agricultural economics: - formulation of research questions and objectives, - description of research population and application of research sampling procedures; - identification appropriate data collection instruments and procedures; - evaluation and application of correct data analysis techniques; - generation and analysis of a bankable research proposal.		
Method of delivery: Contact-Full time		
Assessment modes: Research proposal		
AECM413	**Semester 1**	**NQF Level: 8**
Quantitative Methods in Agricultural Economics		
Module Outcomes: Students should be able to: • Understand and apply basic mathematical methods that are essential for adequate economic analysis and proper understanding of the current economic literature.		
Method of delivery: Contact-Full time		
Assessment modes: Tests, Assignments and Examination		

AECM414	Semester 1	NQF Level: 8
Agricultural Statistics for Research II		
Module Outcomes: Students should be able to: • Make an estimation of simultaneous equation models; • Describe the properties of stochastic and linear time series and estimate regression models, including dummy variables and dummy dependent models including the application of single equation models		
Method of delivery: Contact		
Assessment modes: Tests, Assignments and Examination		
AECM415	**Semester 1**	**NQF Level: 8**
Agribusiness Management		
Module Outcomes: Students should be able to: • Apply production, financial, marketing, human resource and risk management principles to the three sectors of agribusiness environment and a wide variety of agricultural related business settings.		
Method of delivery: Contact		
Assessment modes: Tests, Assignments and Examination		
AECM421	**Semester 2**	**NQF Level: 8**
Farm Planning and Linear Programming		
Module Outcomes: Students should be able to: • Use linear programming and other operations research methods/models in solving allocative and decision problems of agriculture, such as what to produce, how much to produce, and the most profitable enterprise combinations, costs reduction and general optimization of resource usage.		
Method of delivery: Contact		
Assessment modes: Tests, Assignments and Examination		
AECM422	**Semester 2**	**NQF Level: 8**
Agricultural Policy Analysis		
Module outcomes: Students should be able to: • Apply agricultural policy principles to the farming environment and a wide variety of farm business settings for efficient and effective agricultural projects and programme implementation.		
Method of delivery: Contact		
Assessment modes: Tests, Assignments and Examination		

AECM424	Semester 2	NQF Level: 8
Agriculture and Economic Development		
Module outcomes: Students should be able to: • Understand the economic problems of agriculture in developing communities/countries; • Analyse agriculture's role in the development of underdeveloped communities/countries; • Identify barriers to agricultural development and to examine critically remedial agricultural policies and well-known tools of economic analysis to foster more rapid development; • Apply agricultural policy principles to the farming environment and a wide variety of farm business settings for efficient and effective agricultural projects and programme implementation; • Demonstrate a very good understanding of principles of technical, allocative, scale and economic efficiencies.		
Method of delivery: Contact		
Assessment modes: Tests, Assignments and Examination		

AECM425	Semester 2	NQF Level: 8
Research Project and Seminar II		
Module outcomes: Having successfully completed this module the student should be able to: • Show evidence of clarity of argument, understanding of the chosen topic area. • Identify key research questions within the field • Understand and apply theoretical frameworks to the chosen area of study. • Designing an appropriate research strategy and research methodology to carry out the research. • Identify, summarise and critically evaluate relevant literature and write a literature review of the relevant field. • Identify, analyse and interpret data. • Synthesise research findings. • Demonstrate knowledge and understanding of report writing. • Demonstrate appropriate referencing.		
Method of delivery: Full time		
Assessment modes: Research project		

NAS.2.7 AGRICULTURAL EXTENSION

AEXM211	Semester 1	NQF Level: 6
Fundamentals of Agricultural Extension		
Module outcomes: Students should be able to: • Demonstrate an understanding of principles of Agricultural Extension; • Identify challenges of agricultural extension; • Demonstrate an understanding of the process and elements of communication process; • Identify different extension teaching methods and understanding of extension program planning and management concepts.		
Method of delivery: Full time		
Assessment modes: Tests, assignments, examination		

AEXM212	Semester 1	NQF Level: 6
Communication and Agricultural Technology Transfer		
Module outcomes: Students should be able to: • Describe the processes of communication and analyse the communication process in relation to extension service delivery; • Describe different technology transfer models, explain technology transfer processes and highlight the synergy of technology transfer processes and models.		
Method of delivery: Full time		
Assessment modes: Tests, assignments, examination		
AEXM222	**Semester 2**	**NQF Level: 6**
Agricultural Extension for Development		
Module outcomes: Students should be able to: • Demonstrate an understanding of the role of extension in the development process; • Demonstrate an understanding of the teaching and learning process in agricultural extension and the use of different extension teaching methods; • Identify and develop an extension program for development purposes.		
Method of delivery: Full time		
Assessment modes: Tests, assignments, examination		
AEXM324	**Semester 2**	**NQF Level: 7**
Agricultural Rural Sociology		
Module outcomes: Students should be able to: • Demonstrate an understanding of the meaning, nature and scope of rural sociology, theories of social change, organization of societies and problems of cultural and directed change; • Demonstrate an understanding of the definition of diffusion and adoption, and processes of diffusion and adoption, adopter categories and diffusion curves.		
Method of delivery: Full time		
Assessment modes: Tests, assignments, examination		
AXDM211	**Semester 1**	**NQF Level: 6**
Fundamentals of Agricultural Extension		
Module outcomes: Students should be able to: • Develop an understanding of the concepts of agricultural extension and its environment and demonstrate an understanding of the principles of Agricultural Extension; • Demonstrate an understanding of basic social, cultural and psychological concepts in agricultural extension and communication process in agricultural extension; • Demonstrate an understanding of extension program planning, management and evaluation concepts.		
Method of delivery: Full time		

Assessment modes: Tests, assignments, examination		
AXDM311	**Semester 1**	**NQF Level: 7**
Agricultural Extension for Development		
Module outcomes: Students should be able to: • Demonstrate an understanding of the role of extension in the development, teaching and learning process in agricultural extension and the use of different extension teaching methods.		
Method of delivery: Full time		
Assessment modes: Tests, assignments, examination		

NAS.2.8 EXTENDED PROGRAMMES: MODULE OUTCOMES – VANDERBIJLPARK CAMPUS

See the Faculty of Economic and Management Sciences yearbook for the module outcomes of ACFS/ *Sien die Fakulteit van Ekonomiese en Bestuurswetenskappe se jaarboek vir die module uitkomste van ACFS.*

ITSP111	**Semester 1**	**NQF Level: 5**
Introduction to Problem Solving / ***Inleiding tot Probleemoplossing***		
ITSP111(Introduction to Problem Solving) is intended for students who have not taken programming at a grade 12 level. **ITSP111** (Inleiding tot Probleemoplossing) is bedoel vir studente wat nie programmering op graad 12 vlak geneem het nie.		
Module outcomes: Students should be able to: • Explain the difference between solving problems and writing computer programming language code; • Understand what problems are and that they have several possible solutions; • Apply a strategy to help understand, solve, and evaluate the solution to a problem; • Write solutions to problems in a semi-formal structured English (pseudo-code); • Recognize the role of sequence, choice (selection), and repetition (iteration) in solving problems; • Understand the importance of the role of abstraction in problem solving; • Identify the variables (data items) needed in a problem solution (algorithm); • Estimate likely ranges of variables; • Apply the problem solving strategy to real-world problems involving variables and nested action blocks; • Understand the ways in which different kinds (types) of data affect the way solutions to problems are designed; • Recognize appropriate operations that can be carried out on different data types; • Identify different ways of carrying out selection and iteration and understand how different specialized control constructs can be used appropriately; • Understand the difference between simple and compound selections, and how complex conditions can be expressed to control the selections; • Understand the difference between determinate and indeterminate iterations and how complex conditions can be expressed to control the iterations; • determinate: count-controlled iteration;		

- indeterminate: zero-or-more and at-least-once iterations;
- Analyse real-world problems to identify the appropriate selection and iteration constructs to use.

Module-uitkomste:

Studente moet in staat wees om:

- *Te verduidelik wat die verskil is tussen probleemoplossing en die skryf van rekenaar programme in programmeertaal;*
- *Te verstaan wat probleme is en dat probleme meer as een oplossing het;*
- *'n Strategie toe te pas vir die verstaan, oplos en evaluering van 'n oplossing van 'n probleem;*
- *Oplossings te skryf vir probleme in 'n semi-formele gestruktureerde Engels (pseudo-kode);*
- *Die rol van volgorde, keuse (seleksie) en herhaling in probleemoplossing te herken;*
- *Probleemoplossing-strategie toe te pas op werklike probleme, insluitend alternatiewe rigtings van aksie en herhalende stappe van aksie;*
- *Die belangrikheid wat die rol van abstraksie speel in probleemoplossing te verstaan;*
- *Die veranderlikes (data items) wat benodig word in probleemoplossing (algoritme) te identifiseer;*
- *Skatting van waarskynlike reeks waardes vir veranderlikes te doen;*
- *Die probleemoplossing-strategie toe te pas op werklike probleme wat veranderlikes en geneste aksie blokke bevat;*
- *Die maniere waarin verskillende tipes data die manier affekteer hoe oplossings tot probleme ontwerp word, te verstaan;*
- *Toepaslike aksies wat op verskillende data tipes toegepas kan word, te herken;*
- *Verskillende maniere te identifiseer waarop seleksie en herhaling uitgevoer kan word en te verstaan hoe verskillende gespesialiseerde kontrolestrukture toepaslik gebruik kan word;*
- *Die verskil tussen eenvoudige en saamgestelde seleksiestrukture, en hoe komplekse voorwaardes uitgedruk kan word om seleksiestrukture te beheer, te verstaan;*
- *Die verskil tussen bepaalde en onbepaalde herhalings en hoe komplekse kondisies uitgedruk kan word om die herhalings te beheer, te verstaan;*
- *Bepaalde: teller- gekontroleerde herhaling;*
- *Onbepaalde: nul-of-meer en ten-minste-een keer herhalings;*
- *Werklike probleme te analiseer om toepaslike seleksie- en herhalingstrukture te gebruik.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes: Formative and Summative

Assesseringsmetodes: *Formatief en Summatief*

ITSP113	**Semester 1**	**NQF Level: 5**
Introduction to Graphical Interface Programming / ***Inleiding tot Grafiese Koppelvlakprogrammering***		

ITSP113 (Introduction to Graphical Interface Programming) is preparatory for the regular first level module in Graphical Interface Programming.

ITSP113 *(Inleiding tot Grafiese Koppelvlakprogrammering) is ter voorbereiding vir die gewone eerstevlak module in Grafiese Koppelvlakprogrammering*

Module outcomes:

Students should be able to:

Knowledge:

- Demonstrate that he/she is familiar with basic theoretical programming concepts and have gained basic introductory knowledge and skills of a graphical interface programming environment to develop and test basic programs in a GUI computer programming language;

- Understand introductory aspects of graphical interface design and event-driven programming;

Skills:

- Prove that he/she can apply the theory of basic graphical interface programming in a practical way by writing algorithms and subsequently solve basic problems using a GUI programming language.

Module-uitkomste:

Studente moet in staat wees om:

Kennis:

- *Te demonstreer dat hy/sy vertroud is met basiese teoretiese programmeringskonsepte en dat hy/sy oor basiese inleidende kennis en vaardighede van 'n grafiese koppelvlak programmeringsomgewing beskik wat hom/haar in staat stel om basiese programme te ontwikkel en te toets deur die gebruik van 'n GGK rekenaar programmeringstaal;*
- *Inleidende aspekte van grafiese koppelvlakontwerp en gebeurlikheidsgedrewe programmering te verstaan;*

Vaardighede:

- *Te bewys dat hy/sy die teorie van basiese grafiese koppelvlakprogrammering op 'n praktiese wyse kan toepas deur algoritmes te skryf en vervolgens basiese probleme op te los deur die gebruik van 'n GGK programmeringstaal.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests Theory and Practical. Lecture/ Student Observation and Interaction; **Summative:** Formal Examination.

Assesseringsmetodes:

Formatief: *Teoretiese en Praktiese Klastoetse. Dosent/ Student Waarneming en Interaksie;*

Summatief: *Formele Eksamen*

ITSP114	**Semester 1**	**NQF Level: 5**

Introduction to Object Oriented Programming/

Inleiding tot Objekgeöriënteerde Programmering

ITSP114 (Introduction to Object Oriented Programming) is preparatory for the regular first level module in Programming.

ITSP114 *(Inleiding tot Objekgeöriënteerde Programmering) is ter voorbereiding vir die gewone eerstevlak module in Programmering*

Module outcomes:

Students should be able to:

Knowledge:

- Demonstrate basic knowledge on and insight in the basic structures, data types, methods, classes and objects of an object oriented programming language;
- Demonstrate basic knowledge and insight on problem solving, including: debugging, testing and executing of applications;

Skills:

- Show that he/she can apply the knowledge and insight that have been obtained in problem solving by means of a computer.
- Specifically, he/she should be able to:
  - develop a solution plan (algorithm) to solve a problem that has been defined, "translate" (encode) the algorithm in Java, debug it, test it and execute it by means of the computer;
  - apply certain steps of problem solving on defined problems;

- use general properties of the programming language Java to develop applications;
- create and use classes in problem solving;
- handle different data types in Java;
- do arithmetic calculations;
- use classes and methods that already have been defined in Java;
- use Java's decision making structures (choice), namely *if* and *switch*, in problem solving;
- use the repeating structures of Java (loops), namely *while*, *do. while* and *for* in problem solving;
- use a good programming style (program readability);
- write structured classes and programs that gives neat output;
- write programs that are user friendly.

Module-uitkomste:

Studente moet in staat wees om:

Kennis:

- *Basiese kennis en insig te demonstreer van 'n objekgerigte programmeringstaal se basiese strukture, datatipes, metodes, klasse en objekte;*
- *Basiese kennis en insig te demonstreer van probleemoplossing wat insluit: ontfouting, toetsing en uitvoering van toepassings;*

Vaardighede:

- *Te kan bewys lewer dat hy/sy die kennis en insig wat verwerf is, kan toepas in probleem-oplossing met behulp van die rekenaar.*
- *In besonder behoort hy/sy in staat te wees om:*
  - *vir ’n probleem wat gedefinieer is, ’n oplossingsplan (algoritme) te ontwikkel om die probleem op te los, die algoritme te "vertaal" (kodeer) in Java, dit te ontfout, te toets en uit te voer met behulp van die rekenaar;*
  - *sekere stappe van probleemoplossing te kan toepas op gedefinieerde probleme;*
  - *algemene eienskappe van die programmeringstaal Java te gebruik om toepassings te ontwikkel;*
  - *klasse te skep en te gebruik in probleemoplossing;*
  - *verskillende datatipes in Java te hanteer;*
  - *rekenkundige bewerkings te doen;*
  - *klasse en metodes wat reeds in Java gedefinieer is, te kan gebruik;*
  - *Java se besluitnemingstrukture (keuse) naamlik “ if and switch” in probleemoplossing te gebruik;*
  - *die herhalingstrukture van Java (lusse), naamlik “while”, “do while” en “for” te gebruik in probleemoplossing;*
  - *’n goeie programmeringstyl te gebruik (programleesbaarheid);*
  - *gestruktureerde klasse en programme te skryf wat netjiese uitvoer lewer;*
  - *programme te skryf wat gebruikersvriendelik is.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests Theory and Practical. Lecture /Student Observation and Interaction; **Summative:** Formal Examination.

Assesseringsmetodes:

Formatief: *Teoretiese en Praktiese Klastoetse. Dosent /Student Waarneming en Interaksie;* ***Summatief:*** *Formele Eksamen*

ITSP121	Semester 2	NQF Level: 5
Introductory Programming Principles/ ***Inleiding tot Programmeringsbeginsels***		

ITSP121 (Introductory Programming Principles) is preparatory for the regular first level module in Programming.

ITSP121 *(Inleiding tot Programmeringsbeginsels) is ter voorbereiding vir die gewone eerstevlak module in Programmering.*

Module outcomes:

Students should be able to:

- Know various components of a computer;
- Understand how various components of a computer work;
- Understand how to use various components of a computer effectively;
- Demonstrate knowledge of how a computer works;
- Know and explain basic computer concepts;
- Write basic algorithms.

Module-uitkomste:

Studente moet in staat wees om:

- *Die onderskeie komponente van 'n rekenaar te ken;*
- *Te verstaan hoe die onderskeie komponente van 'n rekenaar werk;*
- *Te verstaan hoe om die onderskeie komponente effektief te gebruik;*
- *Te kan demonstreer dat hy/sy weet hoe 'n rekenaar werk;*
- *Basiese rekenaarkonsepte te ken en te verduidelik;*
- *Basiese algoritmes te skryf.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes: Formative and Summative

Assesseringsmetodes: *Formatief en Summatief*

STTF115	Semester 1	NQF Level: 5
Descriptive Statistics/ ***Beskrywende Statistiek***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of the most important elementary statistical techniques that are used daily, such as sampling methods, graphical representation of data, descriptive measures of location and spread, least squares line fitting, prediction from least squares lines, the coefficient of correlation, multiple linear regression with applications in prediction, time series data, movement components to predict future outcomes, practical considerations regarding sample surveys and sample sizes;
- Demonstrate problem solving skills by analysing known and unknown problems, using knowledge to apply sampling methods, graphical representation of data, descriptive measures of location and spread, least squares line fits, predictions using least squares fits, correlation coefficients, interpretation of multiple linear regression output, movement component calculations, prediction of future outcomes time series data and sample size determination to real life data.

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis te demonstreer van die belangrikste elementêre statistiese tegnieke wat daagliks gebruik word soos byvoorbeeld steekproef metodes, grafiese voorstelling van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste-kwadrate lynpassing, voorspelling van kleinste-kwadrate lyne, korrelasiekoëffisiënt, meervoudige lineêre regressie met toepassings in voorspellings, tydreeks data, bewegingskomponente om toekomstige uitkomste te voorspel, praktiese oorwegings aangaande steekproefnemings en steekproefgroottes;*
- *Probleemoplossings vaardighede te demonstreer deur bekende en onbekende probleme te analiseer, kennis toepas op steekproefmetodes, grafiese voorstellinge van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste-kwadrate lynpassing, voorspelling deur die gebruik van kleinste-kwadratelynpassings, korrelasiekoëffisiënt, interpretasie van meervoudige lineêre regressie uitvoer, bewegingskomponent berekenings, voorstelling van toekomstige uitkomste, tydreeks data en steekproefgrootte bepaling met lewenswerklike data.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Summative: 1 × 2 Hour Examination; Weight – 50

This is a guideline and can change.

Assesseringsmetodes:

Summatief: *1 × 2 Uur Eksamen; Gewig – 50*

Hierdie is slegs 'n riglyn en kan verander.

STTF125	**Semester 2**	**NQF Level: 5**

Introductory Statistical Inference/

Inleidende Statistiese Inferensie

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of probability and probability distributions, the central limit theorem, estimation of population parameters by the use of point and interval estimation, hypotheses testing for population means and proportions for one and two samples, one-way analysis of variance (ANOVA) and categorical data analysis, contingency tables and basic tests on categorical data;
- Demonstrate problem solving skills by analysing known and unknown problems, using knowledge to do simple probability calculations, apply the central limit theorem, estimate population parameters using point and interval estimation, test hypotheses for population means and population proportions for one and two samples, apply one-way analysis of variance (ANOVA) methods and interpret computer output, apply methods for categorical data analysis such as contingency tables and basic tests on categorical data.

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis te demonstreer van die belangrikste elementêre statistiese tegnieke wat daagliks gebruik word soos byvoorbeeld steekproef metodes, grafiese voorstelling van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste-kwadrate lynpassing, voorspelling van kleinste-kwadrate lyne, korrelasiekoëffisiënt, meervoudige lineêre regressie met toepassings in voorspellings, tydreeksdata, bewegingskomponente om toekomstige uitkomste te voorspel, praktiese oorwegings aangaande steekproefnemings en steekproefgroottes;*
- *Probleemoplossings vaardighede te demonstreer deur bekende en onbekende probleme te analiseer, kennis toepas op steekproefmetodes, grafiese voorstellinge van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste-kwadrate lynpassing, voorspelling deur die gebruik van kleinste-*

kwadratelynpassings, korrelasiekoëffisiënt, interpretasie van meervoudige lineêre regressie uitvoer, bewegingskomponent berekenings, voorstelling van toekomstige uitkomste, tydreeks data en steekproefgrootte bepaling met lewenswerklike data.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Summative: 1 ×2 Hour Examination; Weight – 50

This is a guideline and can change.

Assesseringsmetodes:

Summatief: *1 × 2 Uur Eksamen; Gewig – 50*

Hierdie is slegs 'n riglyn en kan verander.

STTF215	**Semester 1**	**NQF Level: 6**

Practical Statistics/

Praktiese Statistiek

Module uitkomste:

Studente moet in staat wees om:

- *Die belangrike vereistes vir vraelys ontwerp te verstaan;*
- *Stappe in data voorbereiding voor data analise te identifiseer en toe te pas;*
- *Rekenaaruitdrukke te interpreteer; nl. Grafieke, tabelle, beskrywende statistiek maatstawwe en waarskynlikhede;*
- *'n Statistiek pakket te gebruik om data te analiseer;*
- *Die eenvoudige en meervoudige lineêre regressiemodel te verstaan, sowel as die beredenering agter die aannames in die regressiemodel;*
- *Enige afwykings van die aannames te diagnoseer en dan regstellende aksies toe te pas om die afwykings te korrigeer;*
- *Tydreeks data te analiseer en te voorspel;*
- *'n Suksesvolle statistiese projek uit te voer vanaf ontwerp tot analise.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Summative: 1 × 3 Hour Examination; Weight – 50

This is a guideline and can change.

Assesserings metodes:

Summatief: *1 ×2 Uur Eksamen; Gewig – 50*

Hierdie is slegs 'n riglyn en kan verander.

STTF225	**Semester 2**	**NQF Level: 6**

Introduction to Probability/

Inleiding tot Waarskynlikheidsleer

Module outcomes:

Students should be able to:

- Demonstrate knowledge of concepts such as outcome space, events, probability measures, counting processes, stochastic outcomes of events and the independence of events;
- Demonstrate knowledge of important probability theorems, such as the law of total probability and the theorem of Bayes;

- Demonstrate knowledge of stochastic variables, distribution functions and mass functions (special attention will be given to discrete stochastic variables and the following distributions will be discussed in depth: binomial, geometric, negative binomial, hyper geometric and Poisson distributions. The following continuous random variables, together with their distribution functions will be discussed in detail: exponential, gamma and normal distributions. Functions of these variables will also be discussed.);
- Demonstrate knowledge of probability structures of two or more stochastic variables defined in the same outcome space and functions of joint distributions.

Module uitkomste:

Studente moet in staat wees om:

- *'n Begrip te demonstreer vir konsepte soos die uitkomsruimte, gebeurtenisse, waarskynlikheidmate, telprosesse, stogastiese uitkoms van gebeurtenisse en die onafhanklikheid van gebeurtenisse;*
- *'n Begrip te demonstreer van belangrike waarskynlikheidsleerstelling soos die wet van die totale waarskynlikheid en die stellings van Bayes;*
- *'n Begrip van die stogastiese veranderlikes, verdelingsfunksies en massafunksie. (spesiale aandag sal geskenk word aan diskrete stogastiese veranderlikes en die volgende verdelings sal in diepte bespreek word: binomiaal, geometries, negatief binomiaal, hipergeometries en Poisson. Die volgende kontinue stogastiese veranderlikes tesame met hul verdelingsfunksies sal in detail bespreek word: eksponensieel, gamma en normaalverdelings. Funksies van hierdie veranderlikes sal ook bespreek word)*
- *Meervoudige regressie met toepassing in voorspellings*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes: Summative: 1 x 3 Hour Examination; Weight – 50

Project; Weight – 50

This is a guideline and can change.

Assesseringsmetodes: Summatief: *1 x 3 uur Eksamen; Gewig – 50*

Projek; *Gewig – 50*

Hierdie is 'n riglyn en mag verander.

WISS111	**Semester 1**	**NQF Level: 5**
Introduction to Mathematics I/ ***Inleiding tot Wiskunde I***		

WISS111, 121 (Introduction to Mathematics I/II) are preparatory for the regular first level modules in Mathematics in order to achieve a level of mathematical skills.

WISS111,121 *(Inleiding tot Wiskunde I/II) is ter voorbereiding vir die gewone eerstevlak modules in Wiskunde, om 'n vlak van wiskundige vaardigheid te bereik*

Module outcomes:

Students should be able to:

- Demonstrate knowledge on an introductory level of functions, exponential laws, logarithmic laws, limit laws and other basic theorems;
- Demonstrate knowledge on different types of graphs, solving systems of linear equations, linear programming problems in two variables, limits, analysing the rate of change of functions, the remainder theorem and factor theorem to factorize polynomials and solve equations;
- Apply and demonstrate mathematical concepts and properties by simplifying expressions and solving linear and quadratic equations and linear inequalities

Module-uitkomste:

Studente moet in staat wees om:

- *Kennis op inleidende vlak te demonstreer van funksies, eksponentwette, logaritme wette, limietwette en ander basiese stellings;*
- *Kennis te demonstreer van verskillende tipes grafieke, oplos van stelsels van lineêre vergelykings, lineêre programmering in twee veranderlikes, limiete, analisering van die tempo van verandering van funksies, die resstelling en die faktorstelling om polinome te faktoriseer en vergelykings op te los;*
- *Wiskundige eienskappe en konsepte toe te pas en te demonstreer deur uitdrukkings te vereenvoudig en lineêre en kwadratiese vergelykings en lineêre ongelykhede op te los.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests

Assesseringsmetodes:

Formatief: *Teoretiese Klastoetse.*

WISS113	**Semester 1**	**NQF Level: 5**

Introduction to Mathematical Techniques I/

Inleiding tot Wiskundige Tegnieke I

WISS113,123 (Introduction to Mathematical Techniques I/II) are preparatory for the regular first level modules in Mathematics in order to achieve a level of mathematical skills.

WISS113,123 *(Inleiding tot Wiskundige Tegnieke I/II) is, ter voorbereiding vir die gewone eerstevlak modules in Wiskunde, om 'n vlak van wiskundige vaardigheid te bereik.*

Module outcomes:

Students should be able to:

- Demonstrate knowledge on an introductory level of number systems and exponential laws;
- Write simple word problems in mathematical form;
- Apply and demonstrate mathematical concepts and properties by simplifying expressions and solving linear and quadratic equations and linear and quadratic inequalities.

Module-uitkomste:

Studente moet in staat wees om:

- *Kennis op inleidende vlak te demonstreer van getallestelsels en eksponentwette;*
- *Eenvoudige woordprobleme wiskundig te formuleer;*
- *Wiskundige konsepte en eienskappe toe te pas en te demonstreer deur uitdrukkings te vereenvoudig en lineêre en kwadratiese vergelykings en lineêre en kwadratiese ongelykhede op te los.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests

Assesseringsmetodes:

Formatief: *Teoretiese Klastoetse.*

WISS121	Semester 2	NQF Level: 5
Introduction to Mathematics II/ ***Inleiding tot Wiskunde II***		

WISS111, 121 (Introduction to Mathematics I/II) are preparatory for the regular first level modules in Mathematics in order to achieve a level of mathematical skills.

WISS111,121 *(Inleiding tot Wiskunde I/II) is ter voorbereiding vir die gewone eerstevlak modules in Wiskunde, om 'n vlak van wiskundige vaardigheid te bereik*

Module outcomes:

Students should be able to:

- Demonstrate knowledge on an introductory level of absolute values and the nature of the roots of quadratic equations;
- Solve inequalities (in general) and equations with absolute values;
- Demonstrate knowledge on the inverse functions and graphs of polynomials;
- Demonstrate knowledge on trigonometric functions and identities;
- Find solutions to equations with trigonometric functions on a given interval as well as general solutions;
- Demonstrate knowledge on the transformation of functions.

Module-uitkomste:

Studente moet in staat wees om:

- *Kennis op inleidende vlak te demonstreer van absolute waardes en die aard van die wortels van kwadratiese vergelykings;*
- *Ongelykhede (in die algemeen) en vergelykings met absolute waardes op te los;*
- *Kennis te demonstreer van inverse funksies en die grafieke van polinome;*
- *Kennis te demonstreer van trigonometriese funksies en identiteite;*
- *Algemene oplossings sowel as oplossings op 'n gegewe interval te vind van vergelykings in trigonometriese funksies;*
- *Kennis te demonstreer van die transformasie van funksies.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests

Assesseringsmetodes:

Formatief: *Teoretiese Klastoetse.*

WISS123	Semester 2	NQF Level: 5
Introduction to Mathematical Techniques II/ ***Inleiding tot Wiskundige Tegnieke II***		

WISS113,123 (Introduction to Mathematical Techniques I/II) are preparatory for the regular first level modules in Mathematics in order to achieve a level of mathematical skills.

WISS113,123 *(Inleiding tot Wiskundige Tegnieke I/II) is, ter voorbereiding vir die gewone eerstevlak modules in Wiskunde, om 'n vlak van wiskundige vaardigheid te bereik.*

Module outcomes:

Students should be able to:

- Demonstrate knowledge on an introductory level of functions, exponential laws, logarithmic laws and limit laws;
- Demonstrate knowledge on different types of graphs, solving systems of linear equations, linear programming problems in two variables, limits, analysing the rate of change of functions;
- Demonstrate knowledge on financial mathematics;
- Apply and demonstrate mathematical concepts and properties by simplifying expressions and solving linear and quadratic equations, linear inequalities, exponential equations and logarithmic equations.

Module-uitkomste:

Studente moet in staat wees om:

- *Kennis op inleidende vlak te demonstreer van funksies, eksponentwette, logaritme wette en limietwette;*
- *Kennis te demonstreer van verskillende tipes grafieke, oplos van stelsels van lineêre vergelykings, lineêre programmering in twee veranderlikes, limiete en die analisering van die tempo van verandering van funksies;*
- *Kennis te demonstreer van finansiële wiskunde;*
- *Wiskundige eienskappe en konsepte toe te pas en te demonstreer deur uitdrukkings te vereenvoudig, lineêre en kwadratiese vergelykings, lineêre ongelykhede, eksponensiële vergelykings en logaritmiese vergelykings op te los.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative: Class Tests

Assesseringsmetodes:

Formatief: *Teoretiese Klastoetse.*

NAS.2.9 MAINSTREAM MODULES / *HOOFSTROOM MODULES*

NAS.2.9.1 ACCOUNTING / REKENINGKUNDE

See the Faculty of Economic and Management Sciences yearbook for the module outcomes of ACCC; ACCF; ACCS; EKRP and FINM /

Sien die Fakulteit van Ekonomiese en Bestuurswetenskappe se jaarboek vir die module uitkomste van ACCC; ACCF; ACCS; EKRP en FINM.

NAS.2.9.2 ACADEMIC LITERACY / AKADEMIESE GELETTERDHEID

See the Faculty of Humanities yearbook for the module outcomes of ALDE and ALDA/

Sien die Fakulteit Geesteswetenskappe se jaarboek vir die module uitkomste van ALDE en ALDA.

NAS.2.9.3 BIOCHEMISTRY / *BIOCHEMIE*

BCDT311	**Semester 1**	**NQF Level: 7**
Nutritional Biochemistry/ ***Voedingsbiochemie***		

The main aim of this module is to provide you with the necessary background that will enable you to understand in detail the biochemical basis of health and disease with a specific focus on selected topics that are of primary interest to nutritional sciences.

Module outcomes:

After completion of the module, the student should be able to demonstrate the following for each of the selected topics:

- Knowledge and understanding of all biochemical principles and terminologies encountered.
- Knowledge and understanding of all biochemical/diagnostic methods encountered including the limitations of these.
- An ability to use mainstream genetic and biochemical databases and apply the attained information to theoretical clinical/biochemical problems.
- An ability to apply the above to theoretical clinical/biochemical problems that are of interest to nutrition.
- An ability to conduct focused literature searches where additional information is required.
- Accurate and coherent written and verbal communication via assignments/tasks with understanding of and respect for intellectual property conventions, copyright and rules on plagiarism.
- Active cooperation as a member and/or leader of a group to complete a task/assignment, and achieve the set outcome, accepting responsibility for own learning and co-responsibility for the outcome achieved by the group.

Die hoofdoel van hierdie module is om u die nodige agtergrond te gee om u in staat te stel om die biochemiese basis van gesondheid en siektes in detail te verstaan, met spesifieke fokus op geselekteerde onderwerpe wat vir die voedingswetenskappe van die grootste belang is.

Module-uitkomste:

Na voltooiing van die module, moet die student die volgende kan demonstreer vir elk van die geselekteerde onderwerpe:

- *Kennis en begrip van alle biochemiese beginsels en terminologieë.*
- *Kennis en begrip van alle biochemiese / diagnostiese metodes wat ondervind is, insluitend die beperkings hiervan.*
- *Die vermoë om hoofstroom genetiese en biochemiese databasisse te gebruik en die verkrygde inligting toe te pas op teoretiese kliniese / biochemiese probleme.*
- *Die vermoë om bogenoemde toe te pas op teoretiese kliniese / biochemiese probleme wat van belang is vir voeding.*

- *Die vermoë om gefokusde literatuursoektogte uit te voer waar aanvullende inligting benodig word.*
- *Akkurate en samehangende geskrewe en mondelinge kommunikasie via opdragte / take met begrip en respek vir konvensies vir intellektuele eiendom, outeursreg en plagiaatreëls.*
- *Aktiewe samewerking as lid en / of leier van 'n groep om 'n taak / opdrag uit te voer, en om die gestelde uitkoms te bereik, met verantwoordelikheid vir eie leer en medeverantwoordelikheid vir die uitkoms wat deur die groep bereik is.*

Method of delivery: Full time

Metode van aflewering: *Voltyds*

Assessment plan:

The student demonstrates his/her newly acquired knowledge and skills with regular formal formative assessments which includes tutorials and class tests on selected relevant topics and a semester test. A summative assessment in the form of a final exam is written to evaluate whether the student have mastered the module.

The final mark of the student will be calculated in the following way: The participation mark consists of the average of the class tests (50%) and the semester test (50%). A minimum participation mark of 40% is required for admission to the examination.

The participation and examination mark each contribute 50% to the final module mark.

Assesseringsplan:

Die student demonstreer sy / haar nuut verworwe kennis en vaardighede met gereelde formele formatiewe assesserings, wat tutoriale en klastoetse oor geselekteerde toepaslike onderwerpe en 'n semestertoets insluit. 'n Summatiewe assessering in die vorm van 'n eindeksamen word geskryf om te evalueer of die student die module bemeester het.

Die finale punt van die student word soos volg bereken: die deelnamepunt bestaan uit die gemiddelde van die klastoetse (50%) en die semestertoets (50%). 'n Minimum deelnamepunt van 40% word vereis vir toelating tot die eksamen.

Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

BCHF215	**Semester 1**	**NQF Level: 6**

Biochemistry for Health Sciences/

Biochemie vir Gesondheidswetenskappe

In this module, you will be studying the basic aspects of human biochemistry. The first half of this module focuses on molecules and processes involved in the flow of genetic information from DNA to proteins; whereas the emphasis is on chemical structures, metabolic processes and related medical conditions in the second half of the module. This basic knowledge of biochemistry is essential to health scientists of which the relevancy will be clarified in class.

Module outcomes:

After completion of the module, the student should:

- Demonstrate detailed knowledge on the flow of genetic information in the biosphere, including the structure and synthesis of nucleic acids and proteins.
- Be able to evaluate and discuss the biochemical basis for the presentation of certain medical conditions, keeping in mind the structure-function relationship of biomolecules.
- Be able to evaluate and apply selected biochemical analytical techniques to investigate nucleic acids and proteins.
- Be able to solve selected biochemical analytical problems.
- Evaluate, interpret and present data generated with selected biochemical analytical methods.
- Demonstrate an understanding of the ethical and professional conduct required of a biochemist

In hierdie module bestudeer u die basiese aspekte van menslike biochemie. Die eerste helfte van hierdie module fokus op molekules en prosesse wat betrokke is by die vloei van genetiese inligting vanaf DNA na proteïene; terwyl die klem op chemiese strukture, metaboliese prosesse en verwante mediese toestande in die

tweede helfte van die module val. Hierdie basiese kennis van biochemie is noodsaaklik vir gesondheidswetenskaplikes, waarvan die toepaslikheid in die klas uitgelig sal word.

Module-uitkomste:

Na voltooiing van die module behoort die student:

- *Gedetailleerde kennis van die vloei van genetiese inligting in die biosfeer te demonstreer, insluitend die struktuur en sintese van nukleïnesure en proteïene.*
- *Die biochemiese basis vir die presentering van sekere mediese toestande te kan evalueer en bespreek, met inagneming van die struktuur-funksie-verhouding van bio-molekules.*
- *Geselekteerde biochemiese analitiese tegnieke te evalueer en toe te pas om nukleïnesure en proteïene te ondersoek.*
- *Geselekteerde biochemiese analitiese probleme op te los.*
- *Data wat met geselekteerde biochemiese analitiese metodes gegenereer is, te evalueer, te interpreteer en aan te bied.*
- *Begrip te toon vir die etiese en professionele gedrag wat deur 'n biochemikus vereis word*

Method of delivery: Full time

Metode van aflewering: *Voltyds*

Assessment plan:

The student demonstrates his/her newly acquired knowledge and skills with regular formal formative assessments which includes assignments, tutorials, class tests, practical reports on selected relevant topics and a semester test. A summative assessment in the form of a final exam is written to evaluate whether the student have mastered the module.

This module consists of a theory (67%) and practical component (33%) which contribute to the participation mark. A minimum participation mark of 40% is required for exam admission.

Theory component: The theory participation mark consists of the average of the class tests (50%) and the semester test (50%).

Practical component: The practical participation mark consists of the average of the practical tests (50%) and the average of the two practical exams (50%). A minimum practical participation mark of 40% is required for examination participation.

The participation and examination mark each contribute 50% to the final module mark.

Assesseringsplan:

Die student demonstreer sy / haar nuut verworwe kennis en vaardighede met gereelde formele formatiewe assesserings wat werkopdragte, tutoriale, klastoetse, praktiese verslae oor geselekteerde toepaslike onderwerpe en 'n semestertoets insluit. 'n Summatiewe assessering in die vorm van 'n eindeksamen word geskryf om te evalueer of die student die module bemeester het.

Hierdie module bestaan uit 'n teorie (67%) en 'n praktiese komponent (33%) wat bydra tot die deelnamepunt. 'n Minimum deelnamepunt van 40% word vereis vir toelating tot die eksamen.

Teoriekomponent: Die teorie-deelnamepunt bestaan uit die gemiddelde van die klastoetse (50%) en die semestertoets (50%).

Praktiese komponent: Die praktiese deelnamepunt bestaan uit die gemiddelde van die praktiese toetse (50%) en die gemiddelde van die twee praktiese eksamens (50%). 'n Minimum praktiese deelnamepunt van 40% word vereis vir eksamen toelating.

Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

IBCH221	Semester 2	NQF Level: 6
Clinical Biochemistry/ ***Kliniese Biochemie***		

Module outcomes:

After the successful completion of this module, students should demonstrate:

- A basic pre-knowledge of proteins, enzymes and protein transporters and channels, metabolism and appropriate physiological topics.
- Detailed knowledge and an understanding of key terms, concepts, facts and principles of biochemical investigations, diagnostic accuracy, the chemical and physiological mechanisms that underlie homeostasis, the ethology, pathogenesis, biochemical pathology, clinical features and basic treatments of relevant disease conditions relevant to clinical biochemistry and how conditions relate to nursing and dietetics.
- An ability to select and apply appropriate procedures and methods to obtain samples for biochemical analyses.
- Accurate and coherent written and verbal communication via assignments/tasks with an understanding of and respect for intellectual property conventions, copyright and plagiarism.
- An active cooperation as members and/or leaders of a group to complete tasks/assignments and to achieve the set outcomes by accepting responsibility for their own learning and co-responsibility for the outcomes achieved in a group.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

The outcomes have been mastered when students can:

- Identify/describe/explain key terms, concepts, facts and principles of biochemical investigations, diagnostic accuracy, the chemical and physiological mechanisms that underlie homeostasis, the ethology, pathogenesis, biochemical pathology, clinical features and basic treatments of relevant disease conditions relevant to clinical biochemistry and how these conditions relate to nursing and dietetics.
- Interpret hypothetical laboratory reports.
- Describe/explain appropriate procedures and methods to obtain samples for an analysis in a biochemistry laboratory.
- Explain the ethical aspects to be taken into account regarding clinical biochemistry as well as respect for the basic human rights of healthcare users.
- Apply accurate and coherent written and verbal communication skills to report clinical biochemistry information.
- Obtain information from a variety of scientific sources in the preparation and presentation of written and verbal work.
- Utilise group activities/task achievements as a learning opportunity by being actively involved and in making a sensible contribution towards the achievement of the set outcomes of a working/study group.

BCHN213	Semester 1	NQF Level: 6
Introductory Biochemistry/ ***Inleidende Biochemie***		

Module outcomes:

After completion of the BCHN213 module, the student should:

- Demonstrate detailed knowledge on the flow of genetic information in the biosphere, including the structure and synthesis of nucleic acids and proteins.
- Be able to evaluate and apply selected biochemical analytical techniques to investigate nucleic acids and proteins.

- Be able to solve selected biochemical analytical problems.
- Evaluate, interpret and present data generated with selected biochemical analytical methods.
- Demonstrate an understanding of the ethical and professional conduct required of a biochemist.

Module-uitkomste:

Na voltooiing van die BCHN213 module, behoort die student die volgende te kan demonstreer:

- *In diepte kennis van die vloei van genetiese informasie in die biosfeer, insluitende die struktuur en sintese van nukleïnesure en proteïene.*
- *Die vermoë om geselekteerde biochemiese analitiese tegnieke te gebruik om nukleïnesure en proteïene mee te ondersoek.*
- *Die vermoë om geselekteerde biochemiese analitiese probleme te kan oplos.*
- *Evalueer, interpreteer en aanbied van data wat verkry is deur geselekteerde biochemiese analitiese tegnieke.*
- *Insig van die etiese en professionele gedrag wat van 'n biochemikus vereis word*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative:

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

Theory component (67%): The theory participation mark consists of the average of the class tests (50%) and the semester test (50%).

Practical component (33%): The practical participation mark consists of the average of the practical assignments (50%) and the average of the two practical exams (50%). A minimum practical participation mark of 40% is required for examination participation.

The theory (67%) and practical (33%) components contribute to the participation mark. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark.

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Teorie komponent (67%): Die teorie deelnamepunt bestaan uit die gemiddeld van die klastoetse (50%) en die semestertoets (50%).

Praktiese komponent (33%): Die praktiese deelnamepunt bestaan uit die gemiddeld van die praktiese werkopdragte (50%) en die gemiddeld van die twee praktiese eksamens (50%). 'n Minimum praktiese deelnamepunt van 40% word vereis vir eksaminering.

Die teorie (67%) en praktiese (33%) komponente dra by tot die deelnamepunt. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt

BCHN214	Semester 1	NQF Level: 6
Biochemistry for Animal Health		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate:

- Detailed knowledge and clear understanding of on the flow of genetic information in the biosphere, including the structure and synthesis of nucleic acids and proteins.
- Ability to apply selected biochemical analytical techniques to investigate nucleic acids and proteins
- Ability to solve selected biochemical analytical problems.
- Ability to evaluate, interpret and present data generated with selected biochemical analytical methods and clinical biochemistry

Method of delivery: Full Time

The student will prove that he/she has attained the outcomes of the module when the student can:

- Explain composition, structure and function of the major groups of molecules in cells; nucleic acids, proteins, carbohydrates and lipids and also Identify metabolic pathways
- Summarise the relationship between chemical structure and biological function
- Explain the flow of genetic information in the biosphere, including the structure and synthesis of nucleic acids and proteins.
- Perform basic biochemical analytical techniques to investigate nucleic acids and proteins in case studies, critically examine biochemical analytical problems and suggest solutions
- Evaluate, interpret and present data generated with selected biochemical analytical methods and clinical biochemistry.

BCHN222	Semester 2	NQF Level: 6
Metabolism/ ***Metabolisme***		

Module outcomes:

After completion of the BCHN222 module, the student should demonstrate:

- Integrated knowledge of the core reactions of metabolism to form the basis to accumulate specialized knowledge in any of the biological sciences like microbiology, zoology, botany and physiology;
- Proficient knowledge to evaluate the contribution of food groups to energy productive metabolism under normal and abnormal conditions;
- Proficient knowledge to be able to predict the effect of an inherited or an induced change in the activity of an enzyme and the effect it would have on a metabolic pathway and eventually the total metabolism and;
- Proficient skills to compile a testing regime to test the change in the metabolic profile using initial simple screening tests followed by more complex diagnostic tests;
- The ability to demarcate the results of an abnormal metabolic profile according to known diagnostic profiles of abnormalities and which and how confirmation analyses could be done in selected cases;
- To have the ability to write a report as if in an advisory position (e.g. Doctor, pharmacists, biochemist, dietician) to explain abnormal results in layman's terms so that it can be understood, without having any background knowledge of the abnormality;
- And understanding of the safety, ethical and professional conduct required of a professional analytical biochemist. /

Module-uitkomste:

Na voltooiing van die module BCHN222, behoort die student:

- *Geïntegreerde kennis te hê van die kern reaksies van metabolisme om die basis te vorm vir die versameling van gespesialiseerde kennis in enige van die biologiese wetenskappe soos mikrobiologie, dierkunde, plantkunde en fisiologie;*

- *Voldoende kennis te hê om die bydrae van voedsel groepe tot energie produksie te evalueer onder normale en abnormale omstandighede;*
- *Die vermoë hê om te voorspel watter effek aangebore of geïnduseerde veranderinge van 'n ensiem se aktiwiteit sal hê op die metaboliese weë en die totale metabolisme;*
- *Voldoende vaardighede om 'n siftings program saam te stel om die verandering van 'n metaboliese profiel te evalueer gevolg deur meer komplekse diagnostiese toetse;*
- *Die vermoë hê om 'n abnormale metaboliese profiel te evalueer op grond van bekende diagnostiese profiele en abnormaliteite en die kennis van watter en hoe bevestigende analises uitgevoer kan word op geselekteerde gevalle;*
- *Om die vermoë te hê om 'n verslag te skryf in 'n raadgewende hoedanigheid (bv. Dokter, apteker, biochemikus, dieetkundige) om die abnormale resultate te verduidelik in eenvoudige terme;*
- *Begrip te hê van veiligheids-, etiese- en professionele gedrag wat verwag word van 'n professionele analitiese biochemikus.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative:

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

The semester test will count one third, the practical examination a third and the other third will be compiled from the ongoing evaluation marks received inter alia for class tests and assignments. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark.

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Die semestertoets sal een derde tel, die praktiese eksamen 'n derde en die ander derde sal saamgestel word uit die deurlopende evalueringspunte wat onder andere ontvang word vir klastoetse en opdragte. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

BCHS316	**Semester 1**	**NQF Level: 7**
Enzymology/ ***Ensimologie***		

Module outcomes:

After completion of the BCHS316 module, the student should demonstrate:

- Detailed knowledge and understanding of the following key areas of enzymology:
  - the history, nomenclature and structure-function relationship of enzymes;

- the concepts of catalysis and kinetics of single- and multi-substrate enzyme-catalysed reactions;
- enzyme inhibition and its relevance;
- the characteristics of allosteric enzymes, sigmoidal behaviour of enzymes.

- An integrated knowledge of how these concepts play a role in metabolism.
- The skills to independently gather knowledge of these concepts using all available sources.
- Detailed knowledge and understanding of the various experimental approaches to characterise enzyme kinetics, the ability to theoretically solve enzyme kinetic problems and critically evaluate the methods used for solving these problems.
- Skills related to experimental practice, under appropriate supervision, by following the necessary procedures and methods to effectively execute and complete enzyme kinetics experiments, effectively report on the experimental findings, and to deduce conclusions accurately.
- An understanding of the ethical and professional conduct required of a biochemist and the ethical issues that arise from work where enzymology is applied. /

Module-uitkomste:

Na voltooiing van die BCHS316 module, behoort die student die volgende te demonstreer:

- *In diepte kennis en insig van die volgende hoof areas van ensimologie:*
  - *die geskiedenis, nomenklatuur en struktuur-funksie verwantskap van ensieme;*
  - *die konsepte van katalise en kinetika van een- en multi-substraat ensiemgekataliseerde reaksies;*
  - *ensiem-inhibisie en die relevansie daarvan*
  - *die eienskappe van allosoteriese ensieme en sigmoïdale gedrag van ensieme.*
- *Geïntegreerde kennis van die rol wat hierdie konsepte in die metabolisme speel.*
- *Die vaardighede om op ’n onafhanklike wyse kennis te bekom deur van alle bestaande bronne gebruik te maak.*
- *In diepte kennis en insig van die onderskeie eksperimentele benaderings om ensiemkinetika te karakteriseer, die vermoë om teoretiese probleme in ensiemkinetika te kan oplos asook die vermoë om die metodes wat gebruik word om hierdie probleem op te los krities te kan evalueer.*
- *Vaardighede beskik oor eksperimentele praktyke en, onder gepaste toesig, die nodige prosedures en metodes te volg ten einde ensiemkinetika eksperimente effektief uit te voer en te voltooi, eksperimentele bevindinge effektief te rapporteer en om konklusies akkuraat te maak;*
- *Insig van die etiese en professionele gedrag wat van ’n biochemikus vereis word, asook die etiese kwessies wat mag voortspruit uit toepassings van ensimologie*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative:

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

The semester test will count one third, the practical examination a third and the other third will be compiled from the ongoing evaluation marks received inter alia for class tests and assignments. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark. /

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Die semestertoets sal een derde tel, die praktiese eksamen 'n derde en die ander derde sal saamgestel word uit die deurlopende evalueringspunte wat onder andere ontvang word vir klastoetse en opdragte. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

BCHS317	Semester 1	NQF Level: 7
Molecular Biology/ ***Molekulêre Biologie***		

Module outcomes:

After completion of the BCHS317 module, the student should demonstrate:

- Detailed knowledge and understanding of the following key areas of biochemistry: 1) the genome structure of eukaryotes; 2) the unlocking of genetic information in eukaryotic cells; 3) the regulation of unlocking of genetic information in eukaryotic cells; 4) the fundamentals and applications of recombinant DNA technology
- An integrated knowledge of how these concepts play a role in biochemistry and biotechnology
- Detailed knowledge and understanding of the various experimental methods and approaches in molecular biology, the ability to theoretically solve biological problems and critically evaluate the methods used for solving these problems
- Skills related to experimental practice, under appropriate supervision, by following the necessary procedures and methods to effectively execute and complete experiments to obtain, manipulate and transfer genetic material between organisms, determine the methylation status of genomic DNA and the ability to effectively interpret, report on the experimental findings, and to deduce conclusions accurately.
- An understanding of the ethical and professional conduct required of a biochemist and the ethical issues that arises from work where biochemistry and molecular biology is applied. /

Module-uitkomste:

Na voltooiing van die BCHS317 module, behoort die student die volgende te demonstreer:

- *In diepte kennis en insig van die volgende hoof areas van biochemie: 1) die genoomstruktuur van eukariote; 2) die ontsluiting van genetiese inligting in eukariotiese selle; 3) die regulering van die ontsluiting van genetiese inligting in eukariotiese selle; 4) die beginsels en toepassings van rekombinante DNA tegnologie*
- *'n Geïntegreerde kennis van die rol wat hierdie konsepte in biochemie en biotegnologie speel*
- *In diepte kennis en insig van die onderskeie eksperimentele metodes en benaderings in molekulêre biologie, die vermoë om biologiese probleme teoreties op te los asook die vermoë om die metodes wat gebruik word om hierdie probleme op te los krities te kan evalueer*
- *Vaardighede om eksperimentele praktyke en, onder gepaste toesig, die nodige prosedures en metodes te volg ten einde eksperimente om genetiese materiaal te bekom, te manipuleer en tussen organismes oor te dra en die metilerings status van genomiese DNA te bepaal, effektief uit te voer en te voltooi, eksperimentele bevindinge effektief te rapporteer en om gevolgtrekkings akkuraat te maak*
- *Insig van die etiese en professionele gedrag wat van 'n biochemikus vereis word, asook die etiese kwessies wat vanuit toepassings van biochemie en molekulêre biologie mag onstaan*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative:

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

The semester test will count one third, the practical examination a third and the other third will be compiled from the ongoing evaluation marks received inter alia for class tests and assignments. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark. /

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Die semestertoets sal een derde tel, die praktiese eksamen 'n derde en die ander derde sal saamgestel word uit die deurlopende evalueringspunte wat onder andere ontvang word vir klastoetse en opdragte. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

BCHS321	**Semester 2**	**NQF Level: 7**

Analytical Biochemistry/

Analitiese Biochemie

Module outcomes:

After completion of the BCHS321 module, the student should be able to demonstrate:

- He/she has detailed knowledge to (i) use important characteristics of proteins for the process of protein isolation and characterization and isolation efficacy evaluation, (ii) understand the concept of chromatographic separation and to demonstrate how knowledge of chemical characteristics of unknown compounds can be applied to predict chromatographic elution order of complex biological mixtures under specific chromatographic conditions, (iii) apply knowledge of centrifugation techniques to separate cell organelles and more specifically to progress to the level of protein separation by applying certain concepts of centrifugation, (iv) basic functioning of mass spectrometry, description of specific ionization techniques, application in the analytical environment and the types of molecules which can be analysed with mass spectrometry and the application of mass spectrometry to identify and quantify unknown metabolites. (v) application of electrophoresis techniques for the separation and identification of biological molecules, (vi) evaluation and selection of the most suitable analytical technique for a specific technique based on detailed knowledge of analytical biochemistry;
- He/she has problem solving skills with regard to the application of analytical techniques in practice. This includes the interpretation of data on qualitative and quantitative level and the ability to critically evaluate the results;
- He/she can apply the concept of good laboratory practice in the experimental process, in data generation and communication of results with good supportive arguments;
- He/she can independently use additional sources of knowledge and information like scientific publications, books and the internet to evaluate results critically;

- He/she is familiar with the implication of ethics and professional practice in the application of analytical biochemistry. /

Module-uitkomste:

Na voltooiing van die BCHS321 module, behoort die student te kan demonstreer dat:

- *Hy/sy oor geïntegreerde kennis beskik om (i) belangrike eienskappe van proteïene te kan benut vir die proses van proteïen isolasie en karakterisering en die mate van sukses in die isolasie proses te kan evalueer (ii) die beginsels waarop chromatografiese skeidings berus te verstaan en aan te toon hoedat chemiese eienskappe van onbekende verbindings gebruik kan word om chromatografiese skeiding te voorspel van komplekse biologiese mengsels onder spesifieke chromatografiese kondisies (iii) kennis van sentrifugerings tegnieke te kan aanwend om selorganelle van mekaar te kan skei en meer spesifiek tot op die vlak van proteïen skeiding te kan vorder deur sekere beginsels van sentrifugering toe te pas. (iv) massaspektrometrie se basiese werking te kan beskryf en meer spesifiek sekere ionisasie tegnieke in detail te kan beskryf, hoedat hierdie tegniek aangewend kan word in die analitiese omgewing, tipes verbindings wat hierdeur geïdentifiseer kan word en die gebruik van hierdie tegniek om onbekende metaboliete te identifiseer en te kwantifiseer. (v) elektroforetiese tegnieke te kan aanwend vir die skeiding en identifisering van biologiese molekules. (vi) evaluering van die mees geskikste analitiese tegniek vir ’n spesifieke eksperiment te kan uitvoer en motiveer op grond van in diepte kennis van analitiese biochemie;*
- *Hy/sy oor probleemoplossing vaardighede beskik met betrekking tot die toepassing van die analitiese tegnieke in die praktyk. Dit sluit verder die vermoë in om data beide op kwalitatiewe en kwantitatiewe vlak te kan interpreteer en krities te besin oor die resultaat;*
- *Hy/sy, die beginsels van goeie laboratorium praktyk sal toepas in die eksperimentele proses, in data generering en kommunikasie en afleidings oor resultate te staaf met deurdagte argumente;*
- *Hy/sy addisionele kernbronne soos boeke, wetenskaplike publikasies en die internet selfstandig te kan raadpleeg om resultate krities te beoordeel;*
- *Hy/sy die implikasie van etiek en professionele praktyk in die toepassing van analitiese biochemie begryp en in beginsel kan aanwend.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative:

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

Class tests will form 40% of the participation mark and 60% will be compiled from the ongoing evaluation marks received inter alia for assignments. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark. /

Assesseringsmetodes:

Formele Formatief

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Klastoetse sal 40% van die deelname punt uitmaak en 60% sal saamgestel word uit die deurlopende evalueringspunte wat onder andere ontvang word vir opdragte. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

BCHS322	**Semester 2**	**NQF Level: 7**

Biochemistry Research Project/
Biochemie Navorsingsprojek

Module outcomes:

After completion of the module BCHS322, the student should demonstrate:

- Sufficient knowledge of the integrated theoretic and practical principles and considerations for planning and carrying out a research project in Biochemistry;
- The ability to assimilate multiple sources of knowledge such as books, journals and the internet on particular topics within the field of Biochemistry, and critically evaluate, review and integrate this knowledge to prepare a literature study and motivate a research proposal;
- Integrated knowledge and understanding of the theoretical basis and applications of appropriate analytical equipment and methods that are used in the projects
- The ability to design project-oriented experiments, identify appropriate methods and perform experiments and carry out a small research project in group context, under appropriate supervision;
- The ability to critically evaluate, interpret, present and communicate results of experiments in the form of preparing and presenting a research poster;
- The ability to identify ethical issues in biological research and have an understanding of professional conduct required of a professional biochemist. /

Module-uitkomste:

Na voltooiing van die module BCHS322, behoort die student bewys te lewer van:

- *Genoegsame kennis van die geïntegreerde teoretiese en praktiese beginsels en oorwegings vir die beplanning en uitvoering van `n navorsingsprojek in Biochemie;*
- *Die vermoë om ’n verskeidenheid bronne wat inligting en kennis bevat, soos boeke, joernale en die internet oor ’n spesifieke onderwerp in Biochemie saam te stel, krities die inligting te evalueer en die kennis te kan integreer in ’n literatuuroorsig en ’n navorsingsvoorstel te kan motiveer;*
- *Geïntegreerde kennis en begrip van die teoretiese basis en toepassings van geskikte analitiese apparaat en metodes wat in die projekte gebruik word;*
- *Die vermoë om projek georiënteerde eksperimente te kan ontwerp, toepaslike metodes te identifiseer en ’n klein navorsingsprojek in groepsverband onder geskikte toesig te kan uitvoer;*
- *Die vermoë om resultate van eksperimente krities te kan evalueer, interpreteer, aanbied en kommunikeer in die vorm van die voorbereiding van en aanbied van ’n plakkaat;*
- *Die vermoë om etiese kwessies in biologiese navorsing te kan identifiseer en ’n begrip te hê van die etiese en professionele gedrag wat van ’n professionele biochemikus verwag kan word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments, tutorials and practical reports on selected relevant topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assessment Plan:

Class tests will form 40% of the participation mark and 60% will be compiled from the oral presentation of the research project. A minimum participation mark of 40% is required for examination participation. The participation and examination mark each contribute 50% to the final module mark. /

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte, tutoriale en praktiese verslae oor geselekteerde relevante onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assesseringsplan:

Klastoetse sal 40% van die deelname punt uitmaak en 60% sal saamgestel word uit die mondelinge voordrag van die navorsings projek. 'n Minimum deelnamepunt van 40% word vereis vir eksaminering. Die deelnamepunt en eksamenpunt dra elk 50% by tot die finale modulepunt.

MCBN111/ MCBN171	**Semester 1**	**NQF Level: 5**
Molecular and Cell Biology I/ ***Molekulêre en Selbiologie I***		

Module outcomes:

After completion of the MCBN111 module, the student should:

- Know and be able to use the relevant terminology of Cell Biology;
- Demonstrate basic knowledge of the biology of the cell, including (1) the composition of the cell, (2) functions and organisation of various cellular components such as the cell membrane, organelles, cell wall and the cytoskeleton (3) cell-cell interactions;
- Be able to demonstrate basic theoretical skills regarding cell biology investigation techniques and scientific approaches;
- Have a basic knowledge of the scientific method in science.

Module-uitkomste:

Na voltooiing van die MCBN111 module, behoort die student die volgende te kan demonstreer:

- *Kennis van, en die vermoë om, relevante terminologie van Selbiologie te gebruik;*
- *Basiese kennis van die biologie van die sel, insluitende (1) die samestelling van die sel, (2) funksies en organisasie van verskeie sellulêre komponente soos die selmembraan, organelle, die selwand en die sitoskelet (3) sel-sel interaksies;*
- *Basiese teoretiese vaardighede kan demonstreer soos gebruik in selbiologiese ondersoeke asook wetenskaplike benaderinge;*
- *'n Basiese kennis te hê van die wetenskaplike metode.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria

Candidates have mastered the outcomes if they are able to:

Use the relevant terminology of Cell Biology

Demonstrate basic knowledge of the biology of the cell, including (1) the composition of the cell, (2) functions and organisation of various cellular components such as the cell membrane, organelles, cell wall and the cytoskeleton (3) cell-cell interactions.

Demonstrate basic theoretical skills regarding cell biology investigation techniques and scientific approaches

Demonstrate a basic knowledge of the scientific method in science.

Assesseringskriteria

Kandidate het die uitkomste bemeester indien hulle in staat is om:

Die relevante terminologie van selbiologie te gebruik

Basiese kennis van die biologie van die sel te demonstreer, insluitende (1) die samestelling van die sel, (2) funksies en organisasie van verskeie sellulêre komponente soos die selmembraan, organelle, selwand en die sitoskelet (3) sel-sel interaksies.

Basiese teoretiese vaardighede rakende selbiologie-ondersoektegnieke en wetenskaplike benaderings te demonstreer

'n Basiese kennis van die wetenskaplike metode in die wetenskap te demonstreer.

Assessment Methods:

Formal Formative

The student demonstrates his/her newly acquired knowledge and skills by submitting reports on selected relevant cell biology topics.

Summative:

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate.

Assesseringsmetodes:

Formele Formatief:

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur verslae oor geselekteerde relevante selbiologie onderwerpe in te dien.

Opsommend:

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assessment Plan:

The participation mark consists of the average of the class tests, assignments and tutorials (50%) and the semester test (50 %)

A minimum participation mark of 40 % is required for examination participation.

The participation mark and exam will each contribute 50 % to the module mark.

Asseseringsplan:

Die deelnamepunt bestaan uit die gemiddeld van die klastoetse, opdragte en tutoriale (50%) en die semestertoets (50%).

'n Minimum deelnamepunt van 40 % word benodig vir eksamentoelating.

Die deelnamepunt en eksamen dra elk 50 % by tot die modulepunt.

MCBN121/ MCBN172	Semester 2	NQF Level: 5
Molecular and Cell Biology II/ ***Molekulêre en Selbiologie II***		

Module outcomes:

Students should be able to:

- Demonstrate basic knowledge on the cell, including (1) biomolecules, (2) molecular genetics, (3) energetics, and (4) metabolic reactions and enzymes;
- Demonstrate basic theoretical skills regarding cell biology investigation techniques and scientific approaches;
- Have a basic knowledge of the scientific method in science.

Module uitkomste:

Studente moet in staat wees om:

- *Basiese kennis van die sel, insluitende (1) bio-molekules, (2) molekulêre genetika, (3) energetika, en (4) metaboliese reaksies en ensieme te openbaar;*
- *Basiese teoretiese vaardighede kan demonstreer, soos gebruik in selbiologiese ondersoeke asook wetenskaplike benaderinge*
- *'n Basiese kennis te hê van die wetenskaplike metode.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria

Candidates have mastered the outcomes if they are able to:

- Demonstrate basic knowledge on the cell, including (1) biomolecules, (2) molecular genetics, (3) energetics, (4) metabolic reactions and enzymes.
- Demonstrate basic theoretical skills regarding cell biology investigation techniques and scientific approaches
- Demonstrate a basic knowledge of the scientific method in science. /

Assesseringskriteria

Kandidate het die uitkomste bemeester indien hulle in staat is om:

- *Basiese kennis van die sel te demonstreer, insluitend (1) bio-molekules, (2) molekulêre genetika, (3) energetika, (4) metaboliese reaksies en ensieme.*
- *Basiese teoretiese vaardighede rakende selbiologie-ondersoektegnieke en wetenskaplike*
- *benaderings te demonstreer*
- *Basiese kennis van die wetenskaplike metode in die wetenskap te demonstreer*.

Assessment Methods – Formal Formative

The student demonstrates his/her newly acquired knowledge and skills by submitting assignments and tutorials on selected relevant cell biology topics. /

Assessment Methods – Summative

Summative assessments are in the form of written class tests, a semester test and a final exam to be completed by each candidate. /

Assesseringsmetodes – Formele Formatief

Die student demonstreer sy / haar nuut verwerfde kennis en vaardighede deur opdragte en tutoriaal verslae oor geselekteerde relevante selbiologie-onderwerpe in te dien.

Assesseringsmetodes – Opsommend

Opsommende assesserings is in die vorm van skriftelike klastoetse, 'n semestertoets en 'n finale eksamen wat deur elke kandidaat voltooi moet word.

Assessment Plan

The participation mark consists of the average of the class tests, assignments and tutorials (50%) and the semester test (50 %)

A minimum participation mark of 40 % is required for examination participation.

The participation mark and exam will each contribute 50 % to the module mark. /

Assesseringsplan

Die deelnamepunt bestaan uit die gemiddeld van die klastoetse, opdragte en tutoriale (50%) en die semestertoets (50%).

'n Minimum deelnamepunt van 40 % is nodig vir eksamentoelating.

Die deelnamepunt en eksamen dra elk 50 % by tot die modulepunt.

NAS.2.9.4 BUSINESS MATHEMATICS AND INFORMATICS / *BEDRYFSWISKUNDE EN INFORMATIKA*

BWIA111	**Semester 1**	**NQF Level: 5**
Introduction to Financial Mathematics/ ***Inleiding tot Finansiële Wiskunde***		

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate knowledge and informed understanding of the time value of money, present and future values, nominal and effective interest rates, annuities and loans.
- Demonstrate an ability to select, apply and interpret standard compound interest functions to calculate the present value and accumulated value of a single and recurring cash flows at a specified rate of interest.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Kennis en ingeligte begrip van die tydwaarde van geld, huidige en toekomstige waardes, nominale en effektiewe rentekoerse, annuïteite en lenings te demonstreer.*
- *'n Vermoë te demonstreer om standaardfunksies van saamgestelde rente vir die berekening van huidige en geakkumuleerde waarde van 'n enkele en herhalende kontantvloei te selekteer, toe te pas en te interpreteer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Explain the basic principles of interest rates and the time value of money.
- Calculate the present value and accumulated value of a single and recurring cash flows at a specified rate of interest.
- Calculate the repayments due under different types of loan structures.
- Use continuous interest rates to calculate the present value and accumulated value of a single and recurring cash flows. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Die basiese beginsels van rentekoerse en die tydwaarde van geld te verduidelik.*
- *Die huidige en geakkumuleerde waarde van 'n enkele en herhalende kontantvloei teen 'n spesifieke rentekoers te bereken.*

- *Die terugbetalings in terme van verskillende tipes leningstrukture te bereken.*
- *Kontinue rentekoerse te gebruik om die huidige en geakkumuleerde waarde van 'n enkele en herhalende kontantvloei te bereken.*

Assessment modes:

Formative: Class tests and Practical assignments. Summative: Formal examination.

Assesseringsmetodes:

Formatief: Klastoetse en Praktiese Take. Summatief: Formele eksamen:

BWIA121	**Semester 2**	**NQF Level: 5**
Introduction to Actuarial Science/ ***Inleiding tot Aktuariële Wetenskap***		

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate knowledge and informed understanding of the time value of money, present and future values, nominal and effective interest rates, annuities and loans and use standard actuarial notation to describe these.
- Demonstrate the ability to formulate and mathematically model financial planning problems by means of a suitable computer-based implementation and the ability to communicate the results in an effective way.
- Demonstrate knowledge and informed understanding of financial risk and how it applies to different financial institutions, including insurance companies, banks and pension schemes.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Kennis en ingeligte begrip van die tydwaarde van geld, huidige en toekomstige waardes, nominale en effektiewe rentekoerse, annuïteite en lenings te demonstreer en standaard aktuariële notasie te gebruik om dit te beskryf.*
- *Die vermoë te demonstreer om finansiële beplanningsprobleme te formuleer en wiskundig te modelleer deur die gebruik van 'n toepaslike rekenaargebaseerde toepassing, en die resultate op 'n effektiewe wyse te kommunikeer.*
- *Kennis en ingeligte begrip te demonstreer van finansiële risiko en hoe dit van toepassing is op verskillende finansiële instellings, insluitende versekeringsmaatskappye, banke en pensioenskemas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria

Students have mastered the outcomes if they are able to:

- Define and use standard actuarial notation to calculate the present value and accumulated value of a single and recurring cash flows at a specified rate of interest, including continuous interest rates.
- Solve simple financial planning problems by means of a suitable software-based implementation and communicate the results in written and verbal form.
- Describe fundamental financial terms and explain the use and function of basic financial products.
- Identify the different types of financial risks faced by the providers of financial products and different ways in which they can be managed.
- Explain the role of actuaries, risk managers and data scientists in the financial sector. /

Assesseringskriteria

Studente het die uitkomste bemeester as hulle in staat is om:

- *Standaard aktuariële notasie vir die berekening van die huidige en geakkumuleerde waarde van 'n enkele en herhalende kontantvloei teen 'n spesifieke rentekoers, insluitend kontinue rentekoerse, te definieer en te gebruik.*
- *Eenvoudige finansiële beplanningsprobleme deur middel van 'n toepaslike programgebaseerde toepassing op te los en die resultate in skriftelike en mondelinge vorm te kommunikeer.*
- *Fundamentele finansiële terme te beskryf en die gebruik en funksies van basiese finansiële produkte te verduidelik.*
- *Die verskillende tipes finansiële risiko's vir verskaffers van finansiële produkte, en die wyses waarop dit bestuur kan word, te identifiseer.*
- *Die rol van aktuarisse, risikobestuurders en datawetenskaplikes in die finansiële sektor te verduidelik.*

Assessment modes:

Formative: Class tests and Practical Project. Summative: Formal examination.

Assesseringsmetodes:

Formatief: Klastoetse en Praktiese Projek. Summatief: Formele eksamen.

BWIA272	**Year module**	**NQF Level: 6**
Financial Mathematics/ ***Finansiële Wiskunde***		

Module outcomes:

After completion of the module, the student should be able to:

- Describe the basic principles of financial modelling, including how to use a generalised cash flow model to describe and value financial transactions.
- Demonstrate detailed knowledge and understanding of the process of data analysis and the characteristics of different data sources, including extremely large data sets.
- Demonstrate detailed knowledge and understanding of the time value of money, real and money interest rates, the term structure of interest rates.
- Demonstrate detailed knowledge and understanding of duration, convexity and how these can be used in the immunization of cash flows.
- Use discounted cash flows and the concept of equation of value to solve various practical problems of varying complexity.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Conduct data analyses to solve real-world problems in a scientific manner and describe tools suitable for each stage.
- Show how interest rates can be expressed in different time periods.
- Define and derive commonly used compound interest functions and use these to calculate the present value and accumulated value for a given stream of cash flows under a combination of scenarios.
- Apply discounted cash flow techniques to the valuation of securities, including the effects of taxation.
- Evaluate the duration and convexity of a cash flow sequence and explain how these are used in the immunization of a portfolio of liabilities.
- Calculate different financial metrics to evaluate the profitability and suitability of an investment project, including net present value, internal rate of return, payback period and discounted payback period.

Assessment modes:

Formative: Class tests and Practical assignments. Summative: Formal examination.

Assesseringsmetodes:

Formatief: Klastoetse en Praktiese Take. Summatief: Formele eksamen.

BWIA273	**Year module**	**NQF Level: 6**

Basics of Financial Mathematics/

Basiese Finansiële Wiskunde

Module outcomes:

After completion of the module, the student should be able to:

- Describe the basic principles of financial modelling, including how to use a generalized cash flow model to describe and value simple financial transactions.
- Demonstrate knowledge and understanding of the process of data analysis and the characteristics of different data sources, including extremely large data sets.
- Demonstrate knowledge and understanding of the time value of money, real and money interest rates and the term structure of interest rates.
- Use discounted cash flows and the concept of equation of value to solve various practical problems.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Die basiese beginsels van finansiële modellering te kan beskryf en finansiële transaksies met behulp van 'n algemene kontantvloei model te beskryf en te waardeer.*
- *Kennis en begrip van die proses van data-ontleding asook die eienskappe van verskillende databronne, insluitend uiters groot datastelle, te toon.*
- *Kennis en begrip van die tydwaarde van geld, reële en geld rentekoerse, die termynstruktuur van rentekoerse te toon.*
- *Verdiskonteerde kontantvloei en die konsep van waardevergelyking te gebruik om verskeie praktiese probleme van wisselende kompleksiteit op te los.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Show a basic understanding of data analysis to solve real-world problems in a scientific manner and describe tools suitable for each stage.
- Show how interest rates can be expressed in different time periods.
- Define and derive commonly used compound interest functions and use these to calculate the present value and accumulated value for a given stream of cash flows under a combination of scenarios.
- Apply discounted cash flow techniques to the valuation of securities.
- Calculate different financial metrics to evaluate the profitability and suitability of an investment project, including net present value, internal rate of return, payback period and discounted payback period. /

Assesseringskriteria:

Studente het die uitkomste bemeester indien hulle in staat is om:

- *'n Basiese begrip van data-analise kan toon om werklike probleme op wetenskaplike wyse op te los en tegnieke kan beskryf wat geskik is vir elke stadium.*
- *Aan te toon hoe rentekoerse in verskillende tydperke uitgedruk kan word.*
- *Algemeen gebruikte saamgestelde rente funksies te kan definieer en af te lei en dit kan gebruik om die huidige waarde en opgehoopte waarde vir 'n gegewe stroom kontantvloei te bereken onder 'n kombinasie van scenario's.*
- *Verdiskonteerde kontantvloei tegnieke vir die waardasie van sekuriteite te kan gebruik.*

- *Verskillende finansiële statistieke kan bereken om die winsgewendheid en geskiktheid van 'n beleggingsprojek te evalueer, insluitend netto huidige waarde, interne opbrengskoers terugbetalingsperiode en verdiskonteerde terugbetalingsperiode.*

Assessment modes:

Formative: Class tests and Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

BWIA313	**Semester 1**	**NQF Level: 7**

Actuarial Statistical Models/
Aktuariële Statistiese Modelle

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate integrated knowledge and understanding of statistical distributions for risk modelling, with and without risk sharing, including the assumptions underlying different statistical models.
- Demonstrate the ability to identify and apply the most suitable statistical methods for a broad range of general insurance problems.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Geïntegreerde kennis en begrip te demonstreer van statistiese verspreidings vir risiko modellering, met en sonder risiko deling, insluitende die aannames onderliggend aan verskillende statistiese modelle.*
- *Die vermoë te demonstreer om die mees toepaslike statistiese metodes te identifiseer en toe te pas vir 'n breë spektrum van korttermyn versekeringsprobleme.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Describe the properties of the statistical distributions which are suitable for modelling individual and aggregate losses.
- Use an appropriate statistical software package to fit a statistical distribution to a dataset and calculate appropriate goodness of fit measures.
- Describe the effect of risk-sharing arrangements such as excesses and simple forms of proportional and excess of loss reinsurance.
- Discuss the concepts of risk models and compound distributions and apply these to practical actuarial problems.
- Recognise extreme value distributions, suitable for modelling the distribution of severity of loss and their relationships.
- Explain and apply elementary principles of machine learning. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Die kenmerke van statistiese verspreidings te beskryf wat paslik is vir die modellering van individuele en totale verliese.*
- *'n Gepaste programpakket te gebruik om 'n passing van 'n statistiese verspreiding op 'n datastel te maak en gepaste passingmetings te bereken.*

- *Die effek te beskryf van risiko delings ooreenkomste soos bybetalings en eenvoudige vorms van proporsionele en verlies oorskot versekering.*
- *Die konsepte van risiko modelle en saamgestelde verdelings te bespreek en dit toe te pas op praktiese aktuariële probleme.*
- *Ekstreemwaarde verdelings wat gepas is vir die modellering van die verdeling van die omvang van verlies en hulle verhoudings, te herken*
- *Basiese beginsels van outomatiese leer te verduidelik en toe te pas.*

Assessment modes:

Formative: Class tests and Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

BWIA314	**Semester 1**	**NQF Level: 7**
Stochastic Processes/ ***Stogastiese Prosesse***		

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate integrated knowledge and understanding of the concepts involved in stochastic modelling and the various types of stochastic processes available to model actuarial problems.
- Demonstrate the ability to solve a variety of practical problems to which stochastic process techniques can be applied.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Geïntegreerde kennis en begrip te demonstreer van die konsepte van stogastiese modellering en die verskillende tipes stogastiese prosesse wat beskikbaar is vir die modellering van aktuariële probleme.*
- *Die vermoë te demonstreer om 'n verskeidenheid praktiese probleme op te los waar stogastiese proses tegnieke gebruik kan word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Describe and classify stochastic processes (discrete or continuous time, discrete or continuous state space) and describe possible applications of mixed processes.
- Define, apply and simulate a Markov chain and demonstrate how it can be used as a tool for modelling.
- Define, apply and simulate a Markov process and demonstrate how it can be used as a tool for modelling. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Stogastiese prosesse (diskrete of deurlopende tyd, diskrete of deurlopende ruimte) te beskryf en te klassifiseer, en moontlike toepassings vir gemengde prosesse te beskryf.*
- *'n Markov-ketting te definieer, toe te pas en te simuleer en te demonstreer hoe dit as 'n modelleringshulpmiddel gebruik kan word.*
- *'n Markov-proses te definieer, toe te pas en te simuleer en te demonstreer hoe dit as 'n modelleringshulpmiddel gebruik kan word.*

Assessment modes:

Formative: Class tests and Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

BWIA324	**Semester 2**	**NQF Level: 7**

Survival Models/
Oorlewingsmodelle

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate integrated knowledge and understanding of the concept of survival models and use survival models to model actuarial problems.
- Demonstrate the ability to solve a variety of practical problems to which survival models can be applied.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Geïntegreerde kennis en begrip van die konsep van oorlewingsmodelle te demonstreer en oorlewingsmodelle te gebruik om aktuariële probleme te modelleer.*
- *Die vermoë te demonstreer om 'n verskeidenheid praktiese probleme op te los waar oorlewingsmodelle toegepas kan word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Define and describe the model of lifetime or failure time as a random variable.
- Describe estimation procedures for lifetime distributions including empirical survival functions and proportional hazard models.
- Derive maximum likelihood estimators for transition intensities.
- Develop census formulae and estimate age-dependent transition intensities.
- Describe the process of graduation and discuss appropriate statistical methods and graduation tests.
- Describe the approaches to the forecasting of future mortality and use a suitable software-based implementation to apply the models to a suitable mortality dataset. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Die model van leeftyd of falingstyd as 'n ewekansige veranderlike te definieer en te beskryf.*
- *Beramingsprosedures vir leeftydverspreidings, insluitende empiriese oorlewingsfunksies en proposionele uitvalmodelle te beskryf.*
- *Maksimum aanneemlikheidsberamers vir oorgangsintensiteite af te lei.*
- *Sensus formules te ontwikkel en ouderdomsafhanklike oorgangsintensiteite te ontwikkel.*
- *Die gladstrykings proses te beskryf en toepaslike statistiese toetse en gladstrykings toetse te beskryf.*
- *Die benaderings tot die voorspelling van toekomstige mortaliteit te beskryf en 'n paslike programtoepassing te gebruik om die modelle op 'n paslike mortaliteit-datastel toe te pas.*

Assessment modes:

Formative: Class tests and Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

BWIA371	**Year Module**	**NQF Level: 7**
Contingencies/ ***Gebeurlikhede***		

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate integrated knowledge and understanding of data analysis and the principles of actuarial modelling.
- Demonstrate integrated knowledge and understanding of a broad range of life insurance products for single and multiple lives and of their pricing and reserving.
- Demonstrate the ability to develop formulae for the means and variances of the payments under various assurance and annuity contracts

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Geïntegreerde kennis en begrip van dataontleding en die beginsels van aktuariële modellering te demonstreer.*
- *Geïntegreerde kennis en begrip van 'n breë spektrum van lewensversekeringsprodukte vir enkele en meerdere lewens en vir hulle pryse en voorsienings te demonstreer.*
- *Die vermoë te demonstreer om formules vir die gemiddelde en variansies van betalings by verskillende versekerings- en annuïteitskontrakte te ontwikkel.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Describe the stages of conducting a data analysis to solve real world problems in a scientific manner, explain the characteristics of different data sources and describe tools suitable for each stage of data analysis.
- Describe why and how models are used including, in general terms, the use of models for pricing, reserving, and capital modelling.
- Define and describe the operation of various assurance and annuity contracts, including conventional with-profits and unit-linked contracts and accumulating with-profits contracts,
- Develop formulae for the means and variances of the payments under various assurance and annuity contracts, assuming constant deterministic interest rate.
- Apply actuarial techniques to price and reserve for life insurance products, and to fund pension benefits.
- Project expected future cash flows and perform profit testing for various assurance and annuity contracts, incorporating multiple decrement models as appropriate. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Die stadiums te beskryf van die uitvoer van 'n data-analise om realistiese probleme op 'n wetenskaplike manier uit te voer, die kenmerke van verskillende databronne te verduidelik, en paslike hulpmiddels vir elke stadium van data-analise te beskryf.*

- *Te beskryf waarom en hoe modelle gebruik word, insluitende, in algemene terme, die gebruik van modelle vir beprysing, voorsiening en kapitaalmodellering.*
- *Die werking van verskillende versekerings- en annuïteitskontrakte te definieer en te beskryf, insluitende konvensionele met-wins en eenheid gekoppelde kontrakte en akkumulerende met-wins kontrakte.*
- *Formule vir die gemiddeldes en variansies van betalings by verskillende versekerings- en annuïteitskontrakte te ontwikkel, met veronderstelde konstante deterministiese rentekoers.*
- *Aktuariële tegnieke toe te pas vir die prysing en voorsiening van lewensversekeringsprodukte, en om pensioenvoordele te befonds.*
- *Verwagte toekomstige kontantvloei te projekteer en winsgewendheidstoetsing vir verskillende versekerings- en annuïteitskontrakte uit te voer, met die insluiting van meerdere uitvalmodelle soos toepaslik.*

Assessment modes:

Formative: Class tests and Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

BWIN321	**Semester 2**	**NQF Level: 7**

BMI Project: Capital Markets Modelling and Analysis/

Bedryfswiskunde Projek: Effektebeurs Modellering en Analise

Module outcomes:

After completion of the module, the student should be able to:

- Demonstrate integrated knowledge and understanding of mathematical modelling and analysis of financial instruments.
- Demonstrate the ability to derive and apply mathematical formulae to price simple derivative securities.
- Demonstrate the ability to manage a team in an unfamiliar context in order to solve a problem in the field of capital markets modelling and analysis, monitoring the progress of the team and taking responsibility for task outcomes and application of appropriate resources where necessary.

Module-uitkomste:

Na voltooiing van die module moet die student in staat wees om:

- *Geïntegreerde kennis en begrip van wiskundige modellering en analise van finansiële instrumente te demonstreer.*
- *Die vermoë te demonstreer om wiskundige formules af te lei en toe te pas om eenvoudige afgeleide sekuriteite te prys.*
- *Die vermoë te demonstreer om 'n span in ’n onbekende konteks te bestuur ten einde 'n probleem op die gebied van modellering en analise van kapitaalmarkte op te los, die vordering van die span te monitor en verantwoordelikheid vir taakuitkomste te aanvaar en toepaslike bronne toe te pas waar nodig.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment criteria:

Students have mastered the outcomes if they are able to:

- Price and hedge linear claims such as futures contracts and swaps, using appropriate software, if applicable.

- Derive and apply binomial pricing of options, using appropriate software, if applicable
- As a member of a group plan and conduct research according to standard protocol and to employ appropriate techniques to solve problems in the field of capital markets modelling and analysis and produce a written report. /

Assesseringskriteria:

Studente het die uitkomste bemeester as hulle in staat is om:

- *Lineêre eise soos termynkontrakte en ruiltransaksies te kan pryse en verskans, met toepaslike sagteware, indien van toepassing.*
- *Binomiale prysing van opsies af te lei en toe te pas, met toepaslike sagteware, indien van toepassing*
- *As lid van 'n groep beplanning en navorsing, volgens standaardprotokol en toepaslike tegnieke te kan doen om kapitaalmarkmodellering en -analise probleme op te los en skriftelike daarvan verslag te doen.*

Assessment modes:

Formative: Class tests, Practical assignments.

Summative: Formal examination.

Assesseringsmetodes:

Formatief: *Klastoetse en Praktiese Take.*

Summatief: *Formele eksamen.*

NAS.2.9.5 CHEMISTRY/ *CHEMIE*

NCHE111	Semester 1	NQF Level: 5
Introductory Inorganic and Physical Chemistry/ ***Inleidende Anorganiese en Fisiese Chemie***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge and insight of the properties of substances and compounds, inter molecular interaction, aqueous solutions, chemical equilibria, acids and bases, precipitation and electron transfer reactions (should be able to apply this knowledge to write down and name chemical formula);
- Balance chemical reactions, use and apply stoichiometric and other calculations to find an unknown quantity;
- Recognize and apply tendencies from the periodic table (main group elements);
- Apply laboratory technique and safety rules;
- Explain chemical phenomena, do calculations connected with the phenomena, report results scientifically and to better understand the applications of scientific results in industry and the environment;
- Manage chemical reactions by calculating the enthalpy of reactions, determining the rate of reactions, equilibrium constants, and other aspects of aqueous equilibria such as buffer solutions and solubility products. /

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis en insig te demonstreer van die eienskappe van stowwe en verbindings, intermolekulêre wisselwerking, waterige oplossings, chemiese ewewigte, sure en basisse, neerslagvorming en elektronoordrag reaksies en hierdie kennis te kan toepas om chemiese formules te skryf en te benoem,*

- *Reaksievergelykings te balanseer, stoigiometriese en ander berekenings te gebruik om 'n onbekende grootheid te vind;*
- *Om tendense en verbande uit die periodieke tabel (hoofgroepe) te verklaar;*
- *Vaardighede te demonstreer in die toepassing van laboratorium- en veiligheidsreëls;*
- *Waargenome chemiese verskynsels te verklaar, berekenings in verband daarmee uit te voer, resultate wetenskaplik te kommunikeer en toepassings daarvan in die nywerheid en omgewing beter te kan begryp.*
- *Chemiese reaksies te bestuur deur die entalpie van reaksies te bereken, die tempo van reaksies te bepaal, ewewigskonstantes te bepaal en ander aspekte van waterige ewewigte soos bufferoplossings en oplosbaarheidsprodukte te bereken*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE121	**Semester 2**	**NQF Level: 5**
Introductory Organic Chemistry/ ***Inleidende Organiese Chemie***		

Module outcomes:

Students should be able to:

- Demonstrate knowledge and informed understanding of the concepts underpinning the subthemes of atomic structure, chemical bonding, molecular geometry, organic nomenclature, and intermolecular forces as well as the most important classes of organic compounds, including alkanes, alkenes, benzenes, halo alkanes, alcohols, amines, ethers, carboxylic acids, acyl halides, anhydrides, esters and amides;
- Evaluate the structures of organic compounds and thereby identify suitable synthesis procedures with a limited number of steps;
- Display conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct;
- Utilise basic research skills, such as sourcing and verifying information from various sources and use this information to construct a coherent body of knowledge;
- Communicate these discipline-specific ideas in writing in an accurate and coherent way while showing respect for conventions around copyright and plagiarism;
- Apply the green chemistry approach to organic chemistry and to show the relation between our approach to chemistry and the long-term survival of the human race;
- Manage his or her learning and implement the discipline-specific learning strategies given in the NCHE 121 study guide to improve learning problems. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis en ingeligte begrip van die konsepte wat die volgende subtemas van organiese chemie onderlê atoomstruktuur, chemiese binding, molekulêre geometrie, organiese nomenklatuur en intermolekulêre kragte, sowel as die belangrikste klasse van organiese verbindings, insluitende alkane, alkene, benzene, halo alkane, alkohole, amiene, eters, karboksielsure, asielhaliede, anhidriede, ester en amiede te demonstreer;*

- *Die strukture van organiese verbindings te evalueer en sodoende geskikte sintese prosedures met 'n beperkte aantal stappe te identifiseer;*
- *Optrede in die akademiese omgewing openbaar wat voldoen aan die gedragskode van die Noordwes-Universiteit;*
- *Basiese navorsingsvaardighede soos insameling en verifikasie van inligting vanuit verskillende bronne en die gebruik van hierdie inligting om 'n koherente geheel saam te stel, toe te pas;*
- *Vakspesifieke idees skriftelik te kommunikeer op 'n koherente wyse met inagneming van die konvensies rakende kopiereg en plagiaat;*
- *Die groen chemie benadering toe te pas op organiese chemie en die verwantskap tussen ons benadering tot chemie en die langtermyn oorlewing van die mensdom aan te toon;*
- *Sy of haar leeraktiwiteite te bestuur en vakspesifieke leerstrategieë, soos aangetoon in die NCHE121 studiegids, te implementeer om leerprobleme te verbeter*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE171	Semester 2	NQF Level: 6
Introductory Inorganic and Physical Chemistry		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge and insight of the properties of substances and compounds, inter molecular interaction, aqueous solutions, chemical equilibria, acids and bases, precipitation and electron transfer reactions (should be able to apply this knowledge to write down and name chemical formula);
- Balance chemical reactions, use and apply stoichiometric and other calculations to find an unknown quantity;
- Recognize and apply tendencies from the periodic table (main group elements);
- Apply laboratory technique and safety rules;
- Explain chemical phenomena, do calculations connected with the phenomena, report results scientifically and to better understand the applications of scientific results in industry and the environment;
- Manage chemical reactions by calculating the enthalpy of reactions, determining the rate of reactions, equilibrium constants, and other aspects of aqueous equilibria such as buffer solutions and solubility products. /

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis en insig te demonstreer van die eienskappe van stowwe en verbindings, intermolekulêre wisselwerking, waterige oplossings, chemiese ewewigte, sure en basisse, neerslagvorming en elektronoordrag reaksies en hierdie kennis te kan toepas om chemiese formules te skryf en te benoem,*
- *Reaksievergelykings te balanseer, stoigiometriese en ander berekenings te gebruik om 'n onbekende grootheid te vind;*
- *Om tendense en verbande uit die periodieke tabel (hoofgroepe) te verklaar;*

- *Vaardighede te demonstreer in die toepassing van laboratorium- en veiligheidsreëls;*
- *Waargenome chemiese verskynsels te verklaar, berekenings in verband daarmee uit te voer, resultate wetenskaplik te kommunikeer en toepassings daarvan in die nywerheid en omgewing beter te kan begryp.*
- *Chemiese reaksies te bestuur deur die entalpie van reaksies te bereken, die tempo van reaksies te bepaal, ewewigskonstantes te bepaal en ander aspekte van waterige ewewigte soos bufferoplossings en oplosbaarheidsprodukte te bereken*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE172	Semester 2	NQF Level: 6
Introductory Organic Chemistry		

Module outcomes:

Students should be able to:

- Demonstrate knowledge and informed understanding of the concepts underpinning the subthemes of atomic structure, chemical bonding, molecular geometry, organic nomenclature, and intermolecular forces as well as the most important classes of organic compounds, including alkanes, alkenes, benzenes, halo alkanes, alcohols, amines, ethers, carboxylic acids, acyl halides, anhydrides, esters and amides;
- Evaluate the structures of organic compounds and thereby identify suitable synthesis procedures with a limited number of steps;
- Display conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct;
- Utilise basic research skills, such as sourcing and verifying information from various sources and use this information to construct a coherent body of knowledge;
- Communicate these discipline-specific ideas in writing in an accurate and coherent way while showing respect for conventions around copyright and plagiarism;
- Apply the green chemistry approach to organic chemistry and to show the relation between our approach to chemistry and the long-term survival of the human race;
- Manage his or her learning and implement the discipline-specific learning strategies given in the study guide to improve learning problems. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis en ingeligte begrip van die konsepte wat die volgende subtemas van organiese chemie onderlê atoomstruktuur, chemiese binding, molekulêre geometrie, organiese nomenklatuur en intermolekulêre kragte, sowel as die belangrikste klasse van organiese verbindings, insluitende alkane, alkene, benzene haloalkane, alkohole, amiene, eters, karboksielsure, asielhaliede, anhidriede, ester en amiede te demonstreer;*
- *Die strukture van organiese verbindings te evalueer en sodoende geskikte sintese prosedures met 'n beperkte aantal stappe te identifiseer;*
- *Optrede in die akademiese omgewing openbaar wat voldoen aan die gedragskode van die Noordwes-Universiteit;*

- *Basiese navorsingsvaardighede soos insameling en verifikasie van inligting vanuit verskillende bronne en die gebruik van hierdie inligting om 'n koherente geheel saam te stel, toe te pas;*
- *Vakspesifieke idees skriftelik te kommunikeer op 'n koherente wyse met inagneming van die konvensies rakende kopiereg en plagiaat;*
- *Die groen chemie benadering toe te pas op organiese chemie en die verwantskap tussen ons benadering tot chemie en die langtermyn oorlewing van die mensdom aan te toon;*
- *Sy of haar leeraktiwiteite te bestuur en vakspesifieke leerstrategieë, soos aangetoon in die studiegids, te implementeer om leerprobleme te verbeter*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE211	Semester 1	NQF Level: 6

Analytical Chemistry II/

Analitiese Chemie II

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the basic theories underlying types of errors occurring during chemical analyses, statistics applied on analytical results, taking and preparing samples, quality control, acid-base and complexometric titrations, gravimetry, surface characterisation techniques, atomic spectroscopy, liquid extraction, ion exchange and chromatography;
- Display appropriate laboratory skills in order to conduct measurements associated with all of the above-mentioned theoretical aspects;
- Demarcate and effectively solve problems associated with the theoretical and practical (experimental) aspects;
- Demonstrate an understanding of the safety, ethical and professional conduct required of a professional analytical chemist.

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis van die basiese teorieë onderliggend tot tipes foute wat tydens chemiese ontledings gemaak word, statistieke berekeninge op analitiese resultate, neem en voorbereiding van monsters, kwaliteitsbestuur, suur-basis en kompleksometriese titrasies, gravimetrie, oppervlak karakterisering tegnieke, atoom spektroskopie, vloeistof ekstraksie, ioonuitruiling en chromatografie, te demonstreer;*
- *Toepaslike laboratorium vaardighede te hê om metinge wat verband hou met al die bogenoemde teoretiese aspekte uit te voer;*
- *Probleme af te baken en doeltreffend op te los wat verband hou met die teoretiese en praktiese (eksperimentele) aspekte;*
- *'n Begrip te hê van die veiligheid, etiese en professionele gedrag wat van 'n professionele analitiese chemikus verwag word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE212	Semester 1	NQF Level: 6

Physical Chemistry II/

Fisiese Chemie II

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the theories underlying the thermodynamic and kinetic approaches through which chemical reactions in Physical Chemistry are studied;
- Demonstrate detailed knowledge of the fundamental laws of thermodynamics and the ability to theoretically calculate thermodynamic quantities, as well as to interpret and critically evaluate these values in terms of process characteristics;
- Demonstrate detailed knowledge of kinetic quantities measured and calculated, and interpreting kinetic quantities in terms of the reaction mechanism;
- Demonstrate knowledge of experimental methods and techniques typically utilized to determine thermodynamic and kinetic quantities, as well as the ability to effectively use appropriate laboratory skills in order to conduct these measurements;
- Demarcate and effectively solve complex problems related to thermodynamic and kinetic studies in Physical Chemistry, and to apply experimental measurements with theory-driven arguments;
- Critically judge the ethical/professional conduct of others within different professional/ academic environments in chemistry, and to effect change in conduct where necessary. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis van die teorieë onderliggend aan die termodinamiese en kinetiese benaderings waardeur chemiese reaksies in Fisiese Chemie bestudeer word, te demonstreer;*
- *Gedetailleerde kennis van die fundamentele wette van termodinamika te hê en oor die vermoë beskik om termodinamiese groothede teoreties te bereken, sowel as om hierdie groothede te interpreteer en krities te evalueer in terme van proses eienskappe;*
- *Gedetailleerde kennis van gemete en berekende kinetiese groothede te hê en hierdie kinetiese groothede te interpreteer ten opsigte van die reaksiemeganisme;*
- *Kennis van eksperimentele metodes en tegnieke wat tipies gebruik word om termodinamiese en kinetiese groothede te hê, sowel as oor die vermoë beskik om gepaste laboratoriumvaardighede effektief te gebruik om hierdie metinge uit te voer;*
- *Af te baken en komplekse probleme wat verband hou met termodinamiese en kinetiese studies in Fisiese Chemie effektief op te los, en om eksperimentele metings op teoriegedrewe argumente toe te pas;*
- *Die etiese/professionele gedrag van ander binne verskillende professionele/akademiese omgewings in chemie krities te beoordeel, en om verandering in gedrag teweeg te bring waar nodig.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE213	**Semester 1**	**NQF Level: 6**
Organic Chemistry II (Pharmacy/ Biological Sciences)/ ***Organiese Chemie II (Farmasie/ Biologiese Wetenskappe)***		

Module outcomes:

After completion of module, the student should demonstrate:

- Detailed knowledge and a clear understanding of i) factors influencing electron density and reactivity of organic molecules and ii) aromatic, heterocyclic and polyfunctional organic molecules, their properties and reactivity.
- Critical understanding of the principles of aromaticity applied to aromatic and heterocyclic compounds, knowledge of classic reactions of aromatic and heterocyclic compounds and the ability to explain reactivity trends.
- Critical understanding of polyfunctional organic molecules, their reactivity and mechanistic aspects.
- Ability to select, implement and evaluate the correct mechanism to demonstrate the possible progression of specific aromatic and polyfunctional reactions.
- The ability to effectively use appropriate laboratory skills to synthesise and purify selected aromatic and polyfunctional compounds.
- Understanding of the ethical and environmental impact that chemistry has on society.

Module uitkomste:

Na voltooiing van die module, behoort die student:

- *Gedetailleerde kennis en 'n duidelike begrip van i) die faktore wat elektrondigtheid en die reaktiwiteit van organiese molekules beïnvloed en ii) aromatiese, heterosikliese en polifunksionele molekules, hul eienskappe en reaktiwiteit.*
- *Kritiese begrip te toon van die beginsels van aromatisiteit toegepas op aromatiese en heterosikliese verbindings; kennis van klassieke reaksies van aromatiese en heterosikliese verbindings te hê en die vermoë om tendense in reaktiwiteit te voorspel.*
- *Kritiese begrip te toon van die chemiese eienskappe en meganistiese aspekte van polifunksionele molekules.*
- *Korrekte meganismes te selekteer, toe te pas en te evalueer om sodoende die moontlike progressie van spesifieke aromatiese en polifunksionele reaksies te voorspel.*
- *Begrip te toon van die etiese- en omgewingsimpak van chemie op die samelewing.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE221	Semester 2	NQF Level: 6
Inorganic Chemistry II/ ***Anorganiese Chemie II***		

Module outcomes:

Students should be able to:

- Demonstrate detailed knowledge and a clear understanding of models used to present structure and bonding of atoms and molecules, as well as the reaction properties pertaining to the chemistry of the main group elements;
- Derive chemical and atomic properties, as well as to predict important chemical reactions of main group elements from basic principles;
- Demonstrate detailed knowledge of intermolecular forces in solutions and the ability to reproduce the properties, forms of bonding and reactions of s-block and p-block elements;
- Effectively use appropriate laboratory skills and master practical techniques to synthesize and purify specific inorganic compounds of the main group elements;
- Solve a multi-step reaction using suitable reagents and products to ensure the manufacturing of the desired compound, while planning and executing a work schedule;
- Display a sense of responsibility for fellow humans and the environment in scientific investigations while acting responsible and in accordance with the code of conduct relevant to chemistry. /

Module uitkomste:

Studente moet in staat wees om:

- *Gedetailleerde kennis en ’n duidelike begrip van die modelle wat gebruik word om struktuur en binding van atome en molekules voor te stel, sowel as die reaksie eienskappe wat van toepassing is op die chemie van hoofgroepelemente te demonstreer;*
- *Chemiese- en atoom eienskappe uit basiese beginsels te kan aflei en belangrike reaksies van hoofgroepelemente te kan voorspel;*
- *Gedetailleerde kennis van intermolekulêre kragte in oplossings en die vermoë om eienskappe, bindingsvorme en reaksies van s- en p-blok elemente te kan weergee, te demonstreer;*
- *Toepaslike laboratoriumvaardighede effektief te kan gebruik om spesifieke anorganiese verbindings van die hoofgroepelemente te vervaardig en te suiwer;*
- *’n Multi-stap reaksie te kan weergee deur die nodige reagense en produkte aan te dui om die vervaardiging van die korrekte produk te verseker, terwyl ’n werkskedule beplan en uitgevoer moet kan word;*
- *’n Verantwoordelikheidsgevoel in sy/haar chemiese ondersoeke vir sy/haar medemens en die omgewing te hê, terwyl hy/sy volgens die gedragskode van chemici optree.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE222	Semester 2	NQF Level: 6
Organic Chemistry II/ ***Organiese Chemie II***		

Module outcomes:

Students should be able to:

- Demonstrate detailed knowledge and a clear understanding of models used to present atoms and molecules as well as the properties, reactions and mechanisms pertaining to aromatic chemistry;
- Demonstrate a clear understanding of prevalent schools of thought that determined the progress within the field of molecular models;
- Select, implement and evaluate the correct mechanism to demonstrate the possible progression of specific aromatic based reactions;
- Effectively use appropriate laboratory skills to synthesize and purify specific compounds;
- Solve a multi-step reaction using suitable reagents and products to ensure the manufacture of the desired compound;
- Have a sense of responsibility for fellow humans and the environment in scientific investigations while acting in accordance with the code of conduct relevant to chemistry. /

Module uitkomste:

Studente moet in staat wees om:

- *Gedetailleerde kennis en ’n duidelike begrip van die modelle wat gebruik word om atome en molekules voor te stel, sowel as die eienskappe, reaksies en meganismes wat van toepassing is op aromatiese chemie, te hê;*
- *Die huidige denkskole wat die ontwikkeling binne die veld van molekulêre modelle bepaal het, te verstaan;*
- *Die korrekte meganisme te kan kies, toe te pas en te evalueer om sodoende die moontlike progressie van spesifieke aromatiese reaksies weer te gee;*
- *Die toepaslike laboratoriumvaardighede effektief te gebruik om spesifieke verbindings te vervaardig en te suiwer;*
- *’n Multi-Stap reaksie te kan weergee deur die nodige reagense en produkte aan te dui om die vervaardiging van die korrekte produk te verseker;*
- *’n Verantwoordelikheidsgevoel in sy chemiese ondersoeke vir sy medemens en die omgewing te hê, terwyl hy volgens die gedragskode van chemici optree.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE311	Semester 2	NQF Level: 6
Analytic Methods III/ ***Analitiese Metodes III***		

Module outcomes:

After completion of the module NCHE 311, the student should demonstrate:

- Integrated knowledge and understanding of the theory of the following: chromatographic separation techniques [general theory and gas chromatography], molecular spectroscopic techniques [infrared spectroscopy (IR), nuclear magnetic resonance spectroscopy (NMR)], mass spectrometry (MS), thermal methods [TG, TGA, DSC] and electrochemical methods;
- The ability to determine the structures of organic compounds using data from infrared spectroscopy, mass spectrometry and nuclear magnetic resonance spectroscopy (^{1}H and ^{13}C).
- Be able to address his or her learning needs in a self-addressed manner;
- To demonstrate the ability to take decisions and act ethically and professionally within a supported environment.

Module uitkomste:

Na voltooiing van die NCHE 311 module, behoort die student die volgende te kan aantoon:

- *Geïntegreerde kennis en begrip van die teorie van die volgende: chromatografiese skeidingstegnieke [algemene teorie en gaschromatografie], molekulêre spektroskopiese tegnieke [infrarooi spektroskopie (IR), kernmagnetiese resonans spektroskopie (NMR)], massaspektrometrie (MS), termiese metodes [TG, TGA, DSC] en elektrochemiese metodes;*
- *Die struktuur van organiese verbindings met behulp van data vanaf infrarooi spektroskopie, massaspektrometrie en kernmagnetiese resonans spektroskopie (^{1}H en ^{13}C te kan bepaal.*
- *Die vermoë om sy of haar leerbehoeftes op 'n selfgerigte manier kan aanspreek;*
- *Die vermoë om besluite te neem en eties en professioneel op te tree binne 'n ondersteunde omgewing.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, online tests, a semester test.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE312	Semester 2	NQF Level: 6
Physical Chemistry III/ ***Fisiese Chemie III***		

Module outcomes:

After completion of the NCHE312 module, the student should demonstrate:

- Knowledge, insight and understanding to (i) perform calculations based on introductory quantum chemical principles, (ii) explain the origin of vibration, rotation and vibration-rotation spectra, and to calculate molecular quantities and spectroscopic constants from these spectra, (iii) calculate thermodynamic quantities for real (non-ideal) gases by using tabled data in equations based on deviations from ideal gas behaviour, (iv) utilise the Debye-Hückel and related theories to determine thermodynamic quantities for real (non-ideal) solutions, and (v) determine kinetic quantities and activation parameters for reactions of a more complex nature both numerically and graphically;
- An ability to critically interrogate multiple sources of knowledge such as textbooks and the internet within the field of physical chemistry, with specific reference to the above-mentioned topics, so as to critically

review and evaluate that knowledge with a view of obtaining a deeper understanding and appreciation of theory and practice;

- Skills related to experimental practice, under appropriate supervision, by following the necessary procedures and methods to effectively execute and complete experiments (related to the above-mentioned topics), effectively report on the experimental findings, and extract relevant conclusions as requested;
- Problem solving skills related to the interface between theory and application and to analyse and critically reflect on the outcome/result; and
- An understanding of the ethical and professional conduct required of a professional chemist and the ethical application of physical chemistry.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NCHE321	**Semester 2**	**NQF Level: 6**

Inorganic Chemistry III/

Anorganiese Chemie III

Module outcomes:

After completion of the NCHE312 module, the student should demonstrate:

- Knowledge, insight and understanding to (i) perform calculations based on introductory quantum chemical principles, (ii) explain the origin of vibration, rotation and vibration-rotation spectra, and to calculate molecular quantities and spectroscopic constants from these spectra, (iii) calculate thermodynamic quantities for real (non-ideal) gases by using tabled data in equations based on deviations from the ideal gas behaviour, (iv) utilise the Debye-Hückel and related theories to determine kinetic quantities and activation parameters for reactions of a more complex nature both numerically and graphically;
- An ability to critically interrogate multiple sources of knowledge such as textbooks and the internet within the field of physical chemistry, with specific reference to the above-mentioned topics, so as to critically review and evaluate that knowledge with a view of obtaining a deeper understanding and appreciation of theory and practice;
- Skills related to experimental practice, under appropriate supervision, by following the necessary procedures and methods to effectively execute and complete experiments (related to the above-mentioned topics), effectively report on the experimental findings, and relevant conclusions as requested;
- Problem solving skills related to the interface between theory and application and to analyse and critically reflect on the outcome/ result; and
- An understanding of the ethical and professional conduct required of a professional chemist and the ethical application of physical chemistry.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.		
NCHE322	**Semester 2**	**NQF Level: 6**
Organic Chemistry III/ ***Organiese Chemie III***		

Module outcomes:

After completion of the NCHE322 module, the student should demonstrate

- Integrated knowledge and understanding of the theory of the following: aromatic heterocyclic chemistry, stereochemistry, chemistry of the carbonyl compound and rearrangement reactions;
- An ability to assimilate multiple sources of knowledge such as books, general scientific journals and the internet within the field of organic chemistry, and critically evaluate and review that knowledge to deepen the understanding of organic chemistry;
- Supervised experimental skills by performing a number of synthesis and analytical tasks, to effectively execute a planned research design, communicate findings and conclusions by means of a written report in a scientific manner;
- The ability to identify, demarcate, analyse, critically reflect on and effectively solve problems in organic chemistry by using appropriate methods;
- An understanding of the ethical and professional conduct required of a professional chemist.

Module uitkomste:

Na voltooiing van die NCHE322 module, behoort die student:

- *'n Geïntegreerde kennis en begrip van die teorie van die volgende te hê: aromatiese heterosikliese chemie, stereochemie, chemie van die karbonielverbinding en herrangskikkingsreaksies;*
- *Die vermoë ontwikkel om 'n verskeidenheid bronne van kennis soos boeke, algemene wetenskaplike tydskrifte en die internet binne die veld van organiese chemie te assimileer en krities die inligting te evalueer en te hersien om sodoende die begrip van organiese chemie te verdiep;*
- *Onder toesig navorsingsvaardighede te kan demonstreer deur 'n aantal sintese- en analitiese take te verrig, effektief 'n beplande navorsingsontwerp uit te voer en die resultate en gevolgtrekkings m.b.v. 'n wetenskaplik geskrewe verslag te kommunikeer;*
- *Die vermoë te hê om probleme in organiese chemie met toepaslike metodes te identifiseer, af te baken, te analiseer, krities te bedink en dan effektief op te los;*
- *'n Begrip te hê van die etiese en professionele gedrag wat van 'n professionele chemikus verwag kan word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative:

Class tests, a semester test, pre-practical preparation tests and practical reports.

Summative:

The summative assessment consists of an exam paper that will be written at an appointed time by every student.

NAS.2.9.6 ZOOLOGY / *DIERKUNDE*

DRKN211	Semester 1	NQF Level: 6
Developmental Biology/ ***Ontwikkelingsbiologie***		

Module outcomes:

Students should be able to:

- Demonstrate a detailed knowledge of chordate embryology, the principles of evolutionary theory and basic cytogenetics as well as understand the origin and development of knowledge within the field of embryology, evolutionary theory and cytogenetics;
- Evaluate, select and apply appropriate methods, procedures and techniques in processes of investigation chordate embryology; investigating opinions, approaches and principles of evolutionary theory; and understand applications in the field of cytogenetics;
- Identify and evaluate problems in unfamiliar contexts, gathering evidence appropriate to the field of developmental biology;
- Demonstrate an understanding of the ethical implications of aspects typical of the field of developmental biology, such as research on fetuses, abortion, the extent of genetic manipulation of man and animal and the relationship between religion and evolution as well as taking responsibility of their own actions pertaining a scientist-in-training: integrity in all aspects of their studies;
- Evaluate different sources of information and to present and communicate complex information reliably and coherently;
- Demonstrate an understanding of the relationships between systems of developmental biology.
- Evaluate his/her own performance against given criteria.

Module uitkomste:

Studente moet in staat wees om:

- *Te demonstreer dat hy/sy oor gedetailleerde kennis van Chordata embriologie, die beginsels van evolusieteorie en basiese sitogenetika beskik, asook die oorsprong en ontwikkeling van die kennis in die veld van embriologie, evolusieteorie en sitogenetika verstaan;*
- *Toepaslike metodes, prosedures en tegnieke in die ondersoekproses van Chordata embriologie te evalueer, selekteer en toe te pas; opinies, benaderings en beginsels van evolusieteorie te ondersoek en toepassings in die veld van sitogenetika te begryp;*
- *Probleme in onbekende konteks te kan identifiseer en evalueer, en bewyse van toepassing in die veld van ontwikkelingsbiologie, te kan insamel;*
- *'n Begrip te toon vir die etiese implikasies van aspekte wat tipies is vir die veld van ontwikkelingsbiologie, soos navorsing op fetusse, aborsie, die omvang van genetiese manipulasies op mens en dier en die verhouding tussen religie en evolusie asook om verantwoordelikheid te aanvaar vir sy/haar eie aksies met betrekking tot wetenskaplike-in-opleiding: integriteit in alle aspekte van hulle studie;*
- *Verskillende inligtingsbronne te kan evalueer en komplekse inligting betroubaar en koherent kan kommunikeer;*
- *Begrip te toon vir die verwantskappe tussen stelsels in ontwikkelingsbiologie;*
- *Sy/haar eie vermoë aan die hand van gegewe kriteriums te kan meet.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

DRKN321	**Semester 2**	**NQF Level: 7**

Animal Parasitology/

Dierparasitologie

Module outcomes:

Students should be able to:

- Demonstrate an integrated knowledge and understanding of, as well as an ability to correctly evaluate and apply concepts, facts and principles to different areas of specialization, including the classification, life cycles, biology, pathogenesis, epidemiology immunology, diagnosis and treatment in the field of parasitology and an understanding of how the knowledge relates to other fields or practices such as hygiene with a view to control pathogenesis caused by the parasites;
- Display an understanding of contested knowledge with regard to epidemiology within the field of parasitology and a critical evaluation of the applicability of aforementioned principles and theories to this field;
- Select, evaluate and apply a range of different but appropriate theories and scientific methods of enquiry (qualitative, as well as quantitative), to do focused research and resolve problems that will effect change within practice of parasitology;
- Reflect on all values, ethical conduct and justifiable decision making when people are in involved studies regarding parasitology. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis en begrip te integreer, die vermoë demonstreer om konsepte, feite en beginsels van toepassing op verskillende gebiede van spesialisasie insluitende klassifikasie, lewensiklusse patogenese, epidemiologie immunologie, diagnose en behandeling in die veld van parasitologie te maak, dat hy/sy begryp van hoe om die kennis in verband te bring met ander velde of praktyke soos higiëne met die oog daarop om die patogenese wat deur die parasiete veroorsaak word te beheer;*
- *Betwiste kennis met betrekking tot epidemiologie binne die veld van parasitologie in ag te neem en krities te evalueer tydens die toepassing van reeds genoemde beginsels en teorieë met betrekking tot parasitologie;*
- *Verskillende maar toegepaste teorieë en wetenskaplike metodes van inligtingverkryging te selekteer (kwalitatief sowel as kwantitatief) om gefokusde navorsing te doen en probleme op te los wat tot verandering in uitvoering van die praktyk sal lei;*
- *Oor alle waardes rakende dierparasitologie te kan reflekteer, aan etiese beginsels voldoen en regverdigbare besluite maak wanneer mense betrokke is tydens toepassing van geskikte praktyke met betrekking tot parasitologie.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

DRKS111	**Semester 1**	**NQF Level: 5**
Invertebrates/ ***Invertebrate***		

Module outcomes:

Students should be able to:

- Demonstrate a basic knowledge and informed understanding of the systematics and classification of animals, form and function of animals in general and of invertebrates in particular, as well as being able to identify and classify these animals and indicate phylogenetic relationships;
- Distinguish between examples of invertebrates and to sort them in taxonomic and phylogenetic frameworks;
- Differentiate between animals based on their hierarchical organization, complexity and body plan as well as apply this to demonstrate relationships between groups of invertebrates/taxa;
- Explain what a species is and give an overview of the different species concepts;
- Display an awareness of the economic importance of invertebrates as a source of food, as parasites of humans, animals and plants, or as biological or mechanical carriers of pathogens;
- Report on their skills in respect of the use of microscopes, dichotomous keys and the accessing of sources; with a respect for conventions around intellectual property, copyright and plagiarism;
- Account for the role of humans in conservation of the environment and in particular invertebrate biodiversity. /

Module uitkomste:

Studente moet in staat wees om:

- *Basiese kennis en ingeligte begrip te hê van sistematiek en die klassifikasie van diere, vorm en funksie van diere in die algemeen en van ongewerweldes in die besonder, asook as in staat wees om hierdie diere te identifiseer, te klassifiseer en te dui op filogenetiese verwantskappe;*
- *Te onderskei tussen voorbeelde van ongewerweldes en om hulle te sorteer in taksonomiese en filogenetiese raamwerke;*
- *Te onderskei tussen diere op grond van hul hiërargiese organisasie, kompleksiteit en liggaamsplan asook hoe om hierdie inligting toe te pas om verhoudings tussen groepe ongewerweldes/taksons te demonstreer;*
- *Te kan verduidelik wat 'n spesie is en 'n oorsig kan bied van die verskillende spesiekonsepte;*
- *'n Bewustheid te hê van die ekonomiese belangrikheid van ongewerweldes as 'n bron van voedsel, parasiete van mense, diere en plante, of as biologiese of meganiese draers van patogene;*
- *Verslag te doen oor vaardighede ten opsigte van die gebruik van mikroskope, digotome sleutels en die ontsluiting van bronne; met respek vir konvensies rondom intellektuele eiendom, kopiereg en plagiaat;*
- *Rekenskap te gee van die rol van die mens in die bewaring van die omgewing en in die besonder invertebraatbiodiversiteit.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

DRKS121	**Semester 2**	**NQF Level: 5**
Chordates/ ***Chordata***		

Module outcomes:

Students should be able to:

- Demonstrate an informed understanding of the different aspects of form and function of deuterostome animals, and Southern African chordate diversity;
- Select and apply basic processes of analysis, synthesis and evaluation to unlock existing and additional knowledge;
- Work with a microscope and obtain in-focus images at a required magnification;
- Interpret a microscope image and prepare annotated drawings;
- Report on their skills in respect of field identification guides and keys to identify chordates to the required taxonomic level;
- Account for the role of humans in conservation of the environment and in particular higher invertebrate and chordate biodiversity;
- Display an awareness of ethical issues related to the use and study of higher invertebrates and Chordata. /

Module uitkomste:

Studente moet in staat wees om:

- *Ingeligte begrip van die verskillende aspekte van sistematiek, klassifikasie van diere, vorm en funksie van deuterostome diere in die algemeen en suider-Afrikaanse Chordata diversiteit te demonstreer;*
- *Basiese prosesse van analise, sintese en evaluering te gebruik om bestaande en addisionele inligting te ontsluit;*
- *'n Mikroskoop te hanteer en beelde in fokus en by verlangde vergroting te kry;*
- *Mikroskoopbeelde te interpreteer en benaamde tekeninge te maak;*
- *Vaardigheid ten toon te stel rakende die gebruik van veld-identifikasiegidse en sleutels om Chordate tot die nodige taksonomiese vlakke te identifiseer;*
- *Rekenskap te gee van die rol van die mens in die bewaring van die omgewing en in die besonder hoër invertebraat- en chordaat biodiversiteit;*
- *Bewustheid van etiese aspekte rakende die benutting en studie van hoër invertebrate en Chordata te openbaar.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

DRKS221	Semester 2	NQF Level: 6
Comparative Animal Physiology/ ***Vergelykende Dierfisiologie***		

Module outcomes:

Students should be able to:

- Demonstrate a focused knowledge of the fundamental theory of Animal Physiology;
- Demonstrate an understanding of the crucial relationships between environment, form and function and its influence on the physiology of animals;
- Use figures, tables and graphs to explain and supplement various aspects of Animal Physiology;
- Identify key differences in certain physiological processes among animals from different modes of life (aquatic vs. terrestrial);
- Display an awareness of the scope of ethical and value systems when studying physiological processes in animals;
- Follow instructions to perform experimentation on animals or animal systems to demonstrate a particular physiological process. /

Module uitkomste:

Studente moet in staat wees om:

- *Gefokusde kennis van die fundamentele teorie van Dierfisiologie te demonstreer.*
- *'n Begrip van die noodsaaklike verbande tussen omgewing, vorm en funksie en die invloed daarvan op fisiologie van diere te openbaar;*
- *Figure, tabelle en grafieke te gebruik om die verskeie aspekte van Dierfisiologie te verduidelik en aan te vul;*
- *Sleutelverskille in sekere fisiologiese prosesse te identifiseer tussen diere van verskillende lewenstipe (Akwaties vs. Terrestrieel);*
- *Bewustheid van die omvang van etiese en waardestelsels in die studie van fisiologiese prosesse in diere te openbaar;*
- *Instruksies te volg om eksperimente op diere uit te voer om 'n spesifieke fisiologiese proses te demonstreer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

DRKS311	Semester 1	NQF Level: 7
Ecology/ ***Ekologie***		

Module outcomes:

On completion of the module the student should be able to:

- Demonstrate how knowledge and theories within the field of aquatic and terrestrial ecology relate to knowledge within other fields with a view to understand the interrelatedness thereof.
- Integrate knowledge of the principles of aquatic and terrestrial ecology and be able to evaluate knowledge and explanations provided in the field of ecology.
- Identify the basic research methodologies relevant to terrestrial and aquatic ecology, select appropriate methods and apply a range of methods used in ecological studies.
- Demonstrate an advanced ability to effectively apply practical skills in research projects to survey and critique aquatic and terrestrial ecosystem health and diversity with a view to suggest interventions and improvements in management systems.
- Analyse and evaluate academic literature to demarcate a researchable problem within the field of ecology and specify an appropriate scientific method that can be used to address the identified problem.
- Reflect on the values, ethical conduct and justifiability of decisions appropriate to ecological studies.
- Produce and communicate accurately and coherently both verbally and in written reports on academic principles in ecology and on ecological research projects.

Students registered for DRKS311 must attend a compulsory field trip during March/April (that can include the recess time). The report generated from results obtained during the field trip will contribute to the participation mark. No excuses for absence from the field trip will be accepted, except in the event of illness in which case a medical certificate must be presented. /

Module uitkomste:

Na suksesvolle voltooiing van hierdie module sal die student die volgende kan demonstreer:

- *Kennis en teorie in die veld van akwatiese en terrestriële ekologie en die verband met kennis in ander velde en die interafhanklikheid tussen stelsels.*
- *Geïntegreerde kennis van die beginsels van akwatiese en terrestriële ekologie en in staat wees om kennis en verduidelikings wat in ekologie verskaf word, te evalueer.*
- *Die vermoë om basiese navorsingsmetodologie wat relevant is tot terrestriële en akwatiese ekologie te identifiseer, toepaslike metodes te selekteer en 'n reeks metodes toe te pas in ekologiese studies.*
- *Gevorderde vermoë om praktiese vaardighede toe te pas in navorsingsprojekte en opnames wat daarop gemik is om akwatiese- en terrestriële ekostelselgesondheid te evalueer, en ingrepe en verbeterings voor te stel.*
- *Die vermoë om akademiese literatuur te analiseer en te evalueer om 'n navorsingsvrae in die veld van ekologie te ontwikkel en om toepaslike wetenskaplike metodes voor te stel om hierdie vrae aan te spreek.*
- *Etiese waardes en gedrag en regverdigbaarheid van toepaslike besluite in die studie van ekologie.*
- *Die vermoë om akademiese beginsels in ekologie asook oor navorsingsprojekte, akkuraat en samehangend te kommunikeer, beide in mondelinge voordragte en skriftelike verslae.*

*Studente wat vir **DRKS311** registreer moet 'n verpligte veld ekskursie gedurende Maart/April (dit kan die reses insluit) bywoon. Die resultate wat verkry word, moet in verslagvorm ingehandig word en dit sal bydra tot die deelnamepunt. Geen verskonings sal aanvaar word nie, behalwe in die geval van siekte in welke geval 'n mediese sertifikaat voorgelê moet word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.
Semester tests.
Exam at the end of the semester.
Assesseringsmetodes:
Klastoetse, praktiese toetse, opdragte in groepe of individueel.
Semestertoets.
Eksamen aan die einde van die semester.

DRKS322	**Semester 2**	**NQF Level: 7**

Ethology/
Etologie

Module outcomes:

Students should be able to:

- Demonstrate an integrated knowledge and critical understanding of ethology and associated theories;
- Locate and interrogate multiple sources of knowledge related to ethology;
- Evaluate and contextualize the knowledge and accompanying insights, as well as integrating this with the field project;
- Correctly select and apply knowledge and skills to make use of appropriate methods and techniques relevant to ethology.
- Initiate, plan, develop and execute a project on the behaviour of any wild animal, and integrate the data and observations with the relevant ethological theories;
- Display presentation skills by presenting and discussing research;
- Identify and formulate the ethical considerations of working and research on wild animal behaviour./

Module uitkomste:

Studente moet in staat wees om:

- *'n Grondige kennis en kritiese begrip van etologie te openbaar;*
- *Verskeie inligtingsbronne oor etologie te ontsluit;*
- *Hierdie kennis en insigte te kan evalueer en kontekstualiseer, en om dit te integreer met die veldprojek;*
- *Te besluit welke tegniek of vaardigheid in 'n spesifieke situasie toegepas behoort te word in die konteks van etologie;*
- *'n Navorsingsprojek oor die gedrag van enige wilde dier te inisieer, beplan, ontwikkel en uitvoer en die data en etologie teorieë daarin vervat, te integreer;*
- *Die bevindinge van projekte voor te dra.*
- *Die etiese aspekte relevant tot werk en navorsing oor die gedrag van wilde diere te identifiseer en formuleer.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van die semester.

NAS.2.9.7 ECONOMICS / *EKONOMIE*

See the Faculty of Economic and Management Sciences yearbook for the module outcomes of ECON and EKRP /

Sien die Fakulteit van Ekonomiese en Bestuurswetenskappe se jaarboek vir die module uitkomste van ECON en EKRP.

NAS.2.9.8 ELECTRONICS

SFEM171	**Year module**	**NQF Level: 5**
Foundation Electricity, Magnetism and Circuits		

Module outcomes:

The learner should be able to:

- Demonstrate understanding and application of electric and magnetic field quantities.
- Demonstrate understanding and application of basic concepts in DC circuit analysis
- Solve simple DC circuits using general DC circuit analysis methods.
- Demonstrate an understanding of capacitors and inductors.
- Solve simple RC and RL time dependent circuits.
- Demonstrate a hands-on ability to utilize basic electronic equipment with respect to measurement and interpretation of electronic data.

Module content:

Unit 1: Electric Current and Resistance: Current in a Conductor, Resistivity

- Resistance
- Electric Field Strength and Potential Difference
- Ohm's Law
- The Drude's Model of conduction.

Unit 2: Electric Circuits

- Electromotive Force (EMF)
- Series and parallel resistor combinations
- Kirchhoff's rules for circuits
- Circuit reduction techniques

Unit 3: Basic electrical DC Circuit Analysis

- Cramer's rule
- Branch current method
- Mesh analysis
- Nodal analysis

Unit 4: Capacitors and Dielectrics

- Capacitors and capacitance
- Combinations of capacitors – Series and Parallel
- The energy stored in a capacitor
- Dielectrics
- RC circuits.

Unit 5: Magnetic Circuits, Inductance and Inductors

- Magnetic Field and magnetic flux
- Faraday's Law and Lenz's Law
- Inductance
- Combinations of Inductors– Series and Parallel

- Energy stored inductors

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

SFEM172	Year module	NQF Level: 5

Introduction to Electronics

Module outcomes:

The learner should be able to:

- Demonstrate an understanding of circuit theorems, and their application in the analysis of direct current circuits
- Demonstrate an understanding of basic semiconductor theory and be able to distinguish between metals, semiconductors and insulators using the band gap theory
- Demonstrate an understanding of p-n junction and the diode.
- Calculate and predict the operation of simple diode application circuits.
- Explain the operation of simple diode circuit applications.
- Demonstrate an understanding of the NPN and PNP bit transistors.
- Demonstrate an understanding of transistor biasing and the load line analysis
- Calculate and predict the operation of simple bit circuits.
- Explain the operation of simple bit transistor circuit applications
- Demonstrate an understanding of the FET transistor operation and biasing
- Demonstrate a hands-on ability to utilize basic electronic equipment for measurement, display and interpretation of electronic data and information.

Module content:

Unit 1: Circuit Theorems

- Independent and Dependent Sources
- Source transformation
- Superposition Theorem
- Thevenin's Theorem
- Norton's Theorem
- Maximum Power Transfer Theorem

Unit 2: Basic Semiconductor Theory

- Conductors, Insulators and Semiconductors
- Intrinsic and Extrinsic Semiconductors.

Unit 3: Diodes and Applications

- P-N Junction, Junction Diode and Biasing
- Diode Models

- Circuit Analysis Using Diodes
- Types of Diodes
- Diode Applications: Rectifiers, Clippers, Clampers and Logic Gates.

Unit 4: Transistors and Applications

- BJT Structure: NPN and PNP
- Operation of NPN BJT
- I-V Characteristics of NPN Transistor
- BJT Model
- DC Circuit Analysis and Biasing of Transistors
- BJT Basic Applications: Transistor Switch, Common Emitter Amplifier, Common Collector Amplifier, Darlington Pair Transistors, Logic Gates
- Basic JFET operation and biasing.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM115	Semester 1	NQF Level: 5

Electricity, Magnetism and Circuits

Module outcomes:

The learner should be able to:

- Demonstrate understanding and application of electric and magnetic field quantities.
- Demonstrate understanding and application of basic concepts in DC circuit analysis
- Solve simple DC circuits using general DC circuit analysis methods.
- Demonstrate an understanding of capacitors and inductors.
- Solve simple RC and RL time dependent circuits.
- Demonstrate a hands-on ability to utilize basic electronic equipment with respect to measurement and interpretation of electronic data.

Module content:

Unit 1: Electric Current and Resistance: Current in a conductor, Resistivity

- Resistance
- Electric Field Strength and Potential Difference
- Ohm's Law
- The Drude's Model of conduction.

Unit 2: Electric Circuits

- Electromotive Force (EMF)
- Series and parallel resistor combinations
- Kirchhoff's rules for circuits

- Circuit reduction techniques

Unit 3: Basic electrical dc circuit analysis

- Cramer's rule
- Branch current method
- Mesh analysis
- Nodal analysis

Unit 4: Capacitors and dielectrics

- Capacitors and capacitance
- Combinations of capacitors – Series and Parallel
- The energy stored in a capacitor
- Dielectrics
- RC circuits.

Unit 5: Magnetic Circuits, Inductance and Inductors

- Magnetic Field and magnetic flux
- Faraday's Law and Lenz's Law
- Inductance
- Combinations of Inductors– Series and Parallel
- Energy stored inductors
- RL circuits.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM127	Semester 2	NQF Level: 5

Introduction to Electronics

Module outcomes:

The learner should be able to:

- Demonstrate an understanding of circuit theorems, and their application in the analysis of direct current circuits
- Demonstrate an understanding of basic semiconductor theory and be able to distinguish between metals, semiconductors and insulators using the band gap theory
- Demonstrate an understanding of p-n junction and the diode.
- Calculate and predict the operation of simple diode application circuits.
- Explain the operation of simple diode circuit applications.
- Demonstrate an understanding of the NPN and PNP bit transistors.
- Demonstrate an understanding of transistor biasing and the load line analysis
- Calculate and predict the operation of simple bit circuits.

- Explain the operation of simple bit transistor circuit applications
- Demonstrate an understanding of the FET transistor operation and biasing
- Demonstrate a hands-on ability to utilize basic electronic equipment for measurement, display and interpretation of electronic data and information.

Module content:

Unit 1: Circuit Theorems

- Independent and Dependent Sources
- Source transformation
- Superposition Theorem
- Thevenin's Theorem
- Norton's Theorem
- Maximum Power Transfer Theorem

Unit 2: Basic Semiconductor Theory

- Conductors, Insulators and Semiconductors
- Intrinsic and Extrinsic Semiconductors.

Unit 3: Diodes and Applications

- P-N Junction, Junction Diode and Biasing
- Diode Models
- Circuit Analysis Using Diodes
- Types of Diodes
- Diode Applications: Rectifiers, Clippers, Clampers and Logic Gates.

Unit 4: Transistors and Applications

- BJT Structure: NPN and PNP
- Operation of NPN BJT
- I-V Characteristics of NPN Transistor
- BJT Model
- DC Circuit Analysis and Biasing of Transistors
- BJT Basic Applications: Transistor Switch, Common Emitter Amplifier, Common Collector Amplifier, Darlington Pair Transistors, Logic Gates
- Basic JFET operation and biasing.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM215	Semester 1	NQF Level: 6
Analogue Electronics and Systems		

Module outcomes:

The learner should be able to:

- Demonstrate an understanding of BJT and FET transistor characteristics, transistor biasing and amplifier DC and AC equivalents models;
- Demonstrate an understanding of amplifiers as filters in terms of their frequency characteristics and transfer functions;
- Demonstrate a hands-on ability to apply basic electronic measurement and test equipment and techniques to the measurement, display, and interpretation of electronic quantities in AC and DC circuits and circuits containing active devices.

Module content:

Unit 1: Transistors

- Independent and Dependent Sources
- BJT Transistor I-V characteristics
- Basic Bipolar Junction Transistor (BJT) circuits and biasing
- Load lines and the operating point
- AC equivalent circuits for BJT amplifiers
- Large signal analysis of BJT transistors- amplifiers and amplifier building blocks.
- Field Effect Transistor (FET) circuits and biasing
- Small signal analysis of FET transistors

Unit 2: AC Theory

- Frequency, Phase, Impedance, RLC series and parallel circuits, Phasor diagrams
- Energy storage in capacitors and capacitor circuits
- Filters - low-pass, band-pass and high-pass
- Resonant circuits
- Transformers

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM227	Semester 2	NQF Level: 6
Digital Electronics and Systems		

Module outcomes:

The learner should be able to:

- Demonstrate an understanding of basic logic concepts and elements;
- Apply Boolean algebra and Karnaugh map techniques to logic minimization and circuit realization of logic expressions;
- Demonstrate an understanding of combinational systems such arithmetic circuits, digital building blocks, and memory devices;
- Demonstrate a hands-on ability to apply basic electronic equipment and techniques to the measurement and interpretation of electronic quantities in digital electronics.

Module content:

- Review of basic logic concepts and logic gates
- Combinational logic including logic identities
- Introduction to Boolean algebra, Karnaugh maps and logic minimization
- Circuit implementation of logical expressions, TTL logic specifications.
- Functions of Combinational logic such as half and full adders, decoders, comparator, multiplexer, de-multiplexers, decoders, encoders
- Sequential logic circuits including memory devices: latches and flip-flops
- Sequential Logic Design – counters

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM315	Semester 1	NQF Level: 7
Advanced Analogue Electronics		

Module outcomes:

The learner should be able to:

- Demonstrate an understanding of feedback and its implementation and effect in amplifiers;
- Employ operational amplifiers and related circuit configurations to achieve certain operational objectives;
- Design and apply passive and active filter configurations;
- Acquire an understanding of the high-frequency behavior of active devices;
- Apply high-frequency techniques in the design of oscillators and other high-frequency circuits.

- Demonstrate a hands-on ability to apply electronic test equipment and techniques to the measurement, display and interpretation of electronic quantities in feedback, operational amplifiers, filters and high frequency circuits.

Module content:

- Feedback Theory including basic feedback concepts, definitions, configurations and classifications, advantages and disadvantages.
- Frequency response and stability of feedback amplifiers.
- Advanced operational amplifier circuits.
- Active Filters and Oscillators.
- Voltage Regulation and Power Circuits.
- High Frequency Techniques including HF amplifiers and modulation.
- An introduction to amplitude and frequency modulation techniques.
- An introduction to power electronics devices.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM316	Semester 1	NQF Level: 7

Introduction to Signal and Systems

Module outcomes:

The learner should be able to demonstrate an understanding of:

- Electronic signals in continuous-time and discrete-time;
- The manner in which these can be transformed using the Laplace transform and the Fourier transform;
- Systems in general and linear time-invariant systems in particular;
- The manner in which signals are processed by LTI systems;
- The application of Fourier and Laplace transform techniques in the design and analysis of discrete-time and continuous-time LTI systems; basic filtering, signal sampling and reconstruction.

Module content:

- Continuous-Time Signals and Systems,
- Discrete-Time Signals and Systems,
- Continuous-Time Linear Time-Invariant Systems,
- Discrete-Time Linear Time-Invariant Systems
- Laplace Analysis for Continuous Signals and Systems
- Fourier Analysis for Continuous Signals and Systems,
- Laplace Analysis of Discrete-Time Linear Time-Invariant Systems

- Continuous- and Discrete-Time Filtering, and
- Modulation and Sampling

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM327	Semester: 2	NQF-Level: 7

Advanced Digital Techniques and Systems

Module outcomes:

The learner should be able to:

- Demonstrate an understanding and application of advanced logic concepts and techniques;
- Understand and apply practical considerations in the interconnection of logic elements to form logic circuits and modules for specific operation;
- Understand and apply practical considerations in the interfacing of CMOs and TTL devices;
- Apply methods for digital to analogue and analogue to digital conversion;
- Demonstrate familiarity with the characteristics of common integrated circuit chips;
- Acquire basic skills in programmable logic devices and tools;
- Acquire hands-on ability to apply basic electronic test gear and techniques to the measurement and interpretation of electronic quantities in advanced digital electronics.

Module content:

- Sequential Circuit Design – case of counters
- Counters, Registers and Memories
- Introduction Digital Signal Processing, including DACs, ADCs and Sampling
- Interfacing Basics
- Assertion-level logic notation, TTL and CMOS, common gates, characteristics
- Tristate and open-collector devices, Reduction techniques
- Digital/Analogue interfacing of CMOS and TTL devices
- Introduction to Programmable Logic Devices and Languages – FPGAs, CPLDs using VHDL

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

ELYM328	Semester: 2	NQF-Level: 7
Introduction to Microcontroller Systems		

Module outcomes:

The learner should be able to:

- Describe the differentiating factors between micro-processors and micro-controllers in general;
- Appreciate the circumstances for preferences between the two;
- Design and program simple systems based on a micro-controller.

Module content:

- Computer architecture
- Assembly language concepts
- Bus systems and Interfacing
- Software systems concepts including programming, operating systems, files, memory
- Data communications concepts
- Introduction to microcontrollers - an introduction based on a case study of a popular family of microcontrollers such as the PIC16F84 family plus support hardware for microcontrollers

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NAS.2.9.9 PHYSIOLOGY / *FISIOLOGIE*

See the Faculty of Health Sciences yearbook for the module outcomes of FLGX and FKLT/

Sien die Fakulteit Gesondheidswetenskappe se jaarboek vir die module uitkomste van FLGX en FKLT.

NAS.2.9.10 PHYSICS / *FISIKA*

NPHY111	Semester 1	NQF Level: 5
Basic Physics I/ ***Basiese Fisika I***		

Module outcomes:

On completing the module, the student must have:

- Formal mathematical knowledge and informed understanding of the fundamental concepts underpinning the sub-themes of physics, i.e., kinematics, Newtonian laws of motion, work and energy, momentum, rotation and rolling, equilibrium, gravity, fluid mechanics, simple harmonic motion, waves, the study of heat, and thermodynamics.
- An awareness of the development of physical measurements and theories that shaped the progress of physics.
- The ability and skills to explain certain parts of the theory by means of the basic differential and integral calculus; to solve a variety of natural science problems in the above-mentioned sub themes and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment.
- Effective utilization of basic research skills, such as conducting experiments, measuring basic observable quantities related to special and controlled cases of natural processes, and processing these data. The ability to reliably communicate these discipline-specific ideas by writing a report in an accurate and coherent way while showing respect for conventions related to copyright and plagiarism.
- The ability to manage his or her learning and implement the discipline-specific learning strategies given in the NPHY111 study guide to address learning problems.
- The ability to work in a group and make appropriate contributions and sharing resources to successfully complete the practical sessions and thereby taking co-responsibility for the attainment of the outcomes by the group.
- Conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct. /

Module-uitkomste:

Na voltooiing van die module moet die student:

- *Formele wiskundige kennis en grondige begrip hê van die fundamentele konsepte wat voorkom binne die volgende subtemas van Fisika, nl. kinematika, Newton se bewegingswette, arbeid en energie, momentum, rotasie en rolbeweging, ewewig, gravitasie, fluïede meganika, enkelvoudige harmoniese beweging, golwe, warmteleer en termodinamika.*
- *’n Bewustheid hê van die ontwikkeling van fisiese waarnemings en teorieë wat die vooruitgang van Fisika gerig het.*
- *Die vermoë en vaardigheid hê om sekere gedeeltes van die teorie met behulp van basiese differensiaal- en integraalrekene te beskryf; om ’n verskeidenheid van natuurkundige probleme in bogenoemde subtemas op te los sowel as die evaluering van die antwoorde en toepassing daarvan m.b.t. verskynsels binne ’n goed gedefinieerde en bekende omgewing.*
- *Aanwending van basiese navorsingsvaardighede, soos die uitvoering van eksperimente, meting van basiese waarneembare groothede en dataverwerking. Die vermoë omvakspesifieke idees skriftelik in 'n verslag te kommunikeer op 'n koherente, akkurate en betroubare wyse met inagneming van die konvensies rakende kopiereg en plagiaat.*
- *Die vermoë hê om sy of haar leeraktiwiteite te bestuur en vakspesifieke leerstrategieë, soos bespreek in die NPHY111-studiegids, te implementeer om leerprobleme aan te spreek.*
- *Die vermoë hê om in 'n groep te kan werk en gepaste bydraes te maak en hulpbronne te deel om die praktiese sessies suksesvol af te handel; om sodoende medeverantwoordelikheid te neem vir die bereiking van die gestelde uitkomste deur die groep.*

- *Gedrag binne'n akademiese konteks toon wat voldoen aan die reëls soos gestipuleer in die Noordwes-Universiteit se gedragskode.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY121	**Semester 2**	**NQF Level: 5**

Basic Physics II/

Basiese Fisika II

Module outcomes:

On completing of the module the student must have:

- Formal mathematical knowledge and informed understanding of the fundamental concepts underpinning the sub-themes of physics, i.e. electricity, magnetism, optics and topics from quantum, atom and nuclear physics.
- An awareness of the development of physical measurements and theories that shaped the progress of physics.
- Strengthening of his/her ability and skills to explain certain parts of the theory by means of the basic differential and integral calculus; to solve a variety of natural science problems in the above-mentioned sub-themes and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment.
- Effective utilization of basic research skills, such as conducting experiments, measuring basic observable quantities related to special and controlled cases of natural processes, and processing these data. The ability to reliably communicate these discipline-specific ideas by writing a report in an accurate and coherent way while showing respect for conventions related to copyright and plagiarism.
- The ability to manage his or her learning and implement the discipline-specific learning strategies given in the NPHY121 study guide to address learning problems.
- The ability to work in a group and make appropriate contributions and sharing resources to successfully complete the practical sessions and thereby taking co-responsibility for the attainment of the outcomes by the group.
- Conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct. /

Module-uitkomste:

Na voltooiing van die module moet die student:

- *Formele wiskundige kennis en grondige begrip van die fundamentele konsepte van die volgende subtemas van Fisika hê, nl. elektrisiteit en magnetisme, optika en onderwerpe uit die kwantum-, atoom- en kernfisika.*

- *’n Bewustheid van die ontwikkeling van fisiese waarnemings en teorieë wat die vooruitgang van Fisika gerig het.*
- *Die versterking van sy/haar vermoë en vaardigheid om sekere gedeeltes van die teorie met behulp van basiese differensiaal- en integraalrekene te beskryf; om ’n verskeidenheid van natuurkundige probleme in bogenoemde subtemas op te los sowel as die evaluering van die antwoorde en toepassing m.b.t. verskynsels binne ’n goed gedefinieerde en bekende omgewing.*
- *Aanwending van basiese navorsingsvaardighede, soos die uitvoering van eksperimente, meting van basiese waarneembare groothede en dataverwerking. Die vermoë om vakspesifieke idees skriftelik in 'n verslag te kommunikeer op 'n koherente, akkurate en betroubare wyse met inagneming van die konvensies rakende kopiereg en plagiaat.*
- *Die vermoë hê om sy of haar leeraktiwiteite te bestuur en vakspesifieke leerstrategieë, soos bespreek in die NPHY121-studiegids, te implementeer om leerprobleme aan te spreek.*
- *Die vermoë om in 'n groep te kan werk en gepaste bydraes te maak en hulpbronne te deel om die praktiese sessies suksesvol af te handel; om sodoende medeverantwoordelikheid te neem vir die bereiking van die uitkomste deur die groep.*
- *Gedrag in die akademiese omgewing te toon wat voldoen aan die gedragskode van die Noordwes-Universiteit.*

Method of delivery: Full Time

Metode van aflewering: Voltyds

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY123	**Semester 2**	**NQF-Level: 5**

Introduction to Physics

Module Outcomes:

Upon completion of this course the student would:

- Have a detailed and integrated knowledge of Basic Physics, as especially applicable to the specialized fields of Mechanics, electricity and magnetism.
- Be able to demonstrate mathematical knowledge of the fundamental principles i.e. force, work, energy, momentum, electrostatics, direct currents circuits, magneto statics, electromagnetic induction and alternating currents.
- Derive and understand the awareness of the development of physical measurements and theories that shaped the progress of physics.
- Demonstrate a detailed knowledge of applying vector skills to solve kinematics problems and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment.
- Apply the above specialized skills and integrated knowledge to identify and creatively solve complex and unfamiliar problems at the forefront of the field in mechanics and electromagnetism by selecting and applying the correct problem solving techniques, and evaluating and critically reviewing the

rigorous solutions acquired by referring to multiple sources in the scientific literature, taking full responsibility for the work done.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY124	Semester 2	NQF Level: 8

Introduction to Basic Physics Concepts

Module outcomes:

Students should be able to:

- Have a detailed and integrated knowledge of Basic Physics, as especially applicable to the specialized fields of Mechanics, electricity and magnetism;
- Demonstrate mathematical knowledge of the fundamental principles i.e. Force, work, energy, momentum, electrostatics, direct currents circuits, magneto statics, electromagnetic induction and alternating currents;
- Derive and understand the awareness of the development of physical measurements and theories that shaped the progress of physics;
- Demonstrate a detailed knowledge of applying vector skills to solve kinematics problems and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment;
- Apply the above specialized skills and integrated knowledge to identify and creatively solve complex and unfamiliar problems at the forefront of the field in mechanics and electromagnetism by selecting and applying the correct problem solving techniques, and evaluating and critically reviewing the rigorous solutions acquired by referring to multiple sources in the scientific literature, taking full responsibility for the work done.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY171	Year Module	NQF-Level: 5
Basic Physics I		

Module outcomes:

On completing of the module the student must have:

- Formal mathematical knowledge and informed understanding of the fundamental concepts underpinning the subthemes of physics, i.e., kinematics, Newtonian laws of motion, work and energy, momentum, rotation and rolling, equilibrium, gravity, fluid mechanics, simple harmonic motion, waves, the study of heat, and thermodynamics.
- An awareness of the development of physical measurements and theories that shaped the progress of physics.
- The ability and skills to explain certain parts of the theory by means of the basic differential and integral calculus; to solve a variety of natural science problems in the above-mentioned subthemes and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment.
- Effective utilisation of basic research skills, such as conducting experiments, measuring basic observable quantities related to special and controlled cases of natural processes, and processing these data. The ability to reliably communicate these discipline-specific ideas by writing a report in an accurate and coherent way while showing respect for conventions related to copyright and plagiarism.
- The ability to manage his or her learning and implement the discipline-specific learning strategies given in the FSKS111 study guide to address learning problems.
- The ability to work in a group and make appropriate contributions and sharing resources to successfully complete the practical sessions and thereby taking co-responsibility for the attainment of the outcomes by the group.
- Conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct.

Method of delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY172	Year Module	NQF-Level: 5
Basic Physics II		

Module outcomes:

On completing of the module the student must have

- Formal mathematical knowledge and informed understanding of the fundamental concepts underpinning the subthemes of physics, i.e. electricity, magnetism, optics and topics from the quantum, atom and nuclear physics.
- An awareness of the development of physical measurements and theories that shaped the progress of physics.

- Strengthening of his/her ability and skills to explain certain parts of the theory by means of the basic differential and integral calculus; to solve a variety of natural science problems in the above-mentioned subthemes and to evaluate the answers and apply them to phenomena within a well-defined and familiar environment.
- Effective utilisation of basic research skills, such as conducting experiments, measuring basic observable quantities related to special and controlled cases of natural processes, and processing these data. The ability to reliably communicate these discipline-specific ideas by writing a report in an accurate and coherent way while showing respect for conventions related to copyright and plagiarism.
- The ability to manage his or her learning and implement the discipline-specific learning strategies given in the FSKS121 study guide to address learning problems.
- The ability to work in a group and make appropriate contributions and sharing resources to successfully complete the practical sessions and thereby taking co-responsibility for the attainment of the outcomes by the group.
- Conduct in the academic environment that adheres to the rules as stipulated by the North-West University code of conduct.

Method of Delivery: Full Time

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

FSKS113	**Semester 1**	**NQF Level: 5**

Physics for Biology I/

Fisika vir Biologie

Module outcomes:

Students should be able to:

Knowledge:

- Knowledge and insight in how physics underlies natural science phenomena that are selected mainly from biological sciences by explaining and discussing topics such as kinematics, Newtonian laws of motion, torques, work, energy and power, with applications to the human body, fluid mechanics, pressure, surface tension, viscosity, with applications to the flow of blood, theory of heat, and thermodynamics.

Skills:

- Skills in measuring, processing and reporting on natural science processes.

Module-uitkomste:

Die student moet in staat wees om:

Kennis:

- *Kennis en insig t.o.v. hoe Fisika natuurwetenskaplike verskynsels, hoofsaaklik vanuit die biologiese wetenskappe, onderlê deur die volgende onderwerpe te verduidelik en te bespreek: kinematika, Newton se bewegingswette, wringkragte, arbeid, energie en drywing met toepassings op die menslike liggaam, fluïede meganika, druk, oppervlakspanning, viskositeit, met toepassings in bloedvloei, warmteleer en termodinamika.*

Vaardighede:

- *Vaardighede in die meting, verwerking en verslaggewing van natuurwetenskaplike prosesse.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)

Final Examination mark (50%)

FSKS123	**Semester 2**	**NQF Level: 5**

Physics for Biology II/
Fisika vir Biologie II

Module outcomes:
Students should be able to:
Knowledge:

- Knowledge and insight in how physics occurs in natural science phenomena so that he/she can explain and discuss electrostatics, electric potential, electric circuits, magnetism and electromagnetic waves, with applications to apparatus used in biological sciences, as well as waves, sound optics and nuclear physics.

Skills:

- Skills to solve problems in measuring, processing and reporting natural science processes.

Method of delivery: Full Time

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY211	Semester 1	NQF Level: 6
Electricity and Magnetism/ ***Elektrisiteit en Magnetisme***		

Module outcomes:

On completing of the module the student must:

- Be able to demonstrate understanding and detailed knowledge of the fundamental concepts underpinning the sub-themes of electricity and magnetism, i.e. the laws of electrostatics and magneto-statics in a vacuum and in matter as well as introductory electrodynamics, which includes the electromotive force and electromagnetic induction.
- Have a clear understanding of prevalent schools of thought that determined the progress within the field of electricity and magnetism.
- Have the ability to evaluate, select and apply the correct laws to describe different phenomena in the context of electricity and magnetism.
- Have the ability to solve different problems by calculating electrostatic potentials and fields, magneto-static fields as well as basic problems in electrodynamics like the electromotive force and electromagnetic induction.
- Be able to use discipline-specific methods of scientific enquiry, decision-making and information gathering to execute practical work. Analyse the results and produce an accurate and coherent written and/or oral account of the information using an appropriate discipline-specific format. Understand the ethical implications of decisions and actions in this context.
- In the practical sessions, students will work on several problems with emphasis being put on presenting scientific data analysis in the form of a written report.

Module uitkomste:

Na voltooiing van die module moet die student:

- *In staat wees om grondige begrip en gedetailleerde kennis te toon van die fundamentele begrippe onderliggend aan die subtemas van elektrisiteit en magnetisme, nl. Die wette van elektrostatika en magnetostatika in vakuum en in materie sowel as inleidende elektrodinamika, insluitend elektromotoriese krag en elektromagnetiese induksie.*
- *ʼn Duidelike begrip hê om die korrekte wette, wat verskillende verskynsels beskryf, te evalueer, selekteer en toe te pas, binne die konteks van elektrisiteit en magnetisme.*
- *Die vermoë hê om probleme in elektrodinamika, soos elektromotoriese krag en elektromagnetiese induksie op te los.*
- *Gebruik te maak van vakspesifieke metodes van wetenskaplike ondersoek, besluitneming en versameling van inligting, om praktiese werk uit te voer.*
- *Analisering van die resultate en saamstel van akkurate en koherent-geskrewe en/of mondelingse aanbieding van die inligting deur gebruik te maak van toepaslike vakspesifieke formaat.*
- *Verstaan van die etiese implikasies van besluite en optrede binne hierdie konteks.*
- *In praktiese sessies sal student werk opʼn sekere probleem met fokus op die voordra van wetenskaplike data in die vorm vanʼn skriftelike verslag.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY212	**Semester 1**	**NQF Level: 6**
Modern Physics/ ***Moderne Fisika***		

Module outcomes:
On completing of the module the student must have

- Detailed knowledge of and the ability to apply the fundamental concepts and theories underpinning Modern Physics at an introductory level, i.e., Special Relativity, Lorentz's Transformations, Time Dilation, Length Contraction, the Doppler Effect, the Particle Properties of Waves, Blackbody Radiation, the Photoelectric Effect, the properties of X-Rays in unfamiliar, but relevant contexts.
- In the practical sessions, students will work on several problems with emphasis being put on presenting scientific data analysis in the form of a written report. /

Module uitkomste:
Na voltooiing van die module behoort die student

- *'n Gedetailleerde kennis en vermoë tot die toepassing van die fundamentele begrippe en teorieë onderliggend aan Moderne Fisika op inleidende vlak, d.i. Spesiale Relatiwiteit, Lorentz transformasies, Tyddilatasie, Lengtekontraksie, die Doppler Effek, die Deeltjie-eienskappe van golwe, Swartstraling, die Foto-elektriese effek, eienskappe van X-strale in onbekende, maar relevante konteks.*
- *In die praktiese sessies sal studente werk op sekere probleme met fokus op die voordra van wetenskaplike data in die vorm van 'n skriftelike verslag.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)*:*

NPHY221	Semester 2	NQF Level: 6
Introductory Quantum Physics/ ***Inleidende Kwantumfisika***		

Module outcomes:

On completing the module, the student must have

- A theoretical understanding of the phenomenon of waves
- A solid grounding for the study and application of concepts in quantum mechanics.
- State the laws, definitions and principles of above-mentioned concepts concisely in their own words, without excluding any relevant information.
- Solve the aforementioned differential equations as initial value problems.
- Discuss the evolution of the aforementioned situations with time.
- Discuss the Heisenberg uncertainty principle meaningfully.
- Solve Schrödinger's equation for (i) a free particle, and (ii) a particle in an infinite square well.
- Solve problems similar to those encountered in the examples; the problems to be solved are applications of the above-mentioned topics.
- In the practical sessions, students will work on several problems with emphasis being put on presenting scientific data analysis in the form of a written report.

Module uitkomste:

Na voltooiing van hierdie kursus behoort studente:

- *Teoretiese begrip van die verskynsel van golwe verwerf het.*
- *'n Deeglike grondslag vir die studie en toepassing van die begrippe in kwantummeganika ontwikkel het.*
- *In staat wees om die fundamentele wetmatighede, definisies en begrippe van bogenoemde beginsels in hul eie woorde te stel, sonder om enige relevante inligting uit te laat.*
- *In staat te wees om bogenoemde differensiaalvergelykings as aanvangswaarde-probleme op te los.*
- *In staat wees om die evolusie van bogenoemde situasies met tyd te bespreek.*
- *In staat wees om Heisenberg se onsekerheidsbeginsel betekenisvol te bespreek.*
- *In staat wees om die Schrödingervergelyking op te los vir (i) 'n vrye deeltjie, en (ii) 'n deeltjie in oneindige diep potensiaal put.*
- *In staat wees om probleme, soortgelyk aan dié wat hulle in voorbeelde behandel het, en wat toepassings van bogenoemde onderwerpe is, te kan oplos.*
- *In die praktiese sessies sal studente werk op sekere probleme met fokus op die voordra van wetenskaplike data in die vorm van 'n skriftelike verslag.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY222	Semester 2	NQF-Level: 6
Optics and Waves/ ***Optika en Golwe***		

Module outcomes:

On completion of the module the student must have:

- Detailed knowledge of, and the ability to apply, the fundamental concepts and theories underpinning the physics of optics and waves, i.e., geometrical optics, electromagnetic wave properties and propagation, interference, diffraction and polarization in unfamiliar, but relevant contexts.
- A critical understanding of the development of knowledge within the physics sub-fields optics and waves as a result of the existence of different schools of thought.
- The ability and skill to evaluate, select, and effectively apply methods, procedures and applications typical to optics and waves to solve problems within unfamiliar contexts.
- The ability and skill to use discipline-specific methods of scientific enquiry to investigate relevant problems within optics and waves through well-developed processes of analysis, synthesis and evaluation.
- Apply the results of a scientific investigation or experiment in a given context in optics and waves and communicate these findings accurately and coherently with an understanding of and respect for intellectual property conventions, copyright and rules on plagiarism.
- The ability to make decisions and show appropriate behaviour in familiar and new subject-specific contexts guided by an appreciation for the interdependence of different systems.
- Take responsibility for his or her learning progress by application of relevant learning strategies and as measured against given criteria as stipulated in the NPHY222 (formerly FSKS212) study guide.
- The ability to work in a group and make appropriate contributions and sharing resources to successfully complete the practical sessions and thereby taking co-responsibility for the attainment of the outcomes by the group within a well-defined context. /

Module uitkomste:

Na voltooiing van die module behoort die student

- *'n In-diepte kennis van die konsepte en teorieë hê binne die vakgebied Fisika, en spesifiek die subtemas optika en golwe, d.i. geometriese optika, eienskappe en voortplanting van elektromagnetiese straling, interferensie, diffraksie en polarisasie en die vermoë om dit binne onbekende, maar relevante situasies toe te pas.*
- *Kritiese begrip hê van die ontwikkeling van kennis binne die Fisika-subtemas van optika en golwe as gevolg van die bestaan van verskillende denkskole.*
- *Die vermoë om tipiese metodes en prosedures van optika en golwe te evalueer, selekteer, en effektief toe te pas om probleme in 'n onbekende konteks op te los.*
- *Die vermoë om vakspesifieke ondersoek-en wetenskaplike metodes te gebruik om probleme van toepassing op optika en golwe te ondersoek deur middel van goed-ontwikkelde analise-, sintese- en evalueringsprosesse.*
- *Die vermoë om die bevindinge van 'n wetenskaplike ondersoek in 'n gegewe subtema van optika en golwe toe te pas en akkuraat en duidelik te kommunikeer met begrip en respek vir die konvensies rondom intellektuele eiendom, kopiereg en plagiaat.*
- *Die vermoë om besluite te neem en gepaste gedrag te toon binne bekende en nuwe vakspesifieke kontekste, gemotiveer deur 'n waardering vir die interafhanklikheid van die verskillende stelsels.*
- *Verantwoordelikheid neem vir sy of haar akademiese vordering deur die toepassing van relevante leerstrategieë en soos gemeet aan die gegewe kriteriums wat volledig in die NPHY222 studiegids uiteengesit is.*
- *Die vermoë om in 'n groep te kan werk en gepaste bydraes te maak en hulpbronne te deel om die praktiese sessies suksesvol af te handel; om sodoende medeverantwoordelikheid te neem vir die bereiking van die uitkomste deur die groep binne 'n goed-afgebakende konteks.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY311	**Semester 1**	**NQF Level: 7**

Electromagnetism/

Elektromagnetisme

Module outcomes:

- Initially, this module follows and builds on what was mastered in module NPHY211 (Electricity and Magnetism) by providing a firm theoretical background to describe previously learnt concepts, so that students gain a more mathematically formal understanding and integrated and detailed knowledge of electricity and magnetism while being able to relate previously learnt material with new concepts encountered in this module.
- Subsequently, the Maxwell equations in both a vacuum and matter in general are derived. These equations are fundamental to our understanding of all electromagnetic phenomena.
- Students proceed to master and evaluate solutions to these equations in various scenarios, such as for dielectrics, conductors, waveguides, and optical fibres, and resolve complex problems related to these applications by identifying, selecting and applying the correct problem-solving techniques.
- Furthermore, basic research skills will be acquired and applied in the practical component of this course, where some aspects of electromagnetism are experimentally investigated. Here students will conduct experiments effectively which measure basic observable quantities related to special and controlled cases of natural processes, processing and critically evaluating the data so acquired.
- Students will learn how to reliably demonstrate, develop and communicate discipline-specific ideas by planning and writing experimental reports in an accurate and coherent way, while respecting conventions related to copyright and plagiarism and taking full responsibility for their work with regards to this, thereby gaining valuable scientific writing skills. /

Module-uitkomste:

- *Aanvanklik volg hierdie module op kennis wat in NPHY211 (Elektrisiteit en Magnetisme) bemeester is en bou daarop, en verskaf dusdoende 'n grondige teoretiese agtergrond om en reeds-bekende konsepte te beskryf, sodat studente 'n meer wiskundig-formele begrip en geïntegreerde en gedetailleerde kennis van elektrisiteit en magnetisme kan verkry en ook in staat sal wees om vooraf-bekende materiaal met nuwe konsepte wat hulle teëkom, in verband te bring.*
- *Vervolgens word die algemene Maxwell-vergelykings in beide vakuum en in materie afgelei. Hierdie vergelykings is grondliggend tot ons begrip van elektromagnetiese verskynsels.*
- *Vervolgens bemeester en evalueer studente oplossings van hierdie vergelykings in verskeie scenario's, soos diëlektrika, geleiers, golfgeleiers, optiese vesels, en los komplekse probleme op in verband met hierdie toepassings deur die korrekte probleemoplossingstegnieke te identifiseer, selekteer en toe te pas.*

- *Verder word basiese navorsingsvaardighede bemeester en toegepas in die praktiese komponent van hierdie kursus, waarin sekere aspekte van elektromagnetisme eksperimenteel ondersoek word. Studente sal hier eksperimente effektief uitvoer, en basiese waarneembare groothede, in verband met spesiale en gekontroleerde gevalle van natuurlike prosesse, meet en sodoende die ingesamelde data verwerk en krities evalueer.*
- *Studente sal leer om betroubaar vakspesifieke idees te demonstreer, ontwikkel en te kommunikeer en om die beplanning en skryf van eksperimentele verslae op 'n akkurate en koherente manier, in ooreenstemming met die konvensies in verband met kopiereg en plagiaat, uit te voer en moet volle verantwoordelikheid aanvaar vir hul werk in hierdie verband, sodat hulle waardevolle wetenskaplike skryfvaardighede kan ontwikkel.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY312	**Semester 1**	**NQF Level: 7**
Wave Mechanics/ ***Golfmeganika***		

Module outcomes:
Students should be able to:
Knowledge:

- By the end of this module, students will have been introduced to the first principles of quantum physics in the form of wave mechanics on atomic scales as replacement of Newtonian mechanics. They will have solved Schrödinger's equation for a variety of cases and will have interpreted the results.

Skills:

- Students learn to do basic quantum mechanical calculations and to solve applicable differential equations. They will acquire a solid mathematical grounding necessary to perform quantum-mechanical calculations. In the practical sessions, they study quantum-mechanical phenomena and report on these by means of computerized reports. /

Module-uitkomste:
Studente moet in staat wees om:
Kennis:

- *Aan die einde van hierdie module het studente met die eerste beginsels van die Kwantumfisika in die vorm van Golfmeganika op atomiese skale as vervanging vir Newtonmeganika, kennis gemaak. Hulle sou die Schrödinger-vergelyking vir 'n verskeidenheid gevalle opgelos het en die resultate geïnterpreteer het.*

Vaardighede:

- *Studente leer om basiese Kwantum meganiese berekenings te doen, en om toepaslike differensiaalvergelykings op te los. Hulle ontvang 'n deeglike wiskundige grondslag om relevante*

Kwantum-meganiese probleme op te los. In die praktikums word Kwantum-meganiese verskynsels bestudeer waaroor rekenaarmatig verslag gelewer word.

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:
The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:
Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.
The weightings will be communicated to students in class and in the study guide.
A participation mark of 40% allows a student admission to the final examination (summative assessment).
Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY321	**Semester 2**	**NQF Level: 7**

Thermodynamics/
Termodinamika

Module outcomes:
Students should be able to:
Knowledge:

- After the introduction in NPHY111, students receive a formal education in the following topics: the zeroth, first, second, and third laws of thermodynamics. The concepts of entropy, TdS-equations, and phase transitions are introduced by a simple statistical description of an isolated system, with emphasis on the example of an ideal gas.

Skills:

- Students learn how to develop and present abstract theory and to apply thermodynamic principles to systems like the atmosphere, and to certain cyclic processes like those of heat engines and refrigerators. Great emphasis is placed on problem solving as the outstanding method to apply physics practically. In the practical sessions, accurate measurements are made on pulsating stars, students learn how to measure heat capacity and they gain experience in applying their thermodynamic knowledge to astrophysical problems. /

Module-uitkomste:
Studente moet in staat wees om:
Kennis:

- *Na die inleiding in NPHY111 kry studente 'n formele opleiding in die volgende onderwerpe: die nulde, eerste, tweede, en derde wette van Termodinamika. Die begrippe entropie, TdS-vergelykings, asook ewewig en fase-oorgange word d.m.v. 'n eenvoudige statistiese beskrywing van 'n geïsoleerde sisteem ingevoer, met klem op die voorbeeld van 'n ideale gas.*

Vaardighede:

- *Studente leer hoe om abstrakte teorie te ontwikkel en weer te gee, en om Termodinamiese beginsels op stelsels soos die atmosfeer en bepaalde sikliese prosesse soos warmtemasjiene en verkoelers toe te pas. Groot klem word op probleemoplossing gelê as dié uitstaande manier om Fisika prakties te kan toepas. In die praktikums word noukeurige metings op pulserende sterre gedoen, studente leer hoe om warmtekapasiteit te meet, en hulle kry ervaring om Termodinamiese kennis op astrofisiese probleme toe te pas.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NPHY322	**Semester 2**	**NQF Level: 7**

Nuclear Physics and Elementary Particles/
Kernfisika en Elementêre Deeltjies

Module outcomes:

The course follows directly on NPHY312, which deals with introductory wave mechanics

Students should be able to:

Knowledge:

- This course follows directly on NPHY312, which deals with introductory wave mechanics. At the end of NPHY322 students have knowledge of nuclear structures and reactions, nuclear decay and models, groups of elementary particles, laws of conservation and the standard quark model for elementary particles.

Skills:

- In the theory, emphasis is placed on formal and conceptual knowledge and applications thereof. In the practical sessions, a talk on a popular topic is required, and projects on the contents of the course are discussed. Great emphasis is placed on the correct written and oral presentation of project reports. Proficiency in using computer graphics software and word processing is acquired. /

Module uitkomste:

Hierdie kursus volg direk op NPHY312 wat oor inleidende Golfmeganika handel.

Studente moet in staat wees om:

Kennis:

- *Hierdie kursus volg direk op NPHY312 wat oor inleidende Golfmeganika handel. Aan die einde van NPHY322 het studente kennis van kernstrukture en -reaksies, kernverval en -modelle, groepe van elementêre deeltjies, behoudswette en die standaard kwarkmodel vir elementêre deeltjies*

Vaardighede:

- *In die teorie word klem gelê op formele en begripskennis en toepassings daarvan. 'n Voordrag oor 'n populêre onderwerp word vereis, terwyl projekte oor die inhoud van die kursus in die praktikums behandel word, waar groot klem op die korrekte skriftelike en mondelinge aanbieding van projekverslae gelê word.*
- *Rekenaargebruik van grafika-pakkette en woordverwerking word aangeleer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/ quizzes, scheduled tests and practical tutorials and reports.

The weightings will be communicated to students in class and in the study guide.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before the examination admission is allowed.
The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final Examination mark (50%)

NAS.2.9.11 GEOGRAPHY / *GEOGRAFIE*

GEOG111 & GEOG171	Semester 1	NQF Level: 5
Introduction to Physical Geography/ ***Inleiding tot Fisiese Geografie***		

Module outcomes:

On completion of the module the student should be able to demonstrate:

- A basic knowledge and informed understanding of systems in Climatology and Geomorphology:
- Appreciate the interactions between subsystems that include:
  - in Climatology: the earth's radiation balance, the climate system, Southern hemisphere and Southern African synoptic scale circulation;
  - in Geomorphology: earth materials and tectonic plates; weathering and mass wasting; karst, fluvial, arid, coastal and glacial processes and landforms;
  - the ability to explain climatic and geomorphological processes that are important in the southern African context;
  - the ability to report on their skills in respect of identifying atmospheric circulation and geomorphological processes and landforms;
  - appropriate practical skills including map reading, basic aerial photo interpretation and visual representation of geographical data.

Module-uitkomste:

Na afhandeling van hierdie module moet student die volgende kan demonstreer:

- *Basiese kennis en ingeligte begrip van stelsels in Klimatologie en Geomorfologie;*
- *Waardering van die interaksies tussen subsisteme insluitende:*
  - *In Klimatologie: die aarde se radiasiebalans, die klimaatsisteem, suidelike halfrond asook Suidelike Afrika sinoptiese skaal sirkulasie;*
  - *in Geomorfologie: grondstowwe, tektoniese plate, verwering en massaverplasing; karst-, fluviale-, woestyn-, kus-, gletserprosesse en – land vorms;*
  - *die vermoë om klimaat- en geomorfologiese prosesse wat belangrik is in 'n Suidelike Afrikaanse konteks, te kan verduidelik;*
  - *die vermoë om hulle vaardighede met betrekking tot die identifisering van atmosferiese sirkulasie asook geomorfologiese prosesse en – land vorme te verwoord;*
  - *toepaslike praktiese vaardighede insluitend kartografiese vaardighede, basiese lugfotovertolking en visuele voorstelling van geografiese data.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

Students have mastered the outcomes when they are able to:

- Write notes on, describe and discuss:

- The nature, variability in space and time, and interaction of earth, atmospheric and biological processes;
- The impact and interaction of human activities on earth, atmospheric and biological processes;
- The ethical issues involved in the impact of human activities on earth, atmospheric and biological processes.

- Identify:
  - The important atmospheric circulation patterns;
  - The important geomorphological features;
  - The important ecological features.
- Explain:
  - The drivers of earth, atmospheric and ecological processes;
- Evaluate how changes in lithospheric, atmospheric, and ecological systems are likely to impact on the human environment;
- Demonstrate capacity to use the basic tools of physical geographers;
- Prepare written essays that show an understanding of the fundamental principles of physical Geography.

GEOG121 & GEOG172	**Semester 2**	**NQF Level: 5**
Introduction to Human Geography/ ***Inleiding tot Menslike Geografie***		

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the main areas of Human Geography, including an understanding of the key terms, concept, facts, principles, rules and theories of Human Geography.
- An ability to identify, evaluate and solve defined, routine and new problems within a familiar context, and to apply solutions based on relevant evidence and procedures or other forms of explanation appropriate to Human Geography.
- An ability to gather information from a range of sources, including oral, written or symbolic texts, to select information appropriate to the task, and to apply basic processes of analysis, synthesis and evaluation on that information in the field of Human Geography.
- An ability to communicate information reliably, accurately and coherently, using conventions appropriate to the context, either in writing, verbally or in practical demonstration, including an understanding of and respect for conventions around intellectual property, copyright and plagiarism in the field of Human Geography.
- An ability to operate in a range of familiar and new contexts, demonstrating an understanding of different kinds of systems, their constituent parts and the relationships amongst these parts, and to understand how actions on one geographical scale can impact on other scales within the same system in Human Geography.
- The ability to engage statistically with geographical data, to interpret the data spatially, and to present it in a comprehensible and coherent format. /

Module-uitkomste:

Na afhandeling van hierdie module moet student die volgende kan demonstreer:

- *Geïntegreerde kennis in die hoofareas van Menslike Geografie, insluitende 'n begrip van sleutelterme, konsepte, feite, beginsels, reëls en teorieë relevant tot Menslike Geografie;*
- *Die vermoë om gedefinieerde, roetine en nuwe probleme binne bekende kontekste te identifiseer, evalueer en op te los; om oplossings toe te pas gebaseer op relevante bewyse en prosedures of ander vorms van verduideliking gepas vir Menslike Geografie;*

- *Die vermoë om inligting van verskeie bronne, insluitende mondelinge, geskrewe of simboliese tekste, te selekteer wat gepas is vir 'n taak, asook om die basiese prosesse van analise, sintese en evaluering van daardie inligting toe te pas;*
- *Die vermoë om inligting betroubaar, akkuraat en samehangend te kommunikeer deur gebruik te maak van konvensies wat gepas is vir die konteks, in geskrewe vorm, of verbaal, of d.m.v. praktiese demonstrasie, insluitend 'n begrip van en respek vir konvensies oor intellektuele eiendom, kopiereg en plagiaat;*
- *Die vermoë om in 'n reeks van bekende en nuwe kontekste te kan funksioneer, deur begrip te toon van verskillende tipes stelsels, hul samestellende dele en die verbande daartussen.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

Students have mastered the outcomes of this module if they are able to:

- Write notes on, describe and discuss:
  - Ferent aspects and components of Human Geography
  - The integrated nature of Geography and how it related to everyday phenomena in the world around us.
- Identify:
  - Human Geography problems on a higher cognitive level and present explanations for these problems.
  - Demonstrate the ability to statistically engage with geographical data, interpret spatially and present it in a comprehensible and coherent format.
- Explain:
  - Every day and current international events from a Human Geography perspective.

Evaluate how events on one Geographical scale can impact on other Geographical scales.

GEOG211	**Semester 1**	**NQF Level: 6**

Physical Geography/

Fisiese Geografie

Module outcomes:

On completing the module, the student should have in-depth knowledge and understanding of earth and atmospheric processes and their South African context. In particular students should be able to demonstrate:

- In-depth knowledge and understanding of South African Geomorphology, including controls on landforms, examples of fluvial, sedimentary, arid and coastal Geomorphology, the relationship between landscapes, mankind and environmental change;
- In-depth knowledge and understanding of South African weather and climate, including typical synoptic conditions, weather forecasting, cloud and precipitation processes;
- Detailed knowledge and critical understanding of the use of observations and tools to forecast the weather, including synoptic charts, basic meteorological instrumentation, adiabatic maps like tephigrams, meteorological satellites, weather radar and the output of numerical weather models;
- Demonstrate skills to interpret data from basic meteorological instrumentation and meteorological satellites by carrying out weather measurements and processing and evaluating the data; by constructing and interpreting tephigrams and performing and interpreting computer-assisted statistical operations, individually but also as member of a group;
- The ability to identify and effectively implement acceptable information gathering techniques to do research on South African climatological and geomorphological problems of limited scope, and to communicate possible solutions orally or in writing.

Module-uitkomste:

Aan die einde van die module moet die student in staat wees om die volgende te demonstreer:

- *Grondige kennis en begrip van Suid-Afrikaanse Geomorfologie, o.a. beheer op land vorms; voorbeelde van fluviale, sedimentêre, dorre en kusgeomorfologie; die verwantskap tussen landskappe, die mens en omgewingsverandering;*
- *Grondige kennis en begrip van Suid-Afrikaanse weer en klimaat, insluitend tipiese sinoptiese toestande, weervoorspelling, wolk- en neerslagprosesse;*
- *Grondige kennis en kritiese begrip van die gebruik van waarnemings en gereedskap om die weer te voorspel, insluitend sinoptiese kaarte, basiese weerkundige instrumentasie, adiabaatkaarte soos tephigramme, weerkundige satelliete, weerradar en die uitset van syferkundige weermodelle;*
- *Vaardighede om data van basiese weerkundige instrumentasie en weerkundige satelliete te interpreteer deur die uitvoer van weerkundige metings, verwerking en evaluering van data; die konstruksie en interpretasie van tephigramme; uitvoer en interpretasie van rekenaarondersteunde statistiese prosedures, individueel of as lid van ŉ groep;*
- *Die vermoë om aanvaarbare inligtingversamelingstegnieke te identifiseer en effektief toe te pas ten einde navorsing te kan doen oor Suid-Afrikaanse klimaat- en geomorfologiese probleme met beperkte omvang, en die moontlike oplossings mondelings of skriftelik te kommunikeer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

- Write notes on, describe and discuss:
  - The nature, variability in space and time, and interaction of earth, atmospheric, hydrologic and biological processes of southern Africa;
  - The impact and interaction of human activities on earth, atmospheric, hydrologic and biological processes of southern Africa;
  - The ethical issues involved in the impact of human activities on earth, atmospheric, hydrologic and biological processes.
- Identify:
  - The important atmospheric circulation patterns of southern Africa;
  - The important geomorphological features of southern Africa;
  - The important ecological features of southern Africa;
  - Important features of the global and regional water cycle.
- Explain:
  - The drivers of earth, atmospheric, hydrologic and ecological processes of southern Africa.
- Evaluate how changes in atmospheric, hydrologic, geomorphological and ecological systems are likely to impact on the human environment.
- Demonstrate capacity to use the typical tools of physical geographers.
- Prepare written essays that show an understanding of the fundamental principles of physical geography in the southern African context.

GEOG212	**Semester 1**	**NQF Level: 6**

Environmental Thermodynamics/

Omgewingstermodinamika

Module Outcomes:

On completion of the module, the candidates should be able to demonstrate a thorough and advanced knowledge of, and skills in classical thermodynamics applied to the environment by using earth's atmosphere as a case study.

Students should:

- Have in-depth knowledge and a critical understanding of the vertical variation of the thermodynamic variables in the atmosphere,
- Have in-depth knowledge and a critical understanding of the relevant processes that govern the thermodynamic state and change in state of air parcels,
- Demonstrate skills to interpret thermodynamic diagrams,
- Have understanding how thermodynamic processes relate to and create the weather phenomena,
- Further developing effective problem solving skills. /

Module-uitkomste:

Na afloop van die module behoort die kandidate 'n deeglike en gevorderde kennis van en vaardighede in klassieke termodinamika, toegepas op die omgewing, te demonstreer deur die atmosfeer van die aarde as gevallestudie te gebruik.

Studente moet:

- *In-diepte kennis en kritiese begrip hê van die vertikale veranderlikheid van die termodinamiese veranderlikes in die atmosfeer,*
- *In-diepte kennis en kritiese begrip hê van die relevante prosesse wat die termodinamiese toestand beheer en verandering in die toestand van die atmosfeer kan interpreteer,*
- *Vaardighede demonstreer om termodinamiese diagramme te interpreteer,*
- *Verstaan hoe termodinamiese prosesse verband hou met weerverskynsels,*
- *Verdere ontwikkeling van effektiewe probleemoplossingsvaardighede.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

Students have mastered the outcomes if they are able to:

- Use fundamental knowledge of principles of earth observation to solve problems in classical thermodynamics,
- Interpret and describe the impact of processes on the thermodynamic state of earth's atmosphere,
- Use thermodynamic diagrams to solve problems on the thermodynamic state of earth's atmosphere,
- Prepare and present oral and written reports and use appropriate platforms to communicate the principles of classical thermodynamics applied to the environment.

GEOG221	**Semester: 2**	**NQF-Level 6**
Human Geography/ ***Menslike Geografie***		

Module Outcomes:

At the end of the module the student should be able to demonstrate:

- Detailed knowledge of the main areas of Human Geography, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and theories of Human Geography; and demonstrate knowledge of an area or areas of specialisation and how that knowledge relates to other fields, disciplines or practices.
- An understanding of different forms of knowledge, schools of thought and forms of explanation typical within the field of Human Geography, and an awareness of knowledge production processes.
- An ability to evaluate, select and apply appropriate methods, procedures and techniques such as remote sensing techniques in processes of investigation or application within the context of Human Geography.
- An ability to identify, evaluate and solve problems in unfamiliar contexts, gathering evidence and applying solutions based on evidence and procedures appropriate to the field of Human Geography.

- An ability to evaluate different sources of information, to select information appropriate to the task, and to apply well-developed processes of analysis, synthesis and evaluation on that information.
- An ability to present and communicate complex information reliably and coherently, using appropriate academic and professional or occupational conventions, formats and technologies within the field of Human Geography.
- An ability to work effectively individually and in a team or group, and to take responsibility for his or her own decisions and actions with an understanding of the ethical implications of decisions and actions. /

Module-uitkomste:

Na voltooiing van die module moet die studente die volgende kan demonstreer:

- *Gedetailleerde kennis van die hoofareas van Menslike Geografie, insluitende 'n begrip en toepassing van sleutelbegrippe, -konsepte, feite, beginsels, reëls en teorieë van Menslike Geografie; demonstreer ook gedetailleerde kennis van 'n spesialisarea of -areas en die wyse waarop dit verband hou met ander velde, dissiplines of praktyke.*
- *Begrip van verskillende vorms van kennis, denkskole en vorms van verduideliking wat kenmerkend is van die studieveld van Menslike Geografie, asook 'n bewustheid van kennisproduksie prosesse.*
- *Vermoë om gepaste metodes, prosedures of tegnieke soos afstandwaarnemingstegnieke in prosesse van ondersoek/navorsing te evalueer, te kies en toe te pas binne die konteks van Menslike Geografie.*
- *Die vermoë om probleme te identifiseer, te evalueer en op te los binne onbekende kontekste deur bewyse te versamel en oplossings toe te pas gegrond op bewyse en prosedures gepas vir die studieveld van Menslike Geografie.*
- *Die vermoë om verskillende inligtingsbronne te evalueer, geskikte inligting te kies en goed ontwikkelde prosesse van analise, sintese en evaluasie van daardie inligting toe te pas.*
- *Die vermoë om komplekse inligting betroubaar en samehangend aan te bied en te kommunikeer d.m.v. gepaste akademiese en professionele of beroepskonvensies, formate en tegnologieë binne die konteks van Menslike Geografie.*
- *Die vermoë om komplekse inligting betroubaar en samehangend aan te bied en te kommunikeer d.m.v. gepaste akademiese en professionele of beroepskonvensies, formate en tegnologieë binne die konteks van Menslike Geografie.*
- *Die vermoë om effektief individueel en in groepsverband te werk en verantwoordelikheid vir eie besluite en handelinge te neem met 'n begrip van die etiese implikasies van die genoemde besluite en aksies.*

Method of Delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

The student will have mastered the outcomes of this module if the student is able to:

- Demonstrate detailed knowledge of the main areas of Human Geography, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and theories of Human Geography; and demonstrate knowledge of an area or areas of specialisation and how that knowledge relates to other fields, disciplines or practices.
- Demonstrate an understanding of different forms of knowledge, schools of thought and forms of explanation typical within the field of Human Geography, and an awareness of knowledge production processes.
- Evaluate, select and apply appropriate methods, procedures and techniques such as remote sensing techniques in processes of investigation or application within the context of Human Geography.
- Identify, evaluate and solve problems in unfamiliar contexts, gathering evidence and applying solutions based on evidence and procedures appropriate to the field of Human Geography.
- Evaluate different sources of information, select information appropriate to the task, and apply well-developed processes of analysis, synthesis and evaluation on that information.

- Present and communicate complex information reliably and coherently, using appropriate academic and professional or occupational conventions, formats and technologies within the field of Human Geography.
- Work effectively individually and in a team or group, and take responsibility for his or her own decisions and actions with an understanding of the ethical implications of decisions and actions.

GEOG311	Semester: 1	NQF-Level: 7

GIS and Remote Sensing/
GIS en Afstandwaarneming

Module outcomes:

At the end of the module the student should be able to demonstrate:

- An integrated knowledge of and engagement in Geographical Information Systems (GIS), Geographic Information Science (GISc) and Remote Sensing (RS) and a critical understanding and application of theories and techniques relevant to GIS, GISc and RS.
- Skills in collecting, managing and applying basic analyses to geographical data by making use of appropriate GIS and image processing software.
- The ability to select, apply and critically review the effectiveness of spatial data for use in spatial analysis and mapmaking.
- Critical understanding of how spatial analysis aids in management decisions.
- The ability to analyse, select and effectively apply scientific research methods to address spatial problems and communicate the research findings in an academically appropriate format.

***Module-uitkomste*:**

Aan die einde van die module moet die student in staat wees om die volgende te demonstreer:

- *Geïntegreerde kennis van en betrokkenheid in Geografiese Inligting Stelsels (GIS), Geografiese Inligting Wetenskap (GISc) en Afstandwaarneming (RS) en 'n kritiese begrip en toepassing van teorieë en tegnieke relevant tot GIS, GISc en RS.*
- *Vaardighede om geografiese data te kan insamel, te kan bestuur en basiese analises te kan toepas, deur gebruik te maak van toepaslike GIS en beeldverwerkingsprogrammatuur.*
- *Die vermoë om toepaslike ruimtelike data te kan selekteer en die effektiwiteit daarvan krities te beoordeel vir die gebruik in ruimtelike analise en kaartproduksie.*
- *Kritiese begrip toon van hoe ruimtelike analise bestuursbesluite kan ondersteun.*
- *Die vermoë om wetenskaplike navorsings metodes te analiseer, selekteer en effektief toe te pas op ruimtelike kwessies en die bevindinge op 'n akademiese aanvaarbare wyse te kommunikeer.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment Criteria:

Students have mastered the outcomes if they are able to:

- Analyse the concepts, principles, techniques and applications that are fundamental to GIS, GISc and RS.
- Perform basic data collection, data management and spatial analysis processes.
- Manage complex spatial data and distinguish how they are different from non-spatial data.
- Employ GIS software effectively to select, apply and implement a range of appropriate spatial data with a view to mapmaking.
- Demonstrate how GIS aids in management decisions.
- Analyse, select and effectively apply scientific research methods to reflect on and address spatial issues and communicate the research findings in an academically appropriate format.

GEOG321	Semester 2	NQF Level: 7
Applied Geography/ ***Toegepaste Geografie***		

Module outcomes:

Students should be able to:

- Demonstrate integrated and systematic knowledge pertaining to the different components comprising the field of Geography, and insight into the manner and extent to which these different component parts interact with one another and impact on one another;
- Relate and contextualise theoretical concepts to real world scenarios and problems;
- Think spatially and holistically;
- As an individual and/or as a member of a group, to identify, describe and characterise problems in the field of Geography, to research relevant literature, collect and interpret data, analyse, evaluate and synthesise information and come to a meaningful conclusion, and communicate findings to peers orally and in written reports for a research project of appropriate scope;
- Reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of Geography. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde en sistematiese kennis met betrekking tot die verskillende komponente waaruit Geografie bestaan, en insig in die wyse en die mate waarin hierdie verskillende komponente interaksie met mekaar toon en mekaar impakteer, te demonstreer;*
- *Teoretiese konsepte met die werklikheid en regte wêreld probleme te trou;*
- *Ruimtelik en holisties te kan dink;*
- *As individu of as lid van 'n groep, om Geografiese probleme te identifiseer, beskryf en karakteriseer; gepaste literatuursoektogte te onderneem, data te versamel, te interpreteer, inligting te analiseer, evalueer en te sintetiseer en tot 'n sinvolle gevolgtrekking te kom; en die resultate aan eweknieë te kommunikeer in verbale en/of geskrewe formaat, vir 'n navorsingsprojek van toepaslike omvang;*
- *Te besin oor die waardes, etiese gedrag en verdedigbaarheid van besluite wat toepaslik is vir die praktyk van Geografie.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Criteria:

Students have mastered the outcomes if they are able to:

- Critically discuss the concepts and principles relating to the different components comprising the field of Geography, with relevant focus on Africa.
- Relate theoretical knowledge to real world problems, particularly in Africa.
- Demonstrate an ability to think spatially and holistically.
- Conceptualise and successfully complete a research project.
- Reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of Geography.

NAS.2.9.12 GEOLOGY / *GEOLOGIE*

GLGN112	Semester 1	NQF Level: 5
Geology and the Environment/ ***Geologie en die Omgewing***		

Module outcomes:

Students should be able to:

- Demonstrate a fundamental knowledge base and informed understanding of the internal- and external geo-processes;
- Be aware of how scientific knowledge and theories are developed through the scientific method;
- Describe and identify the most common rock-forming minerals and rocks according to standard methods / description criteria;
- Display the skills required to identify and analyse geological problems or potential problems and to propose and apply solutions in the light of theory-driven arguments;
- Gather research and current information by undertaking literary searches (internet, books and magazines), select information appropriate to the task and communicate information accurately and coherently, demonstrating respect for intellectual property and an understanding of plagiarism;
- Operate as part of a group/pair and to make appropriate contributions to successfully complete a task related to the identification of minerals and rocks, taking co-responsibility for learning progress and outcome realization of the group/pair;
- Assess his or her performance within a structured learning process and to take appropriate action based on feedback from tests and assignments; and
- Be aware of the ethics associated with geology, such as the exploitation of mineral deposits at the expense of the preservation of geo- and biodiversity. /

Module uitkomste:

Studente moet in staat wees om:

- *Te beskik oor 'n fundamentele kennisbasis en ingeligte begrip van die interne en eksterne geo-prosesse;*
- *Bewus te wees van hoe wetenskaplike kennis en teorieë ontwikkel deur toepassing van die wetenskaplike metode;*
- *Die mees algemene rotsvormende minerale en gesteentes volgens standaard metodes / beskrywingskriteria te kan beskryf en identifiseer;*
- *Geologiese probleme of potensiële probleme te identifiseer en te analiseer, asook om oplossings aan die hand van teorie-gedrewe argumente voor te stel en toe te pas;*
- *Navorsing en onlangse inligting in te samel deur die onderneming van literêre soektogte (internet, boeke en joernale), inligting geskik vir die taak te selekteer asook om die inligting akkuraat en samehangend te kommunikeer, met inbegrip van plagiaat en respek vir intellektuele eiendom;*
- *As deel van 'n groep / paar te werk en om sinvolle bydraes te lewer tot 'n taak wat verband hou met die identifisering van minerale en gesteentes, suksesvol te voltooi, asook om medeverantwoordelikheid vir vordering van leer en verwesenliking van uitkomste deur die groep/ paar te neem;*
- *Sy of haar prestasie binne 'n gestruktureerde leerproses te evalueer en om die nodige stappe wat gebaseer is op terugvoer van toetse en opdragte, te neem;*
- *Bewus te wees van die etiek verbonde aan geologie, soos die ontginning van mineraalafsettings ten koste van die behoud van geo – en biodiversiteit.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative: 50%

Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)

Practical: Tests, assignments and practical examination (25%)

Summative: 50%

There will be a 2-hour written examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatiewe: *50%*

Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)

Prakties: toetse, opdragte en praktiese eksamen (25%)

Summatiewe: *50%*

Aan die einde van die semester is daar 'n skriftelike eksamen van 2 ure.

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen: 50%

GLGN122	**Semester 2**	**NQF Level: 5**
South African Geology/ ***Suid-Afrikaanse Geologie***		

Module outcomes:

Students should be able to:

- Demonstrate a fundamental knowledge base and informed understanding of the concept of geologic time, stratigraphic principles relevant to relative dating of rocks, theories relevant to the field of absolute dating of minerals and rocks, the development of the geologic time scale, and the application of the principles in the framework of South African stratigraphic units, as well as the fundamental concepts of crystallography and mineralogy;
- Describe and interpret geologic structures depicted on geologic maps, as well as the symmetry content of crystal models according to standard methods and description criteria;
- Display the skills required to identify and analyse geological problems or potential problems and to propose and apply solutions in the light of theory-driven arguments;
- Gather research and current information by undertaking literary searches (internet, textbooks and journals), select information appropriate to the task and communicate information accurately, and coherently, demonstrating respect for intellectual property and an understanding of plagiarism;
- Operate as part of a pair and make appropriate contributions to successfully complete a task related to practical work, taking co-responsibility for learning progress and outcome realization of the pair;
- Assess his or her performance within a structured learning process and to take appropriate action based on feedback from tests and assignments;
- Be aware of the ethics associated with geology, such as the exploitation of mineral and rock occurrences of value for geo-conservation purposes. /

Module uitkomste:

Studente moet in staat wees om:

- *'n Fundamentele kennisbasis en ingeligte begrip van die konsep van geologiese tyd, stratigrafiese beginsels relevant ten opsigte van relatiewe datering van gesteente, teorieë relevant ten opsigte van die veld van absolute datering van minerale en gesteentes, die ontwikkeling van die geologiese*

tydskaal, en die toepassings van die beginsels in die raamwerk van die Suid-Afrikaanse stratigrafiese eenhede, asook die fundamentele konsepte van kristallografie en mineralogie, te demonstreer;

- *Geologiese strukture voorgestel op geologiese kaarte te beskryf en interpreteer, asook die simmetrie-inhoud van kristal modelle volgens standaard metodes en beskrywingskriteria;*
- *Om geologiese probleme of potensiële probleme te identifiseer en om oplossings in die lig van teorie-gedrewe argumente voor te stel en toe te pas;*
- *Navorsings- en byderwetse inligting te versamel deur middel van literatuursoektogte (internet, handboeke en joernale), inligting van toepassing op die taak te kies en inligting akkuraat en samehangend te kommunikeer terwyl respek vir intellektuele eiendom en 'n begrip van plagiaat deurgaans gedemonstreer word;*
- *As deel van 'n paar te kan werk en gepaste bydraes lewer om 'n taak wat verband hou met praktiese werk, suksesvol af te handel, deur medeverantwoordelikheid te neem vir vordering in leer en realisering van uitkoms deur die paar;*
- *Sy of haar werksverrigting te assesseer binne 'n gestruktureerde leerproses en om gepaste aksie te neem gebaseer op terugvoer van toetse en opdragte;*
- *Bewus te wees van die etiek geassosieer met geologie, soos die uitbuiting van mineraal en gesteentevoorkomste van waarde vir 'n geo-bewaringsdoel.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment Methods:
Formal Formative: 50%
Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)
Practical: Tests, assignments and practical examination (25%)
Summative: 50%
There will be a 2-hour written examination at the end of the semester.
Assesseringsmetodes:
Formeel Formatiewe: *50%*
Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)
Prakties: toetse, opdragte en praktiese eksamen (25%)
Summatiewe: *50%*
Aan die einde van die semester is daar 'n skriftelike eksamen van 2 ure.
Assessment Plan:
Participation mark: 50%
Examination: 50%
Assesseringsplan:
Deelnamepunt: 50%
Eksamen: 50%

GLGN211	**Semester 1**	**NQF Level: 6**
Mineralogy and Igneous Petrology/ ***Mineralogie en Stollingspetrologie***		

Module outcomes:
Students should be able to:

- Demonstrate detailed knowledge and understanding of: a variety of rock-forming and economic minerals, as well as a variety of igneous rock associations and associated rock-forming processes; the chemical, structural and optical aspects of various minerals and igneous rocks, accompanying analysis techniques, and the graphical representation thereof; the identification and systematic description of the major rock-forming minerals and most common igneous rocks;

- Display the skill required to analyse, synthesise and evaluate tendencies in changes with regard to the structure and composition of minerals and rocks; identification and systematic classification of rocks and minerals;
- Display the skill required to apply the investigation method of polarising petrographic microscopy, in order to identify and classify minerals and rocks in thin sections; analyse proposed models for the origin of particular igneous rock associations;
- Conduct accurate and reliable literary searches, to analyse, interpret and synthesise the information and to use it to make proposals to solve problems in both familiar and new contexts;
- Coherently communicate reporting, either individually or in group context, verbally, written or in digital format, to a group of peer learners with the help of IT;
- Demonstrate ethical consciousness and accountability with regard to the collection of rock material for geological investigation, use of appropriate analytical techniques, presentation of geological data, the interpretation thereof, and reporting in written format according to scientific / academic standards with the understanding of intellectual property, copyright and rules on plagiarism. /

Module uitkomste:

Studente moet in staat wees om:

- *Gedetailleerde kennis en begrip te demonstreer van: 'n verskeidenheid gesteentevormende en ekonomiese minerale, asook 'n verskeidenheid stollingsgesteente-assosiasies en gepaardgaande gesteentevormende prosesse; die chemiese, strukturele, en optiese aspekte van verskeie minerale en stollingsgesteentes, gepaardgaande ontledingstegnieke, en die grafiese voorstelling daarvan; die identifisering en sistematiese beskrywing van die hoof gesteentevormende minerale en algemeenste stollingsgesteentes;*
- *Neigings in veranderings ten opsigte van die struktuur en samestelling van minerale en stollingsgesteentes te kan analiseer, sintetiseer en evalueer; identifisering en sistematiese klassifisering van gesteentes en minerale;*
- *Polariserende petrografiese mikroskopie toe te pas om minerale en gesteentes in slypplaatjies te ondersoek, identifiseer en klassifiseer; om voorgestelde modelle vir die oorsprong van bepaalde stollinggesteente-assosiasies te kan analiseer;*
- *Akkurate en betroubare literatuursoektogte te onderneem, die inligting te analiseer / ontleed, interpreteer, sintetiseer en gebruik om voorstelle te maak en probleme op te los in bekende asook nuwe kontekste;*
- *'n Verslag samehangend te kommunikeer, individueel of in groepsverband, mondelings, geskrewe of in digitale formaat met behulp van IT, aan 'n groep eweknie-leerders;*
- *Etiese bewussyn en aanspreeklikheid te openbaar in verband met die versameling van gesteentemateriaal vir geologiese ondersoek, gebruik van gepaste ontledingstegnieke, aanbieding van geologiese data, interpretasie daarvan, en verslaggewing in geskrewe formaat met begrip vir intellektuele eiendom, kopiereg en plagiaatreëls volgens wetenskaplike / akademiese standaarde.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative: 50%

Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)

Practical: Tests, assignments and practical examination (25%)

Summative: 50%

There will be a 2-hour written examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatiewe: *50%*

Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)

Prakties: toetse, opdragte en praktiese eksamen (25%)

***Summatiewe:** 50%*

Aan die einde van die semester is daar 'n skriftelike eksamen van 2 ure.

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen: 50%

GLGN221	Semester 2	NQF Level: 6

Sedimentology, Structural Geology and Neotectonics/

Sedimentologie, Struktuurgeologie en Neo-tektoniek

Module outcomes:

Students should be able to:

- Demonstrate detailed knowledge and understanding of
  - key terms, concepts, facts, principles, rules, theories, etc. within the fields of Sedimentology, structural Geology, and Neotectonics;
  - how knowledge of Sedimentology, structural Geology, and Neotectonics relates to applicable knowledge within the field of Environmental Geology;
  - the origin and development of knowledge within the fields of structural Geology and Sedimentology results in critical understanding of schools of thought, within the field of Geology and environmental applications;
- Select, evaluate and effectively implement/apply, with discernment, those standard procedures/rules/methods/formulas/skills etc. To solve fundamental problems in a defined environment in die field of sedimentology and structural geology, with a view to conceptualize areas of interest;
- Distinguish and solve sedimentological and structural problems in unfamiliar contexts and to apply the solutions to support progress/development in the practice of Environmental Geology, in order to integrate the relationship between structural and sedimentological setting, resources and associated environmental impacts;
- Understand the ethical implications of decisions, actions and practices specifically relevant to field and practical sessions, in accordance with the rules of practice;
- Gather discipline-specific information, methods and techniques from credible and relevant discipline-related scientific sources; analyse, evaluate and synthesize the information and apply your conclusions/research to a given context in the fields of structural geology and sedimentology;
- Demonstrate accurate and coherent written and verbal communication of theoretical information/tasks/projects etc. With understanding of and respect for intellectual property conventions, copyright and rules on plagiarism;
- Act as group member and a group leader and contribute appropriate information/skills to successfully complete a task/project/profile etc., measuring the success of the task completion against given criteria, taking co-responsibility for learning progress and outcome realization of the group;
- Monitor own learning progress and apply relevant learning strategies and known and new resources to successfully realize all outcomes of this module. /

Module uitkomste:

Studente moet in staat wees om:

- *’n In diepte kennis en begrip te demonstreer van*
  - *kern terme, konsepte, feite, beginsels, reëls, teorieë, ens binne die velde van Sedimentologie, Struktuurgeologie, en Neotektoniek;*
  - *hoe kennis van Sedimentologie, Struktuurgeologie, en Neotektoniek verband hou met toegepasde kennis binne die veld van Omgewingsgeologie;*
  - *die ontstaan en ontwikkeling van kennis binne die velde van Struktuurgeologie en Sedimentologie, bydrae tot kritieke begrip van denkrigtings binne die gebied van Geologie en omgewings toepassings;*
- *Die standaard prosedures/ reëls/metodes/formules/vaardighede ens, benodig om fundamentele probleme in 'n bepaalde omgewing in die gebied van sedimentologie en struktuurgeologie op te los, met onderskeiding te kies, te evalueer en effektief te implementeer/toe te pas met die oog op konseptualisering van gebiede van belang;*
- *Sedimentologiese en strukturele probleme in onbekende kontekste te onderskei en op te los en om oplossings wat vordering/ontwikkeling in die praktyk van Omgewingsgeologie ondersteun toe te pas ten einde integrasie van die verhouding tussen die strukturele en sedimentologiese omgewing, hulpbronne en gepaardgaande omgewingsimpakte te bewerkstellig;*
- *Begrip van die etiese implikasies van besluite, optrede en praktyke wat spesifiek op die veldwerk en praktiese sessies betrokke is, in ooreenstemming met die reëls van die praktyk te demonstreer;*
- *Dissipline-spesifieke inligting, metodes en tegnieke van geloofwaardige en relevante dissipline verwante wetenskaplike bronne in te samel; te analiseer, te evalueer en die inligting saam te vat om daarvolgens gevolgtrekkings/navorsing toe te pas in 'n gegewe konteks in die velde van Struktuurgeologie en Sedimentologie;*
- *Akkurate en samehangende geskrewe en verbale kommunikasie van teoretiese informasie/take/projekte ens. Met ’n begrip van en respek vir intellektuele eiendom konvensies, kopiereg en reëls oor plagiaat;*
- *Op te tree as lid van ’n groep en 'n groepleier en dra toepaslike inligting / vaardighede by om 'n taak / projek / profiel suksesvol te voltooi ens, die sukses van die taak voltooiing teen gegewe kriteriums te kan meet, en medeverantwoordelikheid vir die leer proses en uitkoms verwesenliking van die groep kan neem;*
- *Eie leervordering te monitor en relevante leerstrategieë, bekende en nuwe hulpbronne te kan aanwend om suksesvol al die uitkomste van hierdie module te bemeester.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative: 50%

Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)

Practical: Tests, assignments and practical examination (25%)

Summative: 50%

There will be a 2-hour written examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatiewe: *50%*

Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)

Prakties: toetse, opdragte en praktiese eksamen (25%)

Summatiewe: *50%*

Aan die einde van die semester is daar 'n skriftelike eksamen van 2 ure.

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen: 50%

GLGN311	**Semester 1**	**NQF Level: 7**

Metamorphic Petrology and Geochemistry/

Metamorfe Petrologie en Geochemie

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and understanding of, as well as ability to correctly evaluate and apply concepts and principles to different areas of specialization within the fields of Metamorphic Petrology and Geochemistry and an understanding of how that knowledge relates to these fields;
- Demonstrate an understanding of contested knowledge within the field of Metamorphic Petrology and Geochemistry, and a critical evaluation of the applicability of aforementioned concepts and principles to the field of Metamorphic Petrology and Geochemistry;
- Select, evaluate and apply a range of different but appropriate theories and scientific methods of research;
- Reflect all values, and ethical conduct and justifiable decision making appropriate to the practice of research in the fields of Metamorphism and Geochemistry of rocks;
- Ability to identify, analyse, and critically reflect on and address complex Metamorphic and Geochemical problems and apply evidence-based solutions with theory-based arguments, and communicate in an accurate and coherent manner, written and verbal, with understanding of and respect to intellectual property conventions, copyright and rules on plagiarism;
- Manage a group in an unfamiliar context in order to solve a contextual problem (explain type), monitor the progress of the group and take responsibility for task outcomes and application of appropriate resources as necessary. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis en begrip van, asook vermoë om konsepte en beginsels korrekte te evalueer en toe te pas op verskillende spesialisgebiede in die velde van metamorfe petrologie en geochemie, en 'n begrip hoe daardie kennis verband hou met hierdie velde, te demonstreer;*
- *Begrip van betwiste kennis in die veld van Metamorfe Petrologie en Geochemie, en 'n kritiese evaluering van die toepassing van voorheen genoemde konsepte en beginsels in die veld van Metamorfe Petrologie en Geochemie te openbaar;*
- *'n Verskeidenheid, maar gepaste teorieë en wetenskaplike navorsings-metodes te kies, evalueer en toe te pas;*
- *Al die waardes en etiese gedrag, en regverdigbare besluitneming gepas in die navorsingspraktyk in die veld van Geochemie te weerspieël;*
- *Komplekse metamorfe en geochemiese probleme te identifiseer, analiseer, en krities daaroor te besin en te hanteer, en om bewysgebaseerde oplossings met teorie gebosseerde argumente toe te pas, en op 'n akkurate en samehangende manier, geskrewe en verbaal, met begrip van en respek vir gebruike in intellektuele eiendom, kopiereg en reëls ten opsigte van plagiaat;*
- *Saam te werk in 'n groep in 'n onbekende konteks om 'n kontekstuele probleem op te los, die vordering van die groep te monitor en verantwoordelikheid te neem vir taakuitkomste en toepassing van gepaste hulpmiddels soos nodig.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment Methods:

Formal Formative: 50%

Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)

Practical: Tests, assignments and practical examination (25%)

Summative: 50%

There will be a 3-hour written examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatiewe: *50%*

Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)

Prakties: toetse, opdragte en praktiese eksamen (25%)

Summatiewe: *50%*

Aan die einde van die semester is daar 'n skriftelike eksamen van 3 ure.

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen: 50%

GLGN321	**Semester 2**	**NQF Level: 7**
Hydrogeology/ ***Hidrogeologie***		

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and understanding of, as well as an ability to correctly evaluate and apply principles of Hydrogeology and Engineering Geology to different areas of specialization within the field of Environmental Geology, and an understanding of how that knowledge relates to other fields or practices within other disciplines with a view to access and solve environmental problems;
- Select, evaluate and apply a range of different but appropriate procedures/rules/methods/formulas/theories and scientific methods of enquiry to do focused research and resolve problems that will effect change within practice;
- Identify, analyse, critically reflect on and address complex groundwater and engineering geology problems and apply evidence-based/practice-driven/proven solutions with theoretically-driven arguments;
- Reflect all values, ethical conduct and justifiable decision making processes appropriate to the practice of Hydrogeology, Engineering Geology, and Geophysics;
- Demonstrate an understanding of the ethical implications of decisions, actions and practices specifically relevant to field and practical sessions, in accordance with the rules of practice;
- Display accurate and coherent written and verbal communication of projects with understanding of and respect for intellectual property conventions, copyright and rules on plagiarism;
- Manage a group in an unfamiliar context in order to solve a contextual problem (explain type), monitor the progress of the group and take responsibility for task outcomes and application of appropriate resources where appropriate;

- Take full responsibility for own learning needs, monitoring of own learning progress and application of relevant learning strategies and management of all resources to successfully realize all outcomes of this module. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis en begrip van, sowel as 'n vermoë om korrek te evalueer en beginsels van Hidrogeologie en Ingenieursgeologie, verskillende spesialiseringsrigtings binne die veld van Omgewingsgeologie toe te pas, en 'n begrip toon van hoe daardie kennis verband hou met ander velde of praktyke binne ander dissiplines met die oog daarop om omgewingsprobleme te betree en op te los, te demonstreer;*
- *'n Verskeidenheid van verskillende maar toepaslike prosedures/reëls/ metodes/formules/teorieë en wetenskaplike metodes van ondersoek te kies, te evalueer en toe te pas om gefokusde navorsing te doen en probleme op te los wat verandering/vordering binne die praktyk sal bevorder;*
- *Om komplekse grondwater en ingenieursgeologie probleme te identifiseer, te analiseer, krities te besin en aan te spreek asook om bewysgebaseerde/praktykgerigte oplossings toe te pas gemotiveer deur teoreties-ondersteunde argumente;*
- *Te reflekteer oor alle waardes, etiese optrede en regverdigbare besluitnemingsprosesse wat geskik is vir die praktyk van Hidrogeologie, Ingenieursgeologie, en Geofisika;*
- *Begrip te toon van die etiese implikasies van besluite, optrede en praktyke wat spesifiek op die veldwerk en praktiese sessies gerig is, soos in ooreenstemming met die reëls van die praktyk;*
- *Akkurate en samehangende geskrewe en verbale kommunikasie van projekte met 'n begrip van en respek vir intellektuele eiendom konvensies, kopiereg en reëls oor plagiaat openbaar;*
- *'n Groep in 'n onbekende konteks te bestuur ten einde 'n kontekstuele probleem op te los (verduidelik tipe), die vordering van die groep te monitor en verantwoordelikheid te neem vir taak uitkomste en toepassing van geskikte hulpbronne, waar gepas;*
- *Volle verantwoordelikheid vir eie leerbehoeftes te neem, eie leervordering te monitor, relevante leerstrategieë toe te pas en alle hulpbronne te bestuur om al die uitkomste van hierdie module suksesvol te bemeester.*

Method of delivery: Full Time
Metode van aflewering: *Voltyds*

Assessment Methods:
Formal Formative: 50%
Theory (Informal and formal assessments): Class tests, assignments in groups or individually and Semester tests. (25%)
Practical: Tests, assignments and practical examination (25%)
Summative: 50%
There will be a 3-hour written examination at the end of the semester.
Assesseringsmetodes:
Formeel Formatiewe: *50%*
Teorie (Informele en formele assessering): Klastoetse, werkopdragte in groepe en individueel en Semester toets (25%)
Prakties: toetse, opdragte en praktiese eksamen (25%)
Summatiewe: *50%*
Aan die einde van die semester is daar 'n skriftelike eksamen van 3 ure.
Assessment Plan:
Participation mark: 50%
Examination: 50%
Assesseringsplan:
Deelnamepunt: 50%
Eksamen: 50%

NAS.2.9.13 SOIL SCIENCE / *GRONDKUNDE*

GDKN121	Semester 2	NQF Level: 5
Introduction to Soil Science/ ***Inleidende Grondkunde***		

Module outcomes:

On completion of the module, the student should be able to demonstrate:

- An informed understanding of paedogenesis, soil forming factors and basic fundamental principles in soil science;
- The skill to differentiate, identify and classify soil horizons and soil forms within the contexts of south African soils and the standard South African classification procedures;
- The ability to demonstrate the relation between the various soil components and how the interaction between these components affects general soil health and performance;
- The ability to gather research and current information by undertaking literary searches (internet, books and magazines), select information appropriate to tasks and communicate information accurately and coherently while demonstrating respect for intellectual property and an understanding of plagiarism;
- The ability to assess his or her performance within a structured learning program and to take appropriate action based on feedback from tests and assignments; and
- Be aware of his/her personal ethical framework. /

***Module uitkomste*:**

Na voltooiing van die module moet die student:

- *'n Ingeligte begrip van pedogenese, grondvormende faktore en basiese fundamentele beginsels in grondkunde toon;*
- *Beskik oor die vaardigheid om grondhorisonte en grondvorms binne die konteks van Suid-Afrikaanse grond te onderskei, te identifiseer en volgens die standaard Suid-Afrikaanse klassifikasie prosedures te klassifiseer;*
- *Die vermoë om die verhouding tussen die verskillende grondkomponente en hoe die interaksie tussen hierdie komponente beïnvloed algemene gesondheid en prestasie grond te demonstreer;*
- *Beskik oor die vermoë om navorsing en relevante inligting in te samel deur die onderneming van literêre soektogte (internet, boeke en tydskrifte), inligting wat toepaslik is vir take te selekteer en hierdie inligting akkuraat en samehangend te kommunikeer met inbegrip van plagiaat en respek vir intellektuele eiendom;*
- *Beskik oor die vermoë om sy of haar prestasie binne 'n gestruktureerde leerprogram te evalueer en om die nodige stappe, gebaseer op terugvoer van toetse en opdragte, te neem;*
- *Bewus te wees van sy / haar persoonlike etiese raamwerk.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could

include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

GDKN211	Semester 1	NQF Level: 6
Advanced Soil Science/ ***Gevorderde Grondkunde***		

Module outcomes:

On completion of the module, the student should be able to:

- Demonstrate detailed knowledge of: soil chemistry, soil mineralogy and soil fertility.
- Demonstrate understanding of and the ability to apply key terms, concepts, facts, principles, rules and theories of soil science.
- Demonstrate understanding the behaviour of certain soils based on clay mineral content and why it is important for soils to be classified for specific uses and how this influence adsorption and exchange reactions in soil due to surface charge of the colloidal fraction.
- Demonstrate understanding of the principles of plant nutrition.
- Evaluate, select and apply appropriate soil chemical procedures to solve soil environmental problems.
- Evaluate soil analytical data and use that information to make fertiliser recommendations. Present and communicate the fertiliser recommendations made to the interested party in an academic and professional format.
- Make decisions and act appropriately in soil related matters with an understanding of the relationships between soil chemistry, soil mineralogy and soil fertility.
- Work effectively in a team or group, and to take responsibility for his or her decisions and actions and the decisions and actions of others within well-defined contexts, including the responsibility for the use of soil as an important resource. /

***Module uitkomste*:**

Na voltooiing van die module behoort die student:

In diepte kennis van grondmineralogie, grondchemie, plant voeding te kan bewys.

- *Grondkundige beginsels, terme, feite, beginsels reëls en teorie kan verstaan en toepas.*
- *'n Verstaan van die gedrag van sekere grondsoorte gebaseer op klei-mineralogie demonstreer. Verder moet die student weet waarom dit belangrik is om gronde te klassifiseer vir spesifieke gebruike en hoe dit adsorpsie en uitruilingsreaksies in die grond beïnvloed.*
- *Die beginsels van plant voeding te verstaan.*
- *Evaluering en toepassing van grondchemiese prosesse om grondomgewings probleme op te los.*
- *Grondontledingsdata te gebruik om bemestingaanbevelings te maak en dit in 'n professionele verslag weer te gee.*
- *Besluite te maak en op te tree in grond verwante sake met die nodige kennis van grondmineralogie, grondchemie en grondvrugbaarheid.*
- *Om effektief as 'n span te kan werk en verantwoordelikheid te vat vir besluite gemaak ten opsigte van grond as 'n belangrike hulpbron.*
- *Probleme op te los van grond as 'n drie-fase sisteem.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could

include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

The practical examination of the soil science module is compulsory to be considered for admission to the examination.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%); and
- Final examination mark (50%).

The examination subminimum requirement is 40%.

GDKN221	Semester 2	NQF Level: 6

Soil Degradation and Rehabilitation/
Gronddegradasie en Rehabilitasie

Module outcomes:

On completion of this module, you should be able to demonstrate the following:

- To distinguish between natural and anthropogenic soil degradation in terms of origins and factors that lead to soil degradation.
- Identify soil pollution on the basis of physical and chemical analysis and determine what types of analyses are applicable in the case of field investigations.
- Explain the impact of pollution and degradation on the chemical, physical and mechanical properties and general land uses of soils.
- Use remote sensing techniques to identify soil degradation.
- Remedial measures to avoid soil degradation, and to recover degraded soil.
- Identify and/or develop potential rehabilitation programs, describe the implications of soil degradation and pollution with reference to practical field observations.
- Development of sustainable land use management systems.
- Development of Environmental Risk analysis for different land uses.
- Do practical soil surveys in the field with an emphasis on identifying soil degradation and pollution and risk management. /

***Module uitkomste*:**

Ná voltooiing van hierdie module moet die student die volgende te kan demonstreer:

- *Onderskeid te kan tref ten opsigte van natuurlike en antropogenetiese gronddegradasie ten opsigte van oorsprong en faktore wat aanleiding gee tot gronddegradasie.*
- *Besoedeling van grond te kan identifiseer aan die hand van fisiese en chemiese analises en self te kan bepaal watter tipes analises is van toepassing in die geval van veld ondersoeke.*
- *Kan verduidelik wat die invloed van besoedeling en degradasie is op die chemiese, fisiese en meganiese eienskappe en algemene grondgebruike.*
- *Afstandswaarnemingstegnieke te kan gebruik om gronddegradasie te kan uitken en identifiseer.*
- *Remediërende maatreëls kan voorstel om degradasie teen te werk, te voorkom en te kan herstel.*
- *Implikasies van gronddegradasie en besoedeling in veldverband kan identifiseer en potensiële rehabilitasie programme kan identifiseer of ontwikkel.*
- *Volhoubare grondgebruiksbestuur-stelsels kan ontwikkel.*
- *Omgewingsrisiko-analises kan ontwikkel vir verskillende grondgebruike.*
- *Praktiese grondopnames in die veld kan doen met die klem op identifisering van gronddegradasie en besoedeling en risikobestuur.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

The practical examination of the soil science module is compulsory to be considered for admission to the examination.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%); and
- Final examination mark (50%).

The examination subminimum requirement is 40%.

GDKN311	**Semester 1**	**NQF Level: 7**
Soil Genesis and Classification/ ***Grond Genese en Klassifikasie***		

Module outcomes:

This module is designed to equip students with fundamental knowledge regarding the principles, concepts of soil classification. GDKN311 also focus on soil genesis with special emphasis on physical and chemical weathering of parent material. All soil-forming factors and main pedogenic processes i.e. transformation and translocation are discussed in detail. The South Africa 2018 soil classification system will form the main focus of soil classification in this module.

After completion of this module the student should be able to:

- Demonstrate detailed knowledge, understanding and insight regarding soil classification and the ability to apply it practically.
- Know how soils are classified as natural bodies on the basis of their profile characteristics and not merely on the basis of their suitability for a particular use.
- Understand and describe basic principles of soil genesis soil-forming factors and processes related to agricultural and broader soil science applications.
- Understanding the interaction between the different factors and processes and the end land use.
- By understanding these processes and factors the students will be able to predict how soil will be affected by the addition of chemical fertilisers, cultivation and climate change within the South African context.
- Describe the physical breakdown and the chemical alteration and diagenesis of parent material i.e. primary minerals to secondary soil-forming minerals.
- Demonstrate detailed knowledge and practical application of the taxonomic system as applicable in South Africa.
- Identify and classify soil forms according to this classification system to better understand and make sense of the variability that occurs within the soils and how this apply to the use of the soil in South Africa. /

***Module uitkomste*:**

Ná voltooiing van hierdie module moet die student die volgende te kan demonstreer:

- Gevorderde kennis, begrip en insig in grond klassifikasie wat prakties toegepas kan word.
- Weet hoe word gronde geklassifiseer as natuurlike liggame op die basis van hul profiel eienskappe, en nie slegs op grond van hulle gebruiksgeskiktheid nie.

- Die basiese beginsels van grond genese, die grondvormingsfaktore- en prosesse binne die raamwerk van die landbou en die breër grondkundige toepassings verstaan en beskryf.
- Die interaksie tussen grondvormingsfaktore en -prosesse en die landsgebruik te verstaan.
- Te voorspel hoe gronde beïnvloed sal word deur kunsmis toevoegings, bewerking en klimaatsverandering in die Suid Afrikaanse konteks.
- Die fisiese afbreek en chemiese verandering en diagenese van moedermateriaal (die afbreek van primêre kleiminerale na sekondêre kleiminerale) beskryf.
- Gevorderde kennis en die praktiese toepassing van die Suid-Afrikaanse grondklassifikasie sisteem kan demonstreer.
- Grondsoorte volgens die Suid-Afrikaanse grondklassifikasie stelsel kan klassifiseer en die variasie binne grondsoorte verstaan, met toepassing op die gronde se gebruik in Suid-Afrika.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could

include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

The practical examination of the soil science module is compulsory to be considered for admission to the examination.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%);
- Final examination mark (50%).

The examination subminimum requirement is 40%.

GDKN322	**Semester 2**	**NQF Level: 7**
Soil Physics/ ***Grondfisika***		

Module outcomes:

After completion of this module the student should be able to:

- Identify and solve problems related to soil as a three-phase system.
- Demonstrate knowledge of soil water dynamics including the Law of Darcy concerning the flow of water in soil i.e. saturated and unsaturated water flow.
- Demonstrate a detailed understanding the movement of solutes through the soil profile.
- Demonstrate a detailed understanding regarding the gas content, composition, movement and exchange in the soil.
- Thorough knowledge and insight regarding the physical reaction of the solid fraction with water and air.
- Demonstrate a systematic overview of soil hydraulics including various aspects of soil water such as infiltration, run-off, base flow etc.
- Demonstrate an understanding and detail comprehension of what capillary and diffusion flow are.
- Demonstrate an understanding and describe water balances in term of ET, infiltration, precipitation etc.

- Identify processes and factors of plant available water with regards to soil as an entity.
- Demonstrate an in depth knowledge, understanding and insight regarding soil physics in agricultural systems, as well as the ability to apply it practically.

***Module uitkomste*:**

Ná voltooiing van hierdie module moet die student die volgende te kan doen:

- *Probleme in terme van die grond se drie-fase sisteem identifiseer en oplos.*
- *Kennis van grondwater dinamiek, insluitende die reël van Darcy aangaande die vloei van water in 'n grond (versadigde en onversadigde vloei) demonstreer.*
- *'n Gevorderde begrip van die beweging van die grondoplossing deur die grondprofiel demonstreer.*
- *'n Deeglike kennis en insig in die fisiese reaksies tussen die soliede fraksie met water en lug demonstreer.*
- *'n Sistemiese kennis van grond hidroulika (insluitend verskeie aspekte van grond water soos infiltrasie, afloop basis vloei ens.) demonstreer.*
- *'n Gedetailleerde begrip van kapillêre en diffusie vloei demonstreer.*
- *'n Begrip van die waterbalans, in terme van Evapotranspirasie, infiltrasie, presipitasie ens. Demonstreer.*
- *Prosesse en faktore van plantbeskikbare water aangaande die grond as 'n entiteit identifiseer.*
- *'n Gevorderde kennis, begrip en insig aangaande grond fisika in landbou sisteme demonstreer en prakties kan toepas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could

include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

The practical examination of the soil science module is compulsory to be considered for admission to the examination.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%);
- Final examination mark (50%).

The examination subminimum requirement is 40%.

GDKN421	**Semester 2**	**NQF Level: 8**
Precision Farming/ ***Presisieboerdery***		

Module outcomes:

After completion of this module the student should be able to:

- Demonstrate knowledge of control and management aspects (basic principles of project management) and be able to apply it practically.
- Demonstrate a detailed understand of information technology (GIS, remote sensing, satellite images, geo-spatial technology, on-the-go info, etc.) and to explain and implement it practically.
- Identify, explain and implement farm machinery (hardware) and software for use in precision farming.

- Integrate fundamental knowledge and understanding of soil surveys and fertilizer recommendations.
- Demonstrate fundamental knowledge and applications of statistics in precision farming.
- Identify and explain sustainable soil and land management methods.
- Demonstrate detailed knowledge and understanding of the integration and modelling of environmental (climate, irrigation, cultivar choice fertilization, agronomy, yield potential, etc.) and management variables (sustainability of complex systems).
- Demonstrate complete knowledge, understanding and insight in regard to sustainable soil management and the means to apply it practically.
- Demonstrate practical application through integration of all the previous modules, survey data and all aspects of GDKN 421 (as discussed above, as well as with "real-time DSS", for Agronomy to complete a suitable project.

***FIELD MAPPING DURING THE DECEMBER HOLIDAY OF THE 3RD YEAR IS A PREREQUISITE FOR 4TH YEAR REGISTRATION.**

- The field mapping includes fieldwork and soil mapping with regards to the application of basic field techniques, sampling, soil mapping techniques, application of the South African taxonomic classification system, certain laboratory analysis of field samples, fertiliser applications, data interpretation and report writing.
- Demonstrate understanding and insight regarding various classification systems and their practical applications;
- Map soil information by means of geographical information systems (GIS) for application in precision farming planning and modelling in which different environmental and management attributes are integrated. /

***Module uitkomste*:**

Ná voltooiing van hierdie module moet die student die volgende te kan doen:

- *Kennis van beheer en bestuursaspekte (basiese beginsels van projek bestuur) demonstreer en prakties toepas.*
- *'n Gevorderde kennis en begrip van Inligting tegnologie (GIS, afstandswaarneming, satellietbeelde, geo-ruimtelike tegnologie ens.) demonstreer en dit prakties kan verduidelik en implementeer.*
- *Plaasgereedskap en toepaslike sagteware vir gebruik in presisie boerdery kan identifiseer, verduidelik en implementeer.*
- *Fundamentele kennis van grond opnames en kunsmisaanbevelings kan integreer.*
- *Fundamentele kennis en toepassing van statistiek in presisie boerdery demonstreer.*
- *Geskikte volhoubare grond en land bestuursmetodes identifiseer en verduidelik.*
- *Gevorderde kennis en begrip van die integrasie en modellering van omgewings (bv. Klimaat, grond variasie, opbrengspotensiaal) en bestuurs (bv. besproeiing, kultivar keuse, bemesting) veranderlikes demonstreer.*
- *Volkome kennis, begrip en insig ten opsigte van volhoubare grond bestuur demonstreer en prakties toepas.*
- *Die praktiese toepassing van alle vorige modules, opnames, en alle ander aspekte van GKD421 deur integrasie demonstreer (soos hierbo bespreek, sowel as met "intyd DSS" vir Agronomie om 'n geskikte projek te voltooi.*

VELDKARTERING GEDURENDE DIE DESEMBER VAKANSIE VAN DIE 3DE JAAR IS 'n VOORVEREISTE VIR 4DE JAAR REGISTRASIE.

- *Die veld kartering sluit die grondopname en kartering in, wat ook die volgende aspekte behels: basiese veld tegnieke, grondmonsterneming, grondkarteringstegnieke, toepassing van die Suid-Afrikaanse grondklassifikasie stelsel, sekere laboratorium analises van grondmonsters, kunsmisaanbevelings, data interpretasie en verslag skryf.*
- *Begrip en insig in die gebruik van verskeie grondklassifikasie sisteme en hul praktiese toepassing demonstreer.*

- *Grondinligting kan karteer m.b.v. geografiese inligtingstelsels (GIS) vir toepassing in presisie boerdery beplanning en modellering waarin verskillende omgewings en bestuursveranderlikes geïntegreer word.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

The practical examination of the soil science module is compulsory to be considered for admission to the examination.

A participation mark of 40% allows a student admission to the final examination (summative assessment). Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed.

The final module mark is calculated using the following weightings:

- Participation mark (50%);
- Final examination mark (50%).

The examination subminimum requirement is 40%.

NAS.2.9.14 INFORMATION TECHNOLOGY / *INLIGTINGSTEGNOLOGIE*

CMPG111 & 171	Semester 1	NQF Level: 5
Introduction to Computing and Programming/ ***Inleiding tot Rekenaarwese en Programmering***		

Module outcomes:

Students should be able to:

- Knowledge scope:
  - basic / fundamental / elementary knowledge / informed understanding
  - fundamental knowledge of the main areas of the Computer Science discipline including system areas and application areas.
- Methods and procedures:
  - identify, select, organise and implement standard methods / procedures / rules / formulas
  - the ability to identify, select and implement standard procedures and methods related to the manipulation of spreadsheets and database tables with a view to organise, process and present data and transfer data between different applications;
  - the ability to identify, select and implement standard structured programming methods related to computer programming with a view to solve simple computational problems.
- Practical skill:
  - demonstrate / implement / apply a basic practical skill
  - the ability to apply knowledge of tables, computations and functions in order to manipulate data on spreadsheets and database tables;
- Basic problem solving skill
  - the ability to identify, analyse and define basic problems specific to the field of computer programming.

- the ability to select from a range of possible options the best solution to a discipline-specific problem and to apply the solution to support progress in the practice of designing and implementing structured programs.

- Identify ethical and professional behaviour
  - identify social and ethical issues in the field of IT./

Module uitkomste:

Studente moet in staat wees om:

- *Kennisbasis:*
  - *basies / fundamenteel / elementêre kennis / ingeligte begrip*
  - *fundamentele kennis van die hoofareas van die Rekenaarwetenskapdissipline insluitend stelsel- en toepassingsareas te demonstreer;*
- *Metodes en prosedures:*
  - *identifiseer, selekteer, organiseer en implementeer standaard metodes / prosedures / reëls / formules:*
  - *die vermoë om standaardprosedures en -metodes in verband met die manipulasie van sigblaaie en databasisse te identifiseer, selekteer en te implementeer, om data sodoende te organiseer, verwerk, voor te stel en tussen verskillende toepassings oor te dra;*
  - *die vermoë om standaard gestruktureerde programmeringsmetodes te identifiseer, selekteer en te implementeer, om sodoende eenvoudige probleme met die rekenaar op te los.*
- *Praktiese vaardigheid:*
  - *demonstreer / implementeer / pas 'n basiese praktiese vaardigheid toe:*
  - *die vermoë om kennis van tabelle, berekeninge en funksies toe te pas om sodoende data op sigblaaie en databasis tabelle te manipuleer.*
- *Basiese probleemoplossingsvaardighede:*
  - *die vermoë om basiese probleme, spesifiek tot die veld van rekenaarprogrammering, te identifiseer, ontleed en te definieer;*
  - *die vermoë om die beste oplossing uit 'n versameling moontlikhede van 'n dissipline-spesifieke probleem te kies en om deur toepassing van die oplossing die praktyk van ontwerp en implementering van gestruktureerde programme te bevorder.*
- *Identifiseer etiese en professionele gedrag:*
  - *identifiseer sosiale en etiese kwessies in die veld van IT.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC &MC)*

Assessment Modes:

Formal Formative

Schedule tests and quizzes

Computer Lab Practica

Assessment Methods - Summative

3-hour examination including written and practical components

Assessment Plan

Participation mark: 50%

Schedule tests

Quizzes and exercises

Computer Lab Practica

Examination: 50%

3-hour examination including written and practical components.

Assesseringsmodusse:

Formeel Formatief

- *Geskeduleerde toetse en multikeuse toetse*

- *Rekenaarlaboratorium praktikums*
- *Assesseringsmetodes – summatief*
- *3-uur eksaminering wat geskrewe en praktiese komponente insluit*

Assesseringsplan

- *Deelnamepunt: 50%*
- *Geskeduleerde toetse*
- *Multikeuse toetse en oefening*
- *Rekenaarlaboratorium praktikums*
- *Eksamen: 50%*
- *3-uur eksamen wat geskrewe en praktiese komponente insluit*

CMPG112	Semester 1	NQF Level: 5
Introduction to End User Computing/ ***Inleiding tot Rekenaareindgebruik***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of the different components of a computer and an information system, as well as programming languages and their uses;
- Demonstrate the manipulation of spreadsheets by applying knowledge of tables, computations, transfer of data between different applications, functions and graphic presentations;
- Demonstrate the ability to solve problems by designing and implementing structured programming, by using data manipulation and data presentations and applying 'GUI' event-driven approaches in the development environment of a spreadsheet;
- Demonstrate insight into ethical issues related to the wider IT business and an awareness of the risks and dangers that threaten the business;
- Demonstrate the ability to communicate in writing by compiling a report after having completed a project. /

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis te demonstreer van die verskillende komponente van 'n rekenaar en van 'n inligtingstelsel, asook programmeringstale en gebruik daarvan;*
- *Die manipulering van sigblaaie te kan demonstreer deur toepassing van kennis van tabelle, berekenings, oordrag van data tussen verskillende toepassings, funksies en grafiese voorstellings;*
- *Die vermoë te demonstreer om probleme op te los deur ontwerp en implementering van gestruktureerde programmering, gebruik van datamanipulasie en datavoorstellings en toepassing van "GUI" gebeurtenis gedrewe ("event driven") benadering in 'n sigblad se ontwikkelingsomgewing;*
- *Insig in etiese kwessies wat verwant is aan die breër IT-bedryf te verstaan en bewus wees van die risiko en gevare wat die bedryf bedreig;*
- *Skriftelike kommunikasievermoë te demonstreer deur 'n verslag op te stel nadat 'n projek voltooi is.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Modes:

Formal Formative:

Could include, but might not be limited to, class tests, assignments, and case studies.

Summative:

Examination: A three-hour practical examination is written at the end of the semester.

Assesseringsmodusse:

Formeel Formatief

Kan insluit, maar is nie beperk tot klastoetse, opdragte en gevallestudies nie.

Summatief

Eksaminering: 'n 3-ure praktiese eksamen word geskryf aan die einde van die semester.

Assessment Plan:

Formative assessment (50%),

Summative assessment (50%) (1:1)

Assesseringsplan:

Formatiewe assessering (50%,

Summatiewe assessering (50%) (1:1)

CMPG115	**Semester 1**	**NQF Level: 5**

Programming for Engineers I/

Programmering vir Ingenieurs I

Module outcomes:

Students should be able to:

- Demonstrate a thorough knowledge of, and skill in the underlying principles, methods and the application of the following topics:
  - knowledge of and insight in the basic structure, data types, and functions, including structured problem solving and debugging, testing and execution of applications of a structured programming language;
  - the student will have to demonstrate that he/she can apply the acquired knowledge and insight to solve elementary problems, develop an algorithm to solve problems, codify the algorithm, and to debug, test and execute it on the computer.

Module uitkomste:

Studente moet in staat wees om:

- *'n Deeglike kennis van, en vaardigheid in die onderliggende beginsels, metodes en toepassing van die volgende onderwerpe te kan demonstreer:*
  - *basiese kennis en insig te hê oor 'n gestruktureerde programmeringstaal se basiese strukture, datatipes, funksies asook gestruktureerde probleemoplossing wat insluit: ontfouting, toetsing en uitvoering van toepassings.*
  - *die student sal kan bewys lewer dat hy/sy die kennis en insig wat verwerf is, kan toepas ten opsigte van eenvoudige probleemoplossing met programmering, 'n algoritme kan ontwikkel om die probleem op te los, die algoritme kan implementeer (kodeer), ontfout, toets en uitvoer met behulp van die rekenaar.*

Method of delivery: Contact

Metode van aflewering: *Kontak*

Assessment modes:

Formal Formative:

Schedule tests and quizzes

Computer Lab Practica

Summative:

3-hour examination including written and practical components.

Assesseringsmodusse:

Formeel formatief:

Geskeduleerde toetse en vasvrae

Rekenaarlaboratorium praktikums

Summatief:

3-uur lange eksamen met geskrewe en praktiese komponente

Assessment Plan:

- Participation mark: 50%
- Schedule tests
- Quizzes and exercises
- Computer Lab Practica
- Examination: 50%
- 3-hour examination including written and practical components

Assesseringsplan

- *Deelnamepunt: 50%*
- *Geskeduleerde toetse*
- *Multikeuse toetse en oefening*
- *Rekenaar laboratorium praktikums*
- *Eksamen 50%*
- *3-uur eksamen wat geskrewe en praktiese komponente insluit*

CMPG121 & 172	**Semester 2**	**NQF Level: 5**
Structured Programming/ ***Gestruktureerde Programmering***		

Module outcomes:

Students should be able to:

- Knowledge scope: Basic / fundamental / elementary knowledge / informed understanding:
  - Fundamental knowledge of the main areas of structured programming including the basic structure, data types and functions;
  - Knowledge of more advanced structured programming aspects such as arrays, records, file input and output, sorting and recursion;
- Methods and Procedures: Identify, Select, Organise and Implement Standard Methods / procedures / rules / formulas:
  - The ability to use structured programming constructs in designing, coding, debugging, testing and execution of applications in a procedural programming language;
  - The ability to understand basic representation of data in computer memory;
- Practical skill: Demonstrate / implement / apply a basic practical skill:
  - The ability to apply knowledge of programming constructs to develop algorithms to solve programming problems;
- Basic problem solving skill:
  - The ability to apply the acquired knowledge and insight to solve elementary problems by developing algorithms, code the algorithms in a procedural language, and debug and test it on the computer;
- Identify ethical and professional behaviour:
  - The ability to identify social and ethical issues in the field of programming. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennisbasis: basies / fundamenteel / elementêre kennis / ingeligte begrip:*
  - *Fundamentele kennis van die hoofareas van gestruktureerde programmering insluitend die basiese struktuur, datatipes en funksies;*
  - *Kennis van meer gevorderde gestruktureerde programmeringsaspekte soos skikkings, rekords, lêertoevoer en -afvoer, sortering en rekursie;*
- *Metodes en prosedures:*

- *Identifiseer, selekteer, organiseer en implementeer standaard metodes / prosedures / reëls / formules:*
- *Die vermoë om gestruktureerde programmeringskonstrukte te gebruik tydens die ontwerp, kodering, ontfouting, toetsing en uitvoering van toepassings in 'n prosedurele programmeringstaal;*
- *Die vermoë om basiese voorstelling van data in die geheue van die rekenaar te verstaan.*

- *Praktiese Vaardigheid:*
  - *Demonstreer / Implementeer / Pas 'n Basiese Praktiese Vaardigheid Toe:*
  - *Die vermoë om kennis van programmeringskonstrukte toe te pas om algoritmes te ontwikkel om programmeringsprobleme op te los;*
- *Basiese probleemoplossings vaardighede:*
  - *Die vermoë om toepaslike kennis en insig te gebruik om elementêre probleme op te los deur algoritmes te ontwikkel, die algoritmes te kodeer in 'n prosedurele taal, dit te ontfout en op 'n rekenaar te toets;*
- *Identifiseer etiese en professionele gedrag:*
  - *Die vermoë om sosiale en etiese kwessies in die veld van programmering te identifiseer.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative:

Schedule tests and quizzes

Computer Lab Practica

Summative:

A three-hour examination including written and practical components.

Assesseringsmetodes:

Formeel Formatief

Skeduleer toetse en multikeuse toetse

Rekenaarlaboratorium praktikums

Summatief

'n 3-ure eksaminering wat geskrewe en praktiese komponente insluit.

Assessment Plan:

Participation mark: 50%

Schedule tests

Quizzes and exercises

Computer Lab Practica

Examination: 50%

3-hour examination including written and practical components.

Assesseringsplan:

Deelnamepunt: 50%

Geskeduleerde toetse

Multikeuse toetse en oefening

Rekenaar laboratorium praktikums

Eksamen: 50%

3 uur eksamen wat geskrewe en praktiese komponente insluit.

CMPG122	Semester 2	NQF Level: 5
User Interface Programming/ ***Gebruikerskoppelvlakprogrammering***		

Module outcomes:

Students should be able to:

- Write a computer program that demonstrates that the student mastered a thorough knowledge of, and skill in the underlying principles, methods and the application of computer programming;
- Identify problems, analyse and evaluate them and propose solutions through the design and development of applications with the emphasis on user-friendly interfaces;
- Demonstrate aspects such as graphical interface design using principles of human-computer interaction, event-driven programming and incorporating databases in the graphical interface;
- Demonstrate sufficient fundamental knowledge of and insight into the graphic interface environment to develop computerised systems in a visual object-based computer language;
- Demonstrate the ability to implement repetitive, conditional and sequential structures. /

Module uitkomste:

Studente moet in staat wees om:

- *'n Rekenaarprogram te skryf wat demonstreer dat die student deeglike kennis en vaardigheid het van onderliggende beginsels, metodes en die toepassing van rekenaarprogrammering;*
- *Probleme te identifiseer, ontleed en te evalueer en oplossings voor te stel deur die ontwerp en ontwikkeling van toepassings met die klem op gebruikersvriendelike koppelvlakke;*
- *Aspekte soos grafiese koppelvlakontwerp met inagneming van beginsels vir mens-rekenaar-interaksie te demonstreer, asook gebeurlikheidsgedrewe programmering en die insluiting van databasisse in grafiese koppelvlakke;*
- *Genoegsame fundamentele kennis van en insig in die grafiese koppelvlak omgewing te demonstreer om gerekenariseerde stelsels te ontwikkel in 'n visuele objek-gebaseerde rekenaartaal;*
- *Die vermoë te demonstreer om herhalende, voorwaardelike en sekwensiële strukture te implementeer.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

Weekly practical programming assignments and class tests.

Summative

Practical programming examination

Assesseringsmetodes:

Formeel Formatief

Weeklikse praktiese programmeringsopdragte en klastoetse.

Summatief

Praktiese programmering eksaminering

Assessment Plan

Formative assessment (50%),

Summative assessment (50%) (1:1)

Assesseringsplan

Formatiewe assessering (50%),

Summatiewe assessering (50%) (1:1)

CMPG211	Semester 1	NQF Level: 6
Object Oriented Programming/ ***Objekgeoriënteerde Programmering***		

Module outcomes:

Students should be able to:

- Demonstrate a thorough knowledge of, and skill in the underlying principles, methods and the application of the following topics:
  - analyse and solve a problem and write a structured object oriented program for the solution;
  - understand and apply search, sort and recursion methods in object oriented programming solutions;
  - discuss, use and do calculations in different numbering systems such as the binary numbering system;
  - solve problems that need file and exception handling in object oriented programming
  - apply advanced object oriented concepts including inheritance and polymorphism in program solutions;
  - be able to create an event driven programming (such as GUI) solution using object oriented programming;
  - apply version control in project development;
  - understand logical architecture which includes Karnaugh maps / gates;
  - basic understanding of UML diagrams as design tools. /

Module uitkomste:

Studente moet in staat wees om:

- *Deeglike kennis van, en vaardigheid in die onderliggende beginsels, metodes en toepassings van die volgende onderwerpe te demonstreer:*
  - *ontleed en los 'n probleem op en skryf 'n gestruktureerde objek-georiënteerde program vir die oplossing;*
  - *verstaan en pas metodes van soek, sortering en rekursie in objek-georiënteerde programmeringsoplossings toe;*
  - *verduidelik, gebruik en berekenings kan doen in getallestelsels soos die binêre getallestelsel;*
  - *los probleme of wat lêer- en uitsonderingshantering in objek-georiënteerde programmering vereis;*
  - *pas gevorderde objek-georiënteerde konsepte toe, insluitend oorerwing en polimorfisme in program-oplossings;*
  - *in staat wees om gebeurlikheidsgedrewe programmeringsoplossings (soos 'n GGK) deur middel van objek-georiënteerde benaderings te skep;*
  - *weergawebeheer in projek-ontwikkeling te kan toepas;*
  - *verstaan logiese argitektuur wat Karnaugh-diagramme en hekke insluit;*
  - *'n basiese begrip te hê van UML-diagramme en ontwerphulpmiddels.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative

Schedule tests and quizzes

Computer Lab Practica

Summative

4-hour examination including written and practical components

Assesseringsmetodes:

Formeel Formatief

Skeduleer toetse en multikeuse opdragte

Rekenaarlaboratorium praktikums

Summatief

4-ure eksaminering wat geskrewe en praktiese komponente insluit

Assessment Plan

Participation mark: 50%

Examination: 50%

Assesseringsplan

Deelnamepunt: 50%

Eksamen 50%

CMPG212	**Semester 1**	**NQF Level: 6**

Apps and Advanced User Interface Programming/

Toepassings en Gevorderde Gebruikerkoppelvlakprogrammering

Module outcomes:

Students should be able to:

- Demonstrate a thorough knowledge of, and skill in the underlying principles, methods and the application of the following topics: Advanced Graphical Interface programming, file handling, web-based applications and mobile applications;
- Effectively apply programming skills with a view to develop web and mobile applications, determine the nature and scope of graphical user interface systems and select the best possible solution to solve interactive system problems;
- Design systems that are industry-directed and user-friendly and comply with professional and ethical codes of behaviour;
- Identify problems, analyse and evaluate them critically and propose solutions through the design and development of applications with the emphasis on user-friendly interfaces;
- Demonstrate the ability to communicate/demonstrate solutions/programs coherently and reliably, in a group or individually through making use of appropriate academic/professional oral and written argumentation (which includes source code commenting). /

Module uitkomste:

Studente moet in staat wees om deeglike kennis van, en vaardigheid van onderliggende beginsels, metodes en die toepassing van die volgende onderwerpe te demonstreer:

- *Gevorderde Grafiese Koppelvlak programmering, lêerhantering, web-gebaseerde toepassings en mobiele toepassings;*
- *Programmeringsvaardighede effektief toe te pas met die oog op die ontwikkeling van web- en mobiele toepassings, die aard en omvang van grafiese gebruikerskoppelvlak stelsels te bepaal en die beste oplossing vir interaktiewe stelselprobleme te selekteer;*
- *Stelsels te ontwerp wat industrie-gerig en gebruikersvriendelik is en voldoen aan professionele etiese gedragskodes;*
- *Probleme te identifiseer, analiseer en krities te evalueer en oplossings voor te stel vir die ontwerp en ontwikkeling van toepassing met die klem op gebruikersvriendelike koppelvlakke; en*
- *Die vermoë te demonstreer om oplossings/programme in 'n groep, of individueel, koherent en betroubaar te kommunikeer/demonstreer, deur gebruik te maak van toepaslike akademiese/professionele mondelinge of geskrewe argumentering (wat bronkode dokumentering insluit).*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

Class tests and small practical assignments

A practical project

Summative

There will be a 3-hour examination at the end of the semester

Assesseringsmetodes:

Formeel Formatief

Klastoetse en klein praktiese opdragte

'n Praktiese projek

Summatief

Daar sal 'n 3-ure eksaminering aan die einde van die semester wees

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen 50%

CMPG213	**Semester 1**	**NQF Level: 6**

Systems Analysis and Design I/

Stelselontleding en Ontwerp I

Module outcomes:

Students should be able to:

- Describe the phases of the system development life cycle and apply the tools and techniques used during the System Initiation, Analysis and Design phases to an IT project in a chosen scenario;
- Describe the activities involved in project management and apply these in group context cross the stated life-cycle activities while running the IT project;
- Present project reports orally on an ongoing basis and compile documents as an ongoing activity to record facts and specifications for the involved system;
- Act responsibly and professionally when designing and presenting IT projects and when working as part of a project group. /

Module uitkomste:

Studente moet in staat wees om

- *Die fases van die stelselontwikkelingslewenssiklus te beskryf en die hulpmiddels en tegnieke tydens inisiasie-, ontleding- en ontwerpfases van 'n IT projek in 'n gekose omgewing toe te pas;*
- *Die aktiwiteite betrokke by projekbestuur te bespreek en in groepsverband toe te pas tydens die verloop van die genoemde lewenssiklusfase aktiwiteite van die IT projek;*
- *Deurlopende mondelingse voordragte te gee van projekverslae en om dokumente by te werk as deurlopende aktiwiteit om feite en spesifikasies van die betrokke stelsel te weer te gee;*
- *Verantwoordelik en professioneel op te tree wanneer IT projekte ontwerp en voorgedra word en wanneer hy/sy deel is van 'n groep.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative

Class tests and small practical assignments

A practical project

Summative

There will be a 3-hour examination at the end of the semester /

Assesseringsmetodes:

Formeel Formatief

Klastoetse en klein praktiese opdragte

'n Praktiese projek

Summatief

Daar sal 'n 3-ure eksaminering aan die einde van die semester wees

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen 50%

CMPG214	**Semester 1**	**NQF Level: 6**
Communication Skills/ ***Kommunikasievaardighede***		

Module outcomes:

Students should be able to:

- Scope of knowledge: Integrated knowledge and coherent understanding
  - Demonstrate integrated knowledge and clear / coherent / logical / critical understanding of, as well as an ability to correctly evaluate and apply the concept of a principle-based value system according to which he / she can set personal objectives to different areas of specialisation within the field of Computer Science and Information Systems;
  - Demonstrate integrated knowledge and clear / coherent / logical / critical understanding of, as well as an ability to correctly evaluate and apply the concept of the basic communication skills of writing and presentation techniques to different areas of specialisation within the field of Computer Science and Information Systems;
  - Demonstrate integrated knowledge and clear / coherent / logical / critical understanding of, as well as an ability to correctly evaluate and apply the concept of soft skills such as client management, conflict management, critical thinking, decision-making, emotional intelligence, flexibility, interpersonal relations, leadership, negotiation, professionalism, self-management, teamwork, willingness to learn, and work ethic to different areas of specialisation within the field of Computer Science and Information Systems;
- Practical skill: Demonstrate practical skill
  - Able to effectively implement communication skills;
  - Able to function effectively in groups;
  - Able to express themselves on the importance of soft skills, and to apply soft skills in everyday life;
  - Act in accordance with ethical and professional behavioural requirements;
  - Able to reflect on the values, ethical conduct and justifiability of decisions. /

Module uitkomste:

Studente moet in staat wees om:

- *Omvang van kennis: Geïntegreerde kennis en kritiese verstaan*
  - *Geïntegreerde kennis en duidelike / logiese / kritiese verstaan van die konsep van 'n beginselgebaseerde waardestelsel waarvolgens persoonlike doelwitte gestel word, sowel as die*

vermoë om dit te evalueer en toe te pas tot verskillende areas in die veld van Rekenaarwetenskap en Inligtingstelsels te demonstreer;

- *Geïntegreerde kennis en duidelike / logiese / kritiese verstaan van die konsep van basiese kommunikasievaardighede en voorleggingstegnieke, sowel as die vermoë om dit te evalueer en toe te pas tot verskillende areas in die veld van Rekenaarwetenskap en Inligtingstelsels te demonstreer;*
- *Geïntegreerde kennis en duidelike / logiese / kritiese verstaan van die konsep van sagte vaardighede soos byvoorbeeld kliëntbestuur, konflikbestuur, besluitneming, emosionele intelligensie, aanpasbaarheid, interpersoonlike verhoudinge, leierskap, onderhandelinge, professionalisme, selfbestuur, spanwerk, bereidheid om te leer, en werksetiek, sowel as die vermoë om dit te evalueer en toe te pas tot verskillende areas in die veld van Rekenaarwetenskap en Inligtingstelsels te demonstreer;*

- *Praktiese vaardigheid: Demonstreer praktiese vaardigheid*
  - *Vaardigheid om kommunikasievaardighede effektief te implementeer;*
  - *Vaardigheid om effektief te werk as lid van 'n groep;*
  - *Vaardigheid om hulself uit te druk oor die belang van sagte vaardighede, en om sagte vaardighede toe te pas in die daaglikse lewe.*
  - *Tree op in ooreenstemming met etiese en professionele gedragsvereistes*
  - *Die vaardigheid om te reflekteer oor waardes, etiese gedrag en die regverdiging van besluite.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

±4 tests and ±3 practical assignments

Summative

2 hour written examination

Assesseringsmetodes:

Formeel Formatief

± 4 toetse en ±3 praktiese opdragte

Summatief

2-uur geskrewe eksamen

Assessment Plan

Participation mark:

50% Coursework

50% Tests

Final mark:

50 % participation mark

50% Exam

Assesseringsplan

Deelnamepunt:

50% opdragte

50% toetse

Finale punt:

50% deelnamepunt

50% eksamen

CMPG215	Semester 1	NQF Level: 6
Information Security/ ***Inligtingsekuriteit***		

Module outcomes:

Students should be able to:

- Knowledge:
  - On theoretical level the student should have insight and basic knowledge of main concepts of information and cyber security (these include concepts such as confidentiality, integrity, availability, authentication, privacy, secure software development, backup and recovery, legal and ethical issues);
  - The student is introduced to security threats in the world we live in and should be able to recognise appropriate controls to counteract these threats.
- Methods and procedures:
  - The students should have the ability to identify and have knowledge about security threats and vulnerabilities in a computerised environment such as hardware errors, software failures, human errors, malicious intent and natural causes;
  - The students should demonstrate that they have knowledge and can identify applicable controls and countermeasures on different levels such as technical controls, physical controls, and procedural controls as well as social controls in order to counteract the security threats and vulnerabilities in a computerised system.
- Ethics and professional practice:
  - The students should have the ability to act according to the code of conduct of the IT profession towards clients and to use computer resources ethically and responsibly. /

Module uitkomste:

Studente moet in staat wees om

- *Kennis:*
  - *Op teoretiese vlak moet die student insig en basiese kennis hê van die hoofaspekte van inligting- en kubersekuriteit (dit sluit konsepte in soos: vertroulikheid, integriteit, beskikbaarheid, identifisering, privaatheid, veilige programmatuurontwikkeling, rugsteun en herstel, regs- en etiese kwessies);*
  - *Die student word bewus gemaak van sekuriteitsbedreigings in die wêreld waarin ons leef en moet bewus wees van geskikte kontroles en teenmaatreëls om hierdie bedreigings af te weer.*
- *Metodes en prosedures:*
  - *Die student moet oor die vermoë beskik om sekuriteitsbedreigings en kwesbaarhede in 'n gerekenariseerde omgewing te kan identifiseer en kennis te dra van apparatuurfoute, programmatuurfalings, menslike foute, kwaadwillige intensies en natuurlike oorsake;*
  - *Die studente moet demonstreer dat hulle kennis het en toepaslike kontroles en teenmaatreëls kan identifiseer op verskillende vlakke, soos tegniese kontroles, fisiese kontroles, prosedurele kontroles sowel as kontroles op sosiale vlak, om sodoende sekuriteitsbedreigings en – kwesbaarhede in 'n gerekenariseerde stelsel teen te staan.*
- *Etiese en professionele optrede:*
  - *Die studente moet oor die vermoë beskik om volgens die gedragskode van die IT professie op te tree teenoor kliënte en om rekenaarbronne eties en verantwoordelik te gebruik.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

Class assignments

Tests

Summative

2 hour written examination

Assesseringsmetodes:

Formeel Formatief

Klasopdragte

Toetse

Summatief

2-uur geskrewe eksamen

Assessment Plan:

Participation mark:

50% Coursework

50% Tests

Final mark:

50 % Participation mark

50% Exam

Assesseringsplan:

Deelnamepunt:

50% opdragte

50% Toetse

Finale punt:

50% Deelnamepunt

50% Eksamen

CMPG221	**Semester 2**	**NQF Level: 6**

Data Structures and Algorithms/
Datastrukture en Algoritmes

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and critical understanding of, as well as an ability to correctly evaluate running times and complexity of algorithms;
- Demonstrate integrated knowledge and clear understanding of, as well as an ability to correctly evaluate and apply manipulation algorithms for data structures such as linked lists, multidimensional arrays, queues, stacks and trees;
- Display advanced ability to effectively apply data manipulation algorithms with a view to solve familiar and unfamiliar problems including sorting and searching algorithms, using object-oriented programming techniques;
- Have basic knowledge of design patterns and its application. /

Module uitkomste:

Studente moet in staat wees om

- *Kennis te integreer en kritiese begrip, tesame met die vermoë om die looptyd en kompleksiteit van algoritmes te bepaal, te openbaar;*
- *Kennis te integreer en ’n duidelike begrip tesame met die vermoë om algoritmes vir die manipulasie van datastrukture soos geskakelde lyste, multidimensionele vektors, toue, stapels en bome te evalueer en te implementeer, te openbaar;*
- *Gevorderde vermoë openbaar om data manipulasie algoritmes effektief toe te pas om bekende en onbekende probleme soos sorterings- en soek-algoritmes met behulp van objek-georiënteerde metodes op te los;*
- *Basiese kennis van ontwerppatrone en hulle toepassings kan demonstreer.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative

Class tests and small practical assignments

A practical project

Summative

There will be a 2-hour written examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatief

Klastoetse en klein praktiese opdragte

'n Praktiese projek

Summatief

Daar sal 'n 2-ure geskrewe eksaminering aan die einde van die semester wees.

Assessment Plan

Participation mark: 50%

Examination: 50%

Assesseringsplan

Deelnamepunt: 50%

Eksamen 50%

CMPG222	**Semester 2**	**NQF Level: 6**

Data Analytics/

Data Analise

Module outcomes:

Students should be able to:

- Understand the importance of context of large data sets;
- Apply knowledge of concepts of design in data analysis;
- Demonstrate the ability to utilise modern data analysis tools to create effective reports and visualisations.

Module uitkomste:

Studente moet in staat wees om:

- *Die belangrikheid van die konteks van groot datastelle te verstaan;*
- *Kennis van konsepte rakende data-analise te kan toepas;*
- *Die vermoë te demonstreer om moderne hulpmiddels te gebruik om effektiewe verslae en visualiserings te skep.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

Class assignments and tests

Summative

2 hour written examination

Assesseringsmetodes:

Formeel Formatief

Klasopdragte en toetse

Summatief

2-uur geskrewe eksamen

Assessment Plan:

Participation mark:

50% Coursework

50% Tests

Final mark:

50 % Participation mark

50% Exam

Assesseringsplan:

Deelnamepunt:

50% Opdragte

50% Toetse

Finale punt:

50% Deelnamepunt

50% Eksamen

CMPG223	**Semester 2**	**NQF Level: 6**

System Analysis and Design II/

Stelselontleding en Ontwerp II

Module outcomes:

Students should be able to:

- Demonstrate sufficient knowledge and insight into project management techniques and apply the phases and techniques of the system development life cycle (or alternative systems development methodologies) when a system is designed and developed including the later phases of physical design, construction, testing, installation and delivery of a system;
- Demonstrate that he/she can correctly apply and use the phases and techniques of a project as individual or in a group, manage a practical project by applying project management techniques, think and behave in an innovative and creative way when a computerized system is designed and developed;
- Successfully write reports of projects and present it orally;
- Apply a professional attitude towards clients and use computer resources ethically and responsibly when they create, complete and deliver IT projects and work as part of a project team. /

Module uitkomste:

Studente moet in staat wees om:

- *Voldoende kennis en insig te demonstreer in projekbestuurstegnieke en die fases en tegnieke van die stelselontwikkelingslewensiklus (of alternatiewe stelselontwikkelingsmetodologieë) toe te pas wanneer ŉ stelsel ontwerp en ontwikkel word, insluitende die latere fases van fisiese ontwerp, konstruksie, toetsing, installering en aflewering van ŉ stelsel;*
- *Te demonstreer dat hy / sy die fases en tegnieke van 'n projek as individu of in 'n groep korrek kan toepas en gebruik, 'n praktiese projek kan bestuur deur projekbestuurstegnieke toe te pas, op innoverende en kreatiewe wyse te dink en op te tree wanneer 'n gerekenariseerde stelsel ontwerp en ontwikkel word;*
- *Verslae van projekte suksesvol te kan skryf en dit mondelings te kan aanbied;*
- *'n Professionele houding teenoor kliënte te toon en rekenaarhulpbronne eties en verantwoordelik gebruik wanneer hulle IT-projekte skep, voltooi en aflewer en werk as deel van ŉ projekspan.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative

Class tests

Assignments

A practical project

Summative

There will be a 3-hour examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatief

Klastoetse

Opdragte

'n Praktiese projek

Summatief

Daar sal 'n 3-ure eksaminering aan die einde van die semester wees.

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen 50%

CMPG224	**Semester 2**	**NQF Level: 6**

Introduction to Software Engineering/

Inleiding tot Programmatuuringenieurswese

Module outcomes:

Students should be able to:

- Describe Software Engineering and its process;
- Describe and appropriately apply different software development methodologies to implement quality software by:
  - describe different software processes and how to choose between them
  - elicit requirements from a client and specify them
  - create and analysing design models
- Develop a basic system using a DBMS using software requirements and specifications;
- Validate a basic system using a DBMS using software requirements and specifications;
- Write software engineering documentation such as reports, and user manuals;
- Develop technical skills, personal skills and social skill;
- Understand good coding practices, including documentation, contracts, regression tests and daily builds;
- Define software quality and describe various quality assurance techniques, including unit testing, functional testing, and automated analysis tools;
- Work in teams peacefully and create a project plan;
- Be aware of Software Engineering ethics and exhibit professional behaviour. /

Module uitkomste:

Studente moet in staat wees om:

- *Stelsingenieurswese en die prosesse daarvan te beskryf;*

- *Verskillende metodologieë programmatuurontwikkel te beskryf en toe te pas om in hoë kwaliteit programmatuur te implementeer deur:*
  - *beskryf verskillende programmatuurprosesse en die keuse daartussen;*
  - *bepaal spesifiseer behoefte van 'n kliënt.*
  - *skep en analiseer ontwerpmodelle.*
- *'n Stelsel met behulp van 'n DBBS en programmatuurvereistes en spesifikasies te ontwerp;*
- *'n Basiese stelsel met behulp van 'n DBBS en programmatuurvereistes en spesifikasies te valideer;*
- *Programmatuuringenieurswese-dokumentasie soos verslae en gebruikershandleidings te skryf;*
- *Tegniese vaardighede, persoonlike vaardighede en sosiale vaardighede te ontwikkel;*
- *Goeie koderingspraktyke soos dokumentasie, kontrakte, regressie toetsing, en daaglikse weergawe skepping te verstaan;*
- *Programmatuurkwaliteit en verskillende kwaliteitsversekeringstegnieke, soos eenheidstoetsing, funksionele toetsing, en geoutomatiseerde analise hulpmiddele te definieer.*
- *In vredeliewend in groepe te werk en 'n projekplan te skep;*
- *Bewus te wees van etiek van programmatuuringenieurswese en vertoon professionele gedrag.*

Method of delivery: Contact

Metode van aflewering: *Kontak*

Assessment Methods:

Formal Formative

Class tests and small practical assignments

A practical project

Summative

2 hour written examination

Assesseringsmetodes:

Formeel Formatief

Klastoetse en klein praktiese opdragte

'n Praktiese projek

Summatief

2-uur geskrewe eksamen

Assessment Plan:

Participation mark: 50%

Examination: 50%

Assesseringsplan:

Deelnamepunt: 50%

Eksamen 50%

CMPG311	**Semester 1**	**NQF Level: 7**
Databases/ Databasisse		

Module Outcomes:

After completion of the module, the student should demonstrate:

Scope of knowledge:

- Integrated knowledge and coherent understanding:
  - integrated knowledge and clear / coherent / logical / critical understanding of, as well as an ability to correctly evaluate and apply database concepts within the field of Computer Science and Information Systems.

Methods and procedures:

- Implement an appropriate procedure / method / rule / formula and evaluate the effectiveness of the implementation:
  - integrated knowledge and clear understanding of, as well as an ability to correctly evaluate and apply database systems and database design to different areas of concern within the field of Computer Science, Information Systems and business entities;
  - the implementation of an appropriate procedure to develop entity relationship models as part of the database design process, do normalization of database tables and design databases.

Practical skill:

- Demonstrate advanced practical skill:
  - advanced ability to solve given problems in the database environment;
  - advanced ability to effectively use SQL expressions and procedures with a view to create and change database objects, change data and retrieve information to respond to queries and resolve problems within a database environment.

Problem identification and problem solving:

- the ability to identify, analyse, critically reflect on and address complex problems/issues/challenges related to unstructured data stores and apply practice-driven solutions with theory-driven arguments. /

Module uitkomste:

Studente moet in staat wees om

Omvang van kennis:

- *Geïntegreerde kennis en samehangende verstaan:*
  - *geïntegreerde kennis en duidelike en kritiese verstaan van databasiskonsepte, asook die vermoë om databasiskonsepte krities te evalueer en toe te pas binne die veld van Rekenaarwetenskap en Inligtingstelsels.*

Metodes en prosedures:

- *Implementeer gepaste prosedures en evalueer die effektiwiteit van die implementering:*
  - *geïntegreerde kennis en duidelike en kritiese verstaan van databasisstelsels en databasisontwerp, asook die vermoë om databasisstelsels en databasisontwerp krities te evalueer en toe te pas binne die veld van Rekenaarwetenskap en Inligtingstelsels;*
  - *die implementering van gepaste prosedures om entiteitverwantskapmodelle te ontwikkel as deel van die databasisontwerpproses, normalisering van databasis tabelle te doen en databasisse te ontwerp.*

Praktiese vaardigheid: demonstreer gevorderde praktiese vaardigheid:

- *gevorderde vaardigheid om gegewe probleme in die databasisomgewing op te los;*
- *gevorderde vaardigheid om SQL uitdrukkings en prosedures effektief te gebruik vir die skep of verander van databasis objekte, om data te verander of te onttrek, en om probleme in die databasisomgewing op te los.*

Probleemidentifisering en probleemoplossing:

- *die vaardigheid om te identifiseer, ontleed, krities te reflekteer en om komplekse probleme verwant aan ongestruktureerde data store aan te spreek en praktykgedrewe oplossings toe te pas met teorie-gedrewe argumente.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment modes:

Formal Formative

There will typically be various practical and theoretical assignments, various contact tests, semester tests and a semester project to complete during the semester.

Summative

There will be a 3-4-hour examination at the end of the semester. Examination may include a practical session.

Assesseringsmetodes:

Formeel Formatief

Daar sal tipies verskeie praktiese- en teoretiese opdragte, verskeie kontaktoetse, semestertoetse en 'n semester projek wees om te voltooi gedurende die semester.

Summatief

Daar sal 'n 3-4 uur eksaminering aan die einde van die semester wees. Die eksaminering kan 'n praktiese sessie insluit.

Assessment plan:

Formative assessments 50%.

Summative assessments 50% (1:1)

Assesseringsplan:

Formatiewe assesserings 50%

Summatiewe assesserings 50%

CMPG312	**Semester 1**	**NQF Level: 7**

Decision Support Systems I/

Besluitsteunstelsels I

Module outcomes:

On completion of this module, the student should be able to:

- Apply the knowledge and insight that they have gained in problem-solution in the field of study and its fields of application;
- Discuss the definition of a decision-making support system;
- Formulate LP problems, solve them and apply sensitivity analysis to them;
- Formulate and solve transportation and allocation problems;
- Formulate and solve integer programming problems; and
- Formulate and solve network modelling problems.

Module uitkomste:

Studente het die uitkomste bereik as hulle in staat is om:

- *Kennis en insig wat verwerf is in probleem-oplossing in die veld van studie kan toepas;*
- *'n Besluitsteunstelsel se definisie te bespreek;*
- *LP probleme te formuleer, op te los en sensitiwiteitsontleding te doen;*
- *Transportasie en toekenningsprobleme te formuleer en op te los;*
- *Heeltallige programmeringsprobleme te formuleer en op te los; en*
- *Netwerk modelleringsprobleme te formuleer en op te los.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment modes:

Formal formative

There will be 5 practical assignments (homework) and 4 class tests to complete the semester.

Summative

There will be a 3-hour examination at the end of the semester /

Assesseringsmetodes:

Formeel formatief

Daar sal 5 praktiese opdragte (tuiswerk) en 4 klastoetse wees om die semester te voltooi.

Summatief

Daar sal ’n 3-uur eksamen aan die einde van die semester wees.

CMPG313	**Semester 1**	**NQF Level: 7**

Artificial Intelligence/
Kunsmatige Intelligensie

Module outcomes:

Students should be able to:

- Explain that Artificial Intelligence is a full branch of Computer Science, constructed on scientific principles;
- Define Artificial Intelligence and to comment on the definition;
- Describe the foundations and fields of application of the subject;
- Use Propositional Logic and Predicate Logic for the portrayal of problems in Artificial Intelligence;
- Set up condition spaces of problems for use by search processes;
- Use various uninformed and also informed search methods and to apply these to practical problems. /

Module uitkomste:

Studente moet in staat wees om

- *Te verduidelik dat Kunsmatige Intelligensie ’n volwaardige onderafdeling van Rekenaarwetenskap is wat gebou is op wetenskaplike beginsels;*
- *Kunsmatige Intelligensie te definieer en kommentaar te lewer op die definisie;*
- *Die grondslag en toepassingsvelde van die vakgebied te kan beskryf;*
- *Proposisie logika en Predikaatlogika te gebruik om probleme in Kunsmatige Intelligensie voor te stel;*
- *Voorwaarderuimtes van probleme op te stel wat gebruik word deur soekprosesse;*
- *Verskeie oningeligte en ook ingeligte soekmetodes te gebruik en dit toe te pas op praktiese probleme.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment modes:

Formal Formative

A project will be completed during the semester and there will be a number of reports and class discussions. There are typically 6 tests to complete during the semester.

Summative

There will be a 3-hour examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatief

’n Projek sal voltooi word gedurende die semester en daar sal ’n aantal verslae en klasbesprekings wees. Daar is tipies 6 toetse wat voltooi word gedurende die semester.

Summatief

Daar sal ’n 3-ure eksaminering wees aan die einde van die semester.

Assessment Plan:

There will be written tests and assignments.

Assesseringsplan

Daar sal geskrewe toetse en opdragte wees.

CMPG315	Semester 1	NQF Level: 7
Computer Networks/ ***Rekenaarnetwerke***		

Module outcomes:

To achieve the outcomes of the module, the students should be able to:

- Discuss the different types of networks as well as their function
- Describe and compare the OSI and TCP / IP reference models as well as the protocols used in these models.
- Discuss the physical layer of the OSI model in terms of the principles and protocols involved as well as the practical implementation.
- Discuss the data link layer of the OSI model in terms of the principles and protocols involved. Describe and compare different techniques used by protocols in this layer.
- Discuss the medium access control sub layer of the OSI model in terms of principles and protocols involved. Describe and compare different implementations used for these protocols.
- Discuss the network layer of the OSI model in terms of the principles and protocols involved. Compare different techniques used in the transport layer protocols.
- Discuss the session, presentation and application layer of the OSI models in terms of principles and protocols involved. Describe browser, DNS and email implementations and propose solutions for the given scenarios.
- Discuss security implications of networks in terms of the environment, vulnerabilities, attacks and possible protection mechanisms.
- Analyse a given scenario and then design and implement a network solution to solve given problems. /

Module uitkomste:

Studente sal die uitkomste van die module bereik indien hulle die volgende kan doen:

- *Bespreek die verskillende tipes netwerke en hul funksie.*
- *Beskryf en vergelyk die OSI en TCP /IP verwysingsmodelle asook die protokolle wat in die modelle gebruik word.*
- *Bespreek die fisiese-laag van die OSI model in terme van die beginsels en protokolle betrokke asook die praktiese implementering daarvan.*
- *Bespreek die dataverbindingslaag van die OSI-model in terme van die beginsels en protokolle betrokke. Beskryf en vergelyk verskillende tegnieke wat deur protokolle in hierdie lag gebruik word.*
- *Bespreek die medium toegangsbeheer sub-laag van die OSI model in terme van die beginsels en protokolle betrokke. Beskryf en vergelyk verskillende implementerings wat vir hierdie protokolle gebruik word.*
- *Bespreek die netwerk laag van die OSI model in terme van die beginsels en protokolle betrokke. Vergelyk die verskillende tegnieke wat in netwerk laag protokolle gebruik word.*
- *Bespreek die transportlaag van die OSI model in terme van die beginsels en protokolle betrokke. Vergelyk die verskillende tegnieke wat in die transportlaag protokolle gebruik word.*
- *Bespreek die sessie-, voorstellings- en toepassingslaag van die OSI model in terme van die beginsels en protokolle betrokke. Beskryf webblaaier, DNS en epos implementerings en stel oplossings voor die gegewe scenario's.*
- *Bespreek sekuriteitsgevolge van netwerke in terme van die omgewing, kwesbaarheid en aanvalle asook moontlike beskermingsmeganismes.*
- *Analiseer 'n gegewe scenario en ontwerp en implementeer 'n netwerkoplossing om die gegewe probleem op te los.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

A project will be completed during the semester and there will be a number of reports and class discussions.

There are typically 6 tests to complete during the semester.

Summative

There will be a 3-hour examination at the end of the semester.

Assesseringsmetodes:

Formeel Formatief

'n Projek sal voltooi word gedurende die semester en daar sal 'n aantal verslae en klasopdragte wees.

Daar is tipies 3-6 toetse om te voltooi gedurende die semester.

Summatief

Daar sal 'n 3-uur eksaminering aan die einde van die semester wees.

Assessment Plan:

There will be written tests and assignments.

Assesseringsplan:

Daar sal geskrewe toetse en opdragte wees.

CMPG321	**Semester 2**	**NQF Level: 7**
Advanced Databases/ ***Gevorderde Databasisse***		

Module outcomes:

After completion of the module, the student should demonstrate:

Scope of knowledge:

- Integrated Knowledge and Coherent Understanding
  - integrated knowledge and clear / coherent / logical / critical understanding of, as well as an ability to correctly evaluate and discuss the operation of transactions management, control of concurrent use, management of databases and performance, distributed database management systems, data-warehouses, Big Data analytics and NoSQL, database connectivity and web technologies as well as database administration within the field of Computer Science and Information Systems;
  - the ability to reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of data handling and regulatory compliance.

Practical skill:

- Demonstrate advanced practical skill
  - advanced ability to effectively use SQL expressions and procedures with a view to apply database administration practically and resolve complex problems within a database environment;
  - ability to use data visualization to present data;
  - ability to effectively use SQL expressions and procedures to solve advanced problems in the database environment;

Problem identification and problem solving

- the ability to identify, analyse, critically reflect on and address complex problems/issues/challenges related to the database environment. /

Module uitkomste:

Na voltooiing van die module, behoort die student die volgende te demonstreer:

Omvang van kennis:

- *Geïntegreerde kennis en samehangende verstaan*
  - *geïntegreerde kennis en duidelike en kritiese verstaan van transaksiebestuur, bestuur van gelyktydige gebruik, bestuur van databasisse en werksverrigting, verspreide databasisbestuur, datapakhuise, Groot Data ontledings en NoSQL, databasis kernaktiwiteit en web tegnologieë asook databasisadministrasie binne die veld van Rekenaarwetenskap en Inligtingstelsels;*
  - *die vermoë om te reflekteer oor waardes, etiese gedrag en die regverdigbaarheid van besluite, gepas tot die hantering van data en in nakoming van beleid en reëls.*

Praktiese vaardigheid:

- *Demonstreer gevorderde praktiese vaardigheid*
  - *gevorderde vermoë om effektief gebruik te maak van SQL uitdrukkings en prosedures, met die doel om databasisadministrasie prakties toe te pas en komplekse probleme binne 'n databasisomgewing op te los;*
  - *vermoë om data visualisering te gebruik om data voor te stel;*
  - *die vermoë om SQL-uitdrukkings en -prosedures effektief te gebruik om gevorderde probleme in die databasisomgewing op te los;*

Probleemidentifisering en probleemoplossing:

- *Die vermoë om komplekse probleme/ kwessies/ uitdagings verwant aan die databasisomgewing te identifiseer, te ontleed en krities daaroor te reflekteer en aan te spreek.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment Methods:

Formal Formative

There will typically be various practical assignments and theoretical assignments, various contact tests, semester tests and a semester project to complete during the semester.

Summative

There will be a 3-4-hour examination at the end of the semester. Examination may include a practical session.

Assesseringsmetodes:

Formeel Formatief

Daar sal tipies verskeie praktiese- en teoretiese opdragte, verskeie kontaktoetse, semestertoetse en 'n semester projek wees om te voltooi gedurende die semester.

Summatief

Daar sal 'n 3-4 uur eksaminering aan die einde van die semester wees. Die eksaminering kan 'n praktiese sessie insluit.

Assessment Plan:

Formative assessments 50%, summative assessment 50% (1:1)

Assesseringsplan:

Formatiewe assessering 50%, summatiewe assessering 50% (1:1)

CMPG322	**Semester 2**	**NQF Level: 7**

Decision Support Systems II/

Besluitsteunstelsels II

Module outcomes:

Upon successful completion of the module the students will be able to:

- Identify the problem (or model type) based on a problem specification given;
- Solve given problems in each of the (sub)fields of study by hand and/or by utilizing available software;
- Interpret/explain the solution to the problem (as for management);
- Construct/develop a DSS based on a given Case Study (Project).
- Indicative content/Areas of study/Subfields:
  - Decision-making theory and
  - Decision trees
  - Forecasting models
  - Inventory control problems
  - Project management problems
  - Waiting lines and queuing theory models
  - Simulation models

- Markov-analysis problems

- Constructing a Decision Support System. /

Module uitkomste:

Na die suksesvolle voltooiing van die module sal die student in staat wees om:

- *Die probleem (of model tipe) te identifiseer volgens die probleem spesifikasie wat gegee is;*
- *Die gegewe probleem in elk van die sub-velde van die studie met die hand of deur middel van beskikbare sagteware op te los;*
- *Die oplossing van die probleem te kan interpreteer/verduidelik asof vir bestuur;*
- *'n BOS te ontwikkel volgens 'n gegewe gevallestudie (Projek).*
- *Aangeduide inhoud/Onderwerpe van studie/Sub-velde:*
  - *Besluitnemingsteorie en*
  - *Besluitnemingsbome*
  - *Voorspellingsmodelle*
  - *Voorraadbeheermodelle*
  - *Projekbestuurprobleme*
  - *Wagtoue en toustaanteorie modelle*
  - *Simulasiemodelle*
  - *Markov-analise probleem*
- *Ontwikkel van 'n Besluitsteunstelsel.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment modes:

Formal Formative: This module will be presented using lectures in class and practical sessions in the lab (with homework) and further be supported by applicable material. There will be 3x tests during the semester.

Summative: There will be a 3-hour examination at the end of the semester.

Assesseringsmetodes:

Formeel formatief: *Hierdie module word aangebied dmv lesings in klas en praktiese sessies in die laboratorium (met tuiswerk) en verder ondersteun deur toepaslike materiaal. Daar sal 3 toetse gedurende die semester wees.*

Summatief: *Daar sal 'n 3-uur eksamen aan die einde van die semester wees.*

CMPG323	**Semester 2**	**NQF Level: 7**
IT Developments/ ***IT-Ontwikkelings***		

Module outcomes:

After the successful completion of this module, the student must be able to demonstrate;

- Integrated knowledge and clear understanding of, as well as an ability to correctly evaluate and apply new trending technologies to different areas of specialisation within the field of information technology,
- Coherent understanding of the different ways of implementing new and trending technologies in the field of Information Technology,
- The implementation of an appropriate software choice for a specific problem scope and to evaluate the effectiveness of the implementation,
- Advanced ability to effectively implement all practical skills acquired during the course of the degree with a view to prepare the student for industry,
- Access, analyse and evaluate current research on new and trending technologies and offer conclusions within a given context in the field of Information Technology,
- The ability to identify, analyse, critically reflect on and address complex problems related to project development with theory-driven arguments in the form of project documentation,

- The ability to reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of software development,
- Ability to communicate effectively in a variety of formats (oral, written, visual and electronic) to diverse audiences and for various purposes such as demonstrating projects,
- Critical analysis of alternative approaches to software development and the ability to offer value-driven and logical arguments for considered decisions,
- Ability to be self-directed and lifelong learners, who are able to work independently, utilise resources effectively, and exercise initiative,
- Ability to interact and collaborate effectively with others, and to work as part of a team, in diverse social, cultural and linguistic contexts. /

Module uitkomste:

Na die suksesvolle afhandeling van hierdie module moet die student in staat wees om:

- *Geïntegreerde kennis en duidelike begrip van, sowel as die vermoë om nuwe neigingstegnologieë korrek te evalueer en toe te pas in verskillende spesialisrigtings binne die veld van Inligtingstegnologie,*
- *Samehangende begrip van die verskillende manier om nuwe en toekomstige tegnologieë op die gebied van Inligtingstegnologie te implementeer,*
- *Die implementering van ʼn toepaslike sagteware keuse vir ʼn spesifieke probleem omvang en die doeltreffendheid van die implementering te evalueer,*
- *Gevorderde vermoë om alle praktiese vaardighede wat tydens die verloop van die grad verwerf is effektief te implementeer met die oog daarop om die student voor te berei vir die industrie,*
- *Huidige navorsing oor nuwe en neigingstegnologieë te verkry, te analiseer en evalueer en gevolgtrekkings binne ʼn gegewe konteks op die gebied van Inligtingstegnologie te maak,*
- *Die vermoë om komplekse probleme rakende projek ontwikkeling te identifiseer, te analiseer, krities daaroor te reflekteer en te bespreek met teoriegedrewe argumente in die vorm van projekdokumentasie,*
- *Om te besin oor die waardes, etiese optrede en regverdigheid van besluite wat toepaslik is vir die praktyk van sagteware-ontwikkeling,*
- *Effektief te kommunikeer in verskillende formate (mondeling, skriftelik, visueel en elektronies) vir uiteenlopende gehore en vir verskeie doeleindes soos projekte,*
- *Kritiese analise van alternatiewe benaderings tot sagteware-ontwikkeling te identifiseer met die vermoë om waardegedrewe en logiese argumente vir oorweegde besluite aan te bied,*
- *Selfgerigte en lewenslange leerders te wees, wat onafhanklik kan werk, hulpbronne doeltreffend kan gebruik en inisiatief kan uitoefen,*
- *Effektief met ander saam te werk en om as deel van ʼn span te werk, in diverse sosiale, kulturele en taalkundige kontekste.*

Method of delivery: Contact & Distance (PC)/ Contact (VC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC)*

Assessment Methods:

Formal Formative

No tests are written.

Four to six projects have to be completed, including reports.

Summative

There is no exam for this module.

The first projects will count towards the participation mark and the last project will be the exam mark.

Assesseringsmetodes:

Formeel Formatief

Geen toetse word geskryf nie.

Vier tot ses projekte moet voltooi word, insluitend verslae.

Summatief

Daar is geen eksamen vir hierdie module nie.

Assessment Plan:

Four to six projects are completed.

Each project covers all learning outcomes.

Practical assessment 50%; Summative assessment 50% (1:1)

Assesseringsplan:

Vier tot ses projekte moet voltooi word.

Elke projek dek al die leeruitkomste.

Praktiese assessering 50%; Summatiewe assessering 50% (1: 1)

CMPG324	**Semester 1**	**NQF Level: 7**

Operating Systems/
Bedryfstelsels

Module outcomes:

Students have achieved the outcomes if they are able to:

- Describe the functions, layout and core concepts of operating systems;
- Discuss the history of computers and operating systems;
- Describe and compare concepts in operating systems regarding processes and apply different scheduling algorithms;
- Discuss and compare different methods of memory management;
- Describe the concepts and compare various implementations of file systems;
- Describe and compare Input/output concepts as well as storage media;
- Describe deadlock concepts including detection, handling, avoidance and prevention;
- Discuss IT security environment, vulnerabilities and attacks as well as possible protection mechanisms;
- Install and configure an operating system as well as use utility functions. /

Module uitkomste:

Studente het die uitkomste bereik as hulle in staat is om:

- *Die funksies, uitleg en kernkonsepte van bedryfstelsels kan beskryf;*
- *Die geskiedenis van rekenaars en bedryfstelsels kan bespreek;*
- *Die konsepte in bedryfstelsels rakende prosesse kan beskryf en vergelyk en verskillende skedulerings algoritmes kan toepas;*
- *Verskillende metodes van geheuebestuur kan bespreek en vergelyk;*
- *Die konsepte betrokke by lêerstelsels kan beskryf en implementerings daarvan kan vergelyk;*
- *Invoer/Afvoer konsepte kan beskryf en vergelyk, asook verskillende stoormedia;*
- *Dooiepuntkonsepte kan beskryf, insluitend opsporing, hantering, vermyding en voorkoming;*
- *IT-sekuriteitsomgewing, – kwesbaarhede, en -aanvalle kan bespreek, asook moontlike beskermingsmeganismes;*
- *Installering en opstel van 'n bedryfstelsel kan doen, asook nutsfunksies kan gebruik.*

Method of delivery: Contact & Distance (PC)/ Contact (VC & MC)

Metode van aflewering: *Kontak & Afstand (PC)/ Kontak (VC & MC)*

Assessment modes:

Formal formative: There are typically 6 tests and 6 assignments to complete during the semester.

Summative: There will be a 3-hour examination at the end of the semester.

Assesseringsmetodes:

Formeel formatief: *Daar sal tipies 6 toetse en 6 opdragte wees om te voltooi gedurende die semester.*

Summatief: *Daar sal 'n 3-uur eksamen wees aan die einde van die semester.*

CMPG325	**Semester 2**	**NQF Level: 7**

Computer Networks/

Rekenaarnetwerke

Module outcomes:

To achieve the outcomes of the module, the students should be able to:

- Discuss the different types of networks as well as their function.
- Describe and compare the OSI and TCI/IP reference models as well as the protocols used in these models.
- Discuss the physical layer of the OSI model in terms of the principles and protocols involved as well as the practical implementation.
- Discuss the data link layer of the OSI model in terms of the principles and protocols involved. Describe and compare different techniques used by protocols in this layer.
- Discuss the medium access control sub layer of the OSI model in terms of principles and protocols involved. Describe and compare different implementations used for these protocols.
- Discuss the network layer of the OSI model in terms of the principles and protocols involved. Compare different techniques used in the transport layer protocols.
- Discuss the session, presentation and application layer of the OSI models in terms of principles and protocols involved. Describe browser, DNS and email implementations and propose solutions for the given scenarios.
- Discuss security implications of networks in terms of the environment, vulnerabilities, attacks and possible protection mechanisms.
- Analyse a given scenario and then design and implement a network solution to solve given problems. /

Module uitkomste:

Studente sal die uitkomste van die module bereik indien hulle die volgende kan doen:

- *Bespreek die verskillende tipes netwerke en hul funksie.*
- *Beskryf en vergelyk die OSI en TCP/IP verwysingsmodelle asook die protokolle wat in die modelle gebruik word.*
- *Bespreek die fisiese-laag van die OSI model in terme van die beginsels en protokolle betrokke asook die praktiese implementering daarvan.*
- *Bespreek die dataverbindingslaag van die OSI-model in terme van die beginsels en protokolle betrokke. Beskryf en vergelyk verskillende tegnieke wat deur protokolle in hierdie lag gebruik word.*
- *Bespreek die medium toegangsbeheer sub-laag van die OSI model in terme van die beginsels en protokolle betrokke. Beskryf en vergelyk verskillende implementerings wat vir hierdie protokolle gebruik word.*
- *Bespreek die netwerk laag van die OSI model in terme van die beginsels en protokolle betrokke. Vergelyk die verskillende tegnieke wat in netwerk laag protokolle gebruik word.*
- *Bespreek die transportlaag van die OSI model in terme van die beginsels en protokolle betrokke. Vergelyk die verskillende tegnieke wat in die transportlaag protokolle gebruik word.*
- *Bespreek die sessie-, voorstellings- en toepassingslaag van die OSI model in terme van die beginsels en protokolle betrokke. Beskryf webblaaier, DNS en epos implementerings en stel oplossings voor die gegewe scenario's.*
- *Bespreek sekuriteitsgevolge van netwerke in terme van die omgewing, kwesbaarheid en aanvalle asook moontlike beskermingsmeganismes.*
- *Analiseer 'n gegewe scenario en ontwerp en implementeer 'n netwerkoplossing om die gegewe probleem op te los.*

Method of delivery: Contact (VC & MC)

Metode van aflewering: *Kontak (VC & MC)*
Assessment modes: **Formal formative:** A project will be completed during the semester and there will be a number of reports and class discussions. There are typically 6 tests to complete during the semester. **Summative:** There will be a 3-hour examination at the end of the semester. / ***Assesseringsmetodes:*** ***Formeel formatief:*** *'n Projek sal voltooi word gedurende die semester en daar sal 'n aantal verslae en klasdiskoerse wees. Daar is tipies 6 toetse om te voltooi gedurende die semester.* ***Summatief:*** *Daar sal 'n 3-uur eksamen aan die einde van die semester wees.*

NAS.2.9.15 INDIGENOUS KNOWLEDGE

IKSM111	**Semester 1**	**NQF Level: 5**
The Nature and Patterns of Indigenous Knowledge Systems (IKS) and Innovations		
Module outcomes: Students should be able to: • Demonstrate an understanding of the nature and patterns of African indigenous knowledge systems (IKS) and innovations.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures, audio visuals, Excursions		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM112	**Semester 1**	**NQF Level: 5**
African Indigenous Languages and Communication Systems		
Module outcomes: Students should be able to: • Analyse the impact of indigenous languages and communication systems in addressing the psycho - social and cultural needs of the African society.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Community Excursions.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM113	**Semester 1**	**NQF Level: 5**
Introduction to Health Care Systems in Relation to Indigenous Knowledge Systems (IKS)		
Module outcomes: Students should be able to: • Define health care system; describe current trends in health care systems; • Explain indigenous health care modalities; • Identify challenges and opportunities of integrating indigenous and modern health care systems; • Analyse health care systems in relation to IKS.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Community Excursions		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM114	**Semester 1**	**NQF Level: 5**
The Role of Indigenous Knowledge Systems in Climate Change		

Module outcomes:

Students should be able to:

- Define climate change and explain its causes;
- Identify the effects of climate change in various sectors and on sustainable community livelihoods; explain the role of IKS in mitigating the effects of climate change..

Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM115	Semester 1	NQF Level: 5

Introduction to African Indigenous Life Skills Education

Module outcomes:

Students should be able to:

- To demonstrate knowledge and critical understanding of the concepts and approaches to life skills and counselling from an African indigenous socio - cultural perspective.

Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM121	Semester 2	NQF Level: 5

A Historiography of African Indigenous Science and Technology

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the development of African indigenous science and technology

Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM122	Semester 2	NQF Level: 5

Introduction to Tools of Indigenous Knowledge Management

Module outcomes:

Students should be able to:

- Generate, populate and manage IKS data using ICT tools.

Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM123	Semester 2	NQF Level: 5

The Use and Roles of Signs and Symbols in African Communities

Module outcomes:

Students should be able to:

- Analyse the use and roles of signs and symbols in Indigenous languages and communication systems as they link up with the needs of the different African cultures and societies.

Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM124	Semester 2	NQF Level: 5
The Nature and Roles of African Indigenous Health Care Providers		
Module outcomes: Students should be able to: • Demonstrate an understanding of the nature, roles and the impact of health care providers in African indigenous health care systems; • Explain the impact of African Indigenous Health Care Providers on primary health; • Identify the different African Indigenous Health Care Providers; • Explain the theories of indigenous wellness.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM125	**Semester 2**	**NQF Level: 5**
African Indigenous Food Security Systems		
Module outcomes: Students should be able to: • Define food security; • Explain the nature and characteristics of African indigenous food security systems; • Identify the elements and components of the African indigenous food security systems; • Critically analyse case studies of African indigenous food security systems.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures, Audio Visuals, Excursions.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM211	**Semester 1**	**NQF Level: 6**
The Rights of Indigenous Peoples		
Module outcomes: Students should be able to: • Understand the rights and major concerns of indigenous peoples and the national, regional and international legal mechanisms to address them.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM212	**Semester 1**	**NQF Level: 6**
African Cultural Astronomy		
Module outcomes: Students should be able to: • Understand the rights and major concerns of indigenous peoples and the national, regional and international legal mechanisms to address them.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM213	**Semester 1**	**NQF level: 6**
The Nature and Characteristics of African Indigenous Health Care Systems		
Module outcomes:		

Students should be able to:

- Explain the nature and characteristics of African indigenous health care systems;
- Describe the theories behind African indigenous health care systems;
- Identify the challenges and prospects of African indigenous health care systems.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM214	Semester 1	NQF Level: 6

African Indigenous Knowledge Development and Management

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the nature and characteristics of African indigenous knowledge development and management systems.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%) 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM215	Semester 1	NQF Level: 6

Implications of Intellectual Property Rights (IPR) on Indigenous Knowledge Systems (IKS)/ Traditional Knowledge (TK)

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the nature, characteristics, importance and implications of IPR for IKS / Traditional Knowledge (TK).

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM221	Semester 2	NQF Level: 6

African Indigenous Architecture and Design

Module outcomes:

Students should be able to:

- Critically interrogate theories and principles on African architectural designs and its contribution to contemporary designs and housing needs.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM222	Semester 2	NQF Level: 6

African Indigenous Approaches to Peace and Conflict Resolution

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the efficacy of African indigenous approaches and institutions for conflict transformation and peace - building for sustainable community livelihood.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSM223	Semester 2	NQF Level: 6
Socio-Cultural Protocols Associated with African Traditional Medicine and Health Care Systems		
Module outcomes: Students should be able to: • Demonstrate an understanding of the socio - cultural protocols in African traditional medicine and health care systems; • Explain the international and national legal instruments supporting bio-cultural community protocols.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM224	**Semester 2**	**NQF Level: 6**
African Indigenous Cultural, Bio-Diversity and Heritage		
Module outcomes: Students should be able to: • Define African Indigenous Cultural, Bio-Diversity and Heritage; • Explain the concepts and theories associated with African indigenous cultural, bio- diversity and heritage; • Apply concepts and theories associated with African indigenous cultural, bio-diversity and heritage to climate change and globalization issues; • Explain the significance of African indigenous cultural, bio-diversity and heritage for sustainable community livelihood and development with examples.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM225	**Semester 2**	**NQF Level: 6**
Foundations of African Indigenous Education		
Module outcomes: Students should be able to: • Demonstrate an understanding of the nature, structure and content of African indigenous education; the impact of colonialism and other forms of imperialism on pre-colonial education and the interfacing of African indigenous and modern forms of education.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM313	**Semester 1**	**NQF Level: 7**
Theories of Indigenous Community Innovation Systems and Technologies for Sustainable Livelihood		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge of the theories, concepts and applications associated with community innovation and technologies. • Compare and contrast between African community innovation and technologies for sustainable livelihood; • Make a critical evaluation of the role African community innovation and technologies on sustainable livelihood; • Make an analysis of African community innovation and technologies on sustainable livelihood.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM411	**Semester 1**	**NQF Level: 8**
Principles of Research		
Module outcomes: Students should be able to: • Demonstrate an understanding and skills of recording and using IKS for promoting sustainable community livelihood in local communities.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%),1 Project (20%), 3 Hour exam (50%).		
IKSM412	**Semester 1**	**NQF Level: 8**
Research Methodologies in Indigenous Knowledge Systems (IKS)		
Module outcomes: Students should be able to: • Explain the differences between Qualitative and Quantitative Research Methods; • Describe the components of Qualitative and Quantitative Research Methods; • Select the appropriate research methods to use in IKS research; • Demonstrate skills of applying the principles of qualitative and quantitative research methods in IKS research; • Select and apply appropriate research method to an IKS research project		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSM421	**Semester 2**	**NQF Level: 8**
Internship and Research Project		
Module outcomes: Students should be able to: • Gain practical experience and skills in their field of IKS specialization; and will be able to write an independent research paper based on the field experience (internship) in their area of specialization.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS311	**Semester 1**	**NQF Level: 7**
Introduction to African Ethno-mathematics		
Module outcomes: Students should be able to: • Demonstrate knowledge and understanding of the African Ethno- mathematics		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		

IKSS312	Semester 1	NQF Level: 7
Comparative African Indigenous and Western Science and Technology Systems		
Module outcomes: Students should be able to: • Demonstrate a critical and comparative analysis of the development of African indigenous and western science and technology.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS321	**Semester 2**	**NQF Level: 7**
African Indigenous Metallurgy I		
Module outcomes: Students should be able to: • Analyse and apply the scientific and technological processes involved in African indigenous metallurgy for sustainable community livelihood.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS322	**Semester 2**	**NQF Level: 7**
African Indigenous Ethno-mathematics II		
Module outcomes: Students should be able to: • Demonstrate critical knowledge and skills of African indigenous Ethno-mathematics.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS323	**Semester 2**	**NQF Level: 7**
Comparative African Indigenous Textile Technologies		
Module outcomes: Students should be able to: Acquire critical knowledge and skills of the scientific and technological processes involved in African indigenous textile technologies		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS324	**Semester 2**	**NQF Level: 7**
Indigenous Knowledge and Renewable Energy Sources for Sustainable Livelihood		
Module outcomes: Students should be able to: Demonstrate a critical knowledge and understanding of the relationship between indigenous knowledge systems (IKS), community - based renewable energy sources and sustainable development and livelihood in African local communities.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSS413	**Semester 1**	**NQF Level: 8**
African Indigenous Metallurgy II		
Module outcomes: Students should be able to: • Analyse and apply the scientific and technological processes involved in African Indigenous metallurgy for sustainable community livelihood.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSA311	**Semester 1**	**NQF Level: 7**
Impact of Climate Change on African Indigenous Food Security Systems		
Module outcomes: Students should be able to: • Demonstrate knowledge and understanding of the theories and applications on the causes (natural and human) of climate change within the context of indigenous agriculture; • Demonstrate an understanding of the effects of climate change on sustainable indigenous community livelihoods; • Make a critical evaluation of the impact of climate change on African indigenous food security systems; • Make an evaluation the role of indigenous knowledge and systems in mitigating against the effects of climate change.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSA321	**Semester 2**	**NQF Level: 7**
African Indigenous Agriculture and Sustainable Community Livelihood and Development in Southern Africa		
Module outcomes: Students should be able to: • Demonstrate an understanding of the role of African indigenous agriculture for sustainable community livelihoods in Southern Africa; • Display detailed knowledge on the types and elements of African indigenous agriculture and their contribution to sustainability; • Comprehend the role of African indigenous agriculture in community development in Southern Africa; • Demonstrate a critical understanding of the challenges and prospects of indigenous agriculture for community livelihoods and development in the Southern African region.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		

IKSA322	Semester 2	NQF Level: 7
Comparative African Indigenous Cultural, Bio-diversity and Heritage		
Module outcomes: Students should be able to: • Compare and contrast African indigenous and Western cultural, bio-diversity and heritage; • Demonstrate detailed knowledge and understanding of the concepts and theories associated with African indigenous cultural, biodiversity and heritage; • Make a critical evaluation of African indigenous cultural, bio-diversity and heritage; • Understand the relationships between African indigenous cultural, bio-diversity and heritage.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSA323	**Semester 2**	**NQF Level: 8**
Comparative African Indigenous and Western Food Security Systems		
Module outcomes: Students should be able to: • Compare and contrast African indigenous and western food security systems; • Demonstrate detailed knowledge of the components of African indigenous and western food security systems and their role in sustainable community livelihoods. • Evaluate the challenges and prospects of African indigenous and western food security systems.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSA413	**Semester 2**	**NQF Level: 8**
Indigenous Knowledge and Renewable Energy Sources for Sustainable Livelihood II		
Module outcomes: Students should be able to: • Demonstrate a critical knowledge and understanding of the relationship between indigenous knowledge systems (IKS), community-based renewable energy sources and sustainable development and livelihood in African local communities.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSC311	**Semester 1**	**NQF Level: 7**
Comparative Western and African Indigenous Life Skills Education		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge of the theories and application of western and African indigenous life skills education; • Make a critical evaluation of the socio-cultural context of western and African indigenous life skills education; • Compare and contrast western and African life skills education.		
Method of delivery: Contact and Practical Modes of teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		

IKSC312	Semester 1	NQF Level: 7
Comparative African Indigenous and Western Peace and Conflict Resolution Approaches		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge of indigenous and western peace and conflict resolution approaches; • Make an application of theories of indigenous and western peace and conflict resolution approaches; • Compare and contrast between indigenous and western peace and conflict resolution approaches; • Display a critical knowledge of indigenous and western peace and conflict resolution approaches.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSC321	**Semester 2**	**NQF Level: 7**
African Traditional Governance and Democracy		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge and understanding of the nature and characteristics of African traditional authority; • Make an application of the theories and practices of African traditional authorities in the promotion of democracy and socio – economic development in local communities; • Demonstrate detailed understanding of the role of African traditional authorities in the promotion of democracy and socio – economic development in local communities; • Compare and contrast African traditional governance and western governance.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSC322	**Semester 2**	**NQF Level: 7**
African Indigenous Music and Dance		
Module outcomes: Students should be able to: • Demonstrate an in-depth understanding and knowledge of the nature, characteristics, principles and practices of different African indigenous music and dances; • Make an application of the theories and concepts of different African indigenous music and dances; • Compare and contrast African indigenous music and dances from different African cultures.		
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.		
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).		
IKSC323	**Semester 2**	**NQF Level: 8**
Gender in African Indigenous Arts and Culture		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge of African indigenous arts and culture; • Make an application of the theories and concepts of gender in African indigenous arts and cultural issues;		

- Understand the role of gender in African indigenous arts and cultural issues.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSC413	Semester 2	NQF Level: 8

African Indigenous Music and Dance II

Module outcomes:

Students should be able to:

- Demonstrate an in-depth understanding and knowledge of the nature, characteristics, principles and practices of different African indigenous music and dances;
- Make an application of the theories and concepts of different African indigenous music and dances;
- Compare and contrast African indigenous music and dances from different African cultures.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH311	Semester 1	NQF Level: 7

Comparative Health Care Systems

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the theories of different health care systems of the world;
- Make an application of theories of health care systems to the Southern African region;
- Compare and contrast different health care systems in the world;
- Make an evaluation of the nature, characteristics and limitations of the different health care systems of the world.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH312	Semester 1	NQF Level: 7

African Indigenous Medicinal and Nutritional Significance of Living Organisms

Module outcomes:

Students should be able to:

- Demonstrate and understanding of the significance of living organisms as medicine and food;
- Make an evaluation of the extent of interdependence between human beings and other living organisms from an indigenous knowledge systems health care perspective;
- Make a critical analysis of the medicinal and nutritional significance of African Indigenous living organisms.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH314	Semester 1	NQF Level: 7

Gender in African Indigenous Health Care Systems

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the role of gender in African Indigenous Health Care Systems;

- Make a critical analysis of the role of gender in African indigenous health care systems;
- Make an evaluation on the relationship between gender, culture and science and technology with regards to African Indigenous Health Care Systems.

Method of delivery: Contact and Practical Modes of teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH321	Semester 2	NQF Level: 7

The Nature and Role of African Indigenous Health Care Providers

Module outcomes:

Students should be able to:

- Demonstrate an understanding of the categories and roles of African indigenous health care providers;
- Demonstrate detailed knowledge of the theories, challenges and prospects of African indigenous health care providers in the primary health realm;
- Make an analysis of the practices of African indigenous health care providers;
- Make an evaluation of the application of standard protocols by African indigenous health care providers.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH322	Semester 2	NQF Level: 8

African Indigenous Knowledge (IK) and Innovation Systems in Public Health Care I

Module outcomes:

Students should be able to:

- Display detailed knowledge of the research, innovation and technologies in African public health; demonstrate understanding of the benefits of IK innovations in public health;
- Make a critical analysis of the role of policy and institutions in promoting African indigenous knowledge (IK) and innovation systems in public health care;
- Make an evaluation of the challenges and opportunities of African Indigenous Knowledge (IK) and Innovation Systems in Public Health Care.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH323	Semester 2	NQF Level: 8

African Traditional Medicine and Health Care Systems I

Module outcomes:

Students should be able to:

- Demonstrate understanding of the history of African Traditional Medicine and Health Care Systems;
- Compare and contrast between African Traditional and western health care systems;
- Make a critical analysis on the challenges experienced by African Traditional Medicine Practitioners

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

IKSH411	Semester 1	NQF Level: 8
African Traditional Medicine and Health Care Systems II		

Module outcomes:

Students should be able to:

- Demonstrate detailed knowledge of African traditional medical systems for sustainable community livelihood;
- Display detailed knowledge of theories, concepts and practices of African traditional medical systems;
- Make an evaluation of the role of African traditional medical systems on sustainable livelihood.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

WVCS223	Semester 2	NQF Level: 6
Understanding the Cultural World		

Module outcomes:

In this module, you will aim to reach three very important outcomes:

- Have a fundamental knowledge base of a selection of world views and ideologies and demonstrate their critical understanding through an ability to compare the nature and function, as well as different contemporary manifestations of these world views and ideologies;
- Have the ability to understand the interrelatedness of phenomena that occurs in natural and social systems, and from this vantage point, analyse and evaluate real life problems or case studies based on core issues of our time, such as poverty, constant change, human rights, HIV-AIDS, power abuse, corruption, racism, xenophobia, etc.;
- Be able to articulate their personal world view and use it as a point of departure for arguing and communicating feasible solutions to core issues and problems of our time in a standard academic manner.

This will allow you to:

a) You will have developed a broad understanding of the range of problems and issues that mark your current life world landscape.

b) You will have developed a basic level of competence to apply cognitive, critical skills to a few life world problems with which you are being confronted in your personal life world.

Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.

Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

WVLS317	Semester 1	NQF Level: 7
Man and Society		

Module outcomes:

Students should be able to:

- Have a solid and systematic knowledge of the most important foundational issues in the field of IKS and demonstrate a critical understanding of the meta-theoretical assumptions underscoring foundational issues;
- Demonstrate knowledge and a critical understanding of specific forms of ethics that apply to the field of IKS, such as a personalized code of conduct or the general human rights charter, and be able to apply such forms of ethics discriminately to analyse, evaluate and pose possible solutions to some current themes or issues salient to the field of IKS;
- Demonstrate the ability to analyse, synthesize and critique the assumptions on which a chosen theme or issue are based, formulate a personal opinion about the theme or issue that gives evidence of an

own coherent world view, and communicate the findings in a presentation making use of applicable technology, as well as in a proof-based report written in a typically academic format
Method of delivery: Contact and Practical Modes of Teaching: Lectures and Audio Visuals.
Assessment modes: 1 Test (10%), 2 Assignments (20%), 1 Project (20%), 3 Hour exam (50%).

NAS.2.9.16 MICROBIOLOGY / *MIKROBIOLOGIE*

MKBN121	**Semester 2**	**NQF Level: 5**
Microbiology for Nursing/ ***Mikrobiologie vir Verpleegkunde***		
Module outcomes: After completion of the module, the student should be able to: • Demonstrate knowledge of microbiology and its relation to health sciences; • Apply knowledge of infectious diseases, infection control and related procedures within the health sciences context; • Demonstrate and apply specific microbiology laboratory techniques; • Exhibit skills in elementary research techniques, group work, report writing and problem solving through case studies; • Uphold strict ethical principles in all situations and show respect for life without exception. ***Module uitkomste*:** *Na voltooiing van die module moet die student in staat wees om:* • *Kennis van mikrobiologie en die verwantskap daarvan met gesondheidswetenskappe te kan demonstreer.* • *Kennis van infektiewe siektetoestande, beheer van infeksies en verwante prosedures binne die konteks van gesondheidsorg toe te kan pas.* • *Spesifieke mikrobiologiese laboratoriumtegnieke wat relevant is tot gesondheidswetenskappe te demonstreer en toe te pas.* • *Vaardighede wat betref elementêre navorsingstegnieke, groepwerk, skryf van verslae en probleemoplossing deur middel van gevallestudies te kan toon. Streng etiese beginsels in alle omstandighede te kan handhaaf en deurgaans respek vir lewe te kan toon.*		
Method of delivery: Full Time ***Metode van aflewering:*** *Voltyds*		
Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester. ***Assesseringsmetodes:*** *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*		
MKBN211	**Semester 1**	**NQF Level: 6**
Introductory Microbiology/ ***Inleidende Mikrobiologie***		
Module outcomes: Students should be able to: • Demonstrate detailed knowledge of development, scope and contribution of Microbiology as a discipline; basic concepts in Microbiology and characteristics of different types of microorganisms; • Demonstrate an understanding of and ability to apply and demonstrate basic practical skills in the laboratory that are associated with Microbiology;		

- Identify, evaluate and solve problems in unfamiliar contexts by gathering evidence and applying solutions based on evidence and procedures appropriate to Microbiology;
- Communicate complex information reliably and coherently using appropriate academic formats relevant to the field of Microbiology;
- Demonstrate an ability to evaluate performance against given criteria and identify and address own task-specific learning needs;
- Work effectively in a group and to take responsibility for own decisions and actions as well as those of group members in a defined context, including the ethical use of resources. /

Module uitkomste:

Studente moet in staat wees om

- *Gedetailleerde kennis te demonstreer van die ontwikkeling, omvang en bydrae van Mikrobiologie as 'n dissipline; basiese konsepte in Mikrobiologie en eienskappe van verskillende tipes mikroörganismes;*
- *Basiese praktiese vaardighede wat geassosieer word met Mikrobiologie te kan uitvoer en demonstreer in die laboratorium en 'n begrip daarvan te toon;*
- *Probleme in onbekende kontekste te kan identifiseer, evalueer en oplos deur bewyse te versamel en oplossings toe te pas gebaseer op bewyse en prosedures wat toepaslik is in Mikrobiologie;*
- *Komplekse inligting betroubaar en samehangend te kan oordra deur gebruik te maak van gepaste akademiese formate wat relevant is tot die veld van Mikrobiologie;*
- *Die vermoë te demonstreer om prestasie teen gegewe kriteriums te evalueer en eie taak-spesifieke leerbehoeftes te identifiseer en aan te spreek;*
- *Effektief te werk in 'n groep en om verantwoordelikheid te neem vir eie besluite en aksies sowel as die van groepslede in 'n gedefinieerde konteks, insluitend die etiese gebruik van bronne.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKBS221	**Semester 2**	**NQF Level: 6**

Introductory Microbial Genetics, Virology and Immunology/
Inleidende Mikrobiese Genetika, Virologie en Immunologie

Module outcomes:

Students should be able to:

- Demonstrate knowledge and informed understanding of key concepts relevant to microbial genetics, virology and immunology;
- Select and effectively apply the basic standard procedures and laboratory techniques relevant to the field of molecular biology and genetics.
- Identify, analyse and solve problems in the field of microbial genetics, virology and immunology in unfamiliar contexts.
- Communicate complex information reliably and coherently using appropriate academic formats relevant to the field of microbiology.
- Demonstrate an ability to evaluate performance against given criteria and identify and address own task-specific learning needs.
- Work effectively in a group and to take responsibility for own decisions and actions as well as those of group members in a defined context, including the ethical use of resources. /

Module uitkomste:

Studente moet in staat wees om

- *Kennis en duidelike begrip te toon van die sleutelkonsepte relevant tot mikrobiese genetika, virologie en immunologie;*
- *Die basiese standaardprosedures en laboratoriumtegnieke wat relevant is tot die veld van molekulêre biologie en genetika kan selekteer en effektief toepas;*
- *Probleme in die veld van mikrobiese genetika, virologie en immunologie in onbekende kontekste te identifiseer, analiseer en oplos;*
- *Komplekse inligting betroubaar en sinvol te kan kommunikeer deur gebruik te maak van gepaste akademiese formaat in die veld van mikrobiologie;*
- *Die vermoë te demonstreer om eie vordering en prestasie te kan meet teen gegewe kriteriums en om self taak-spesifieke leerbehoeftes aan te spreek;*
- *Effektief te kan werk in 'n groep en verantwoordelikheid neem vir eie besluite en aksies sowel as die van groepslede in 'n gedefinieerde konteks, insluitend die etiese gebruik van bronne.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKBS313	**Semester 1**	**NQF Level: 7**

Microbial Physiology/

Mikrobiese Fisiologie

Module outcomes:

At the end of the module the student should be able to:

- Demonstrate an integrated knowledge and clear understanding of the diversity of microbial physiology (metabolism) and the impacts and applications thereof.
- Be able to implement appropriate methods and procedures to apply principles from microbial physiology (metabolism) to characterise, identify and study microorganisms.
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of microbial physiology (metabolism) to support evidence-based solutions and theory-driven arguments.
- Obtain, manage and process information gathered from literature or through experimentation. This includes being able to independently validate the reliability of information or data. Students should also be able to communicate information and research findings in well-formulated arguments in written and oral reports.
- Interpret and manage tasks related to microbial physiology (metabolism). This include monitoring the progress of teams and taking responsibility for task outcomes.
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes.
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety. /

***Module uitkomste*:**

Aan die einde van die module moet die student in staat wees om:

- *'n Geïntegreerde kennis en duidelike begrip van die diversiteit van mikrobiese fisiologie (metabolisme) asook die impakte en toepassings daarvan kan demonstreer.*

- *In staat wees om gepaste metodes en prosedures te implementeer om beginsels vanuit mikrobiese fisiologie (metabolisme) toe te pas om mikroörganismes te karakteriseer, identifiseer en bestudeer.*
- *Gevorderde vaardighede te demonstreer om effektief komplekse probleme te identifiseer en te analiseer; deur praktiese vaardighede wat bemeester is in hierdie module en toepassing van die beginsels van mikrobiese fisiologie (metabolisme), bewys-gebaseerde en teorie-gedrewe argumente te ondersteun.*
- *Inligting te verkry, hanteer en te verwerk vanaf literatuur of eksperimentele werk. Dit sluit in die vermoë om die inligting en bevindinge te kan kommunikeer as goed geformuleerde stelling in geskrewe of mondelinge verslae.*
- *Take met betrekking tot mikrobiese fisiologie (metabolisme) te kan interpreteer en te bestuur. Dit sluit in die monitering van die vordering van groepe en om verantwoordelikheid te neem vir die taak se uitkomstes.*
- *Effektief sy/haar leerbehoeftes kan identifiseer, evalueer en aanspreek op 'n self-gedrewe wyse om gesamentlike leerprosesse te fasiliteer.*
- *Die vermoë demonstreer om volle verantwoordelikheid te neem vir sy of haar werk, insluitend professionele en etiese gedrag wanneer daar met mikroörganismes gewerk word, terselfdertyd ook bewustheid handhaaf vir publieke- en/of omgewingsveiligheid.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKBS314	**Semester 1**	**NQF Level: 7**

Recombinant DNA Technology and Industrial Microbiology/
Rekombinante DNA Tegnologie en Industriële Mikrobiologie

Module outcomes:

Students should be able to:

- Demonstrate an integrated knowledge and clear understanding of recombinant DNA technology and industrial microbiology as well as the impacts and applications thereof in society;
- Be able to implement appropriate methods and procedures to (i) apply principles from recombinant DNA technology and industrial microbiology to identify, characterise and study microorganisms used in laboratory and industrial settings; (ii) use methods and national standards to critically describe and evaluate the application of microbiology in water and waste-water treatment processes;
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of recombinant DNA technology and industrial microbiology to support evidence-based solutions and theory-driven arguments;
- Demonstrate the ability to obtain, manage and process information gathered form literature or through experimentation (this includes being able to independently validate the reliability of information or data and to communicate information and research findings in well-formulated arguments in written and oral reports);
- Interpret and manage tasks related to recombinant DNA technology and industrial microbiology in unfamiliar environments (this includes monitoring the progress of teams and taking responsibility for task outcomes);
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes;

- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety. /

Module uitkomste:

Studente moet in staat wees om

- *'n Geïntegreerde kennis en duidelike begrip van rekombinante DNA tegnologie en industriële mikrobiologie te kan demonstreer asook die impakte en toepassings daarvan in die samelewing;*
- *In staat wees om gepaste metodes en prosedures te implementeer om (i) beginsels vanuit rekombinante DNA tegnologie en industriële mikrobiologie toe te kan pas om mikroörganismes te karakteriseer, identifiseer en bestudeer in die laboratorium en industriële omgewings; (ii) metodes en nasionale standaarde te gebruik om krities die toepassing van mikrobiologie in water en afvalwater prosesse te evalueer;*
- *'n Gevorderde vaardigheid demonstreer om effektief komplekse probleme te identifiseer en te analiseer en dan deur praktiese vaardighede bemeester in hierdie module en deur die beginsels van rekombinante DNA tegnologie en industriële mikrobiologie toe te pas, bewys-gebaseerde en teorie-gedrewe argumente te ondersteun;*
- *Die vermoë demonstreer om inligting te verkry, hanteer en te verwerk vanaf literatuur of eksperimentele werk (dit sluit in die vermoë om die betroubaarheid van die inligting of data te kan beoordeel asook om navorsingsbevindinge te kan kommunikeer as goed geformuleerde stellings in geskrewe of mondelinge verslae);*
- *Take met betrekking tot rekombinante DNA tegnologie en industriële mikrobiologie te kan interpreteer en te kan bestuur (dit sluit in die monitering van die vordering van groepe en om verantwoordelikheid te neem vir die taak se uitkomstes);*
- *Effektief sy/haar leerbehoeftes kan identifiseer, evalueer en aanspreek op 'n self-gedrewe wyse om gesamentlike leerprosesse te fasiliteer;*
- *Die vermoë demonstreer om volle verantwoordelikheid te neem vir sy of haar werk, insluitend professionele en etiese gedrag wanneer daar met mikroörganismes gewerk word, terselfdertyd ook bewustheid handhaaf vir publieke- en/of omgewingsveiligheid*.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKBS316	**Semester 1**	**NQF Level: 7**
Microbial Ecology		

Module outcomes:

After completion of the module, the student should:

- Demonstrate an integrated knowledge and clear understanding of the key concepts and theories of microbial ecology and the impacts and applications thereof.
- Be able to use appropriate methods and procedures to apply principles from microbial ecology to characterise and study microorganisms in their various environments.
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of microbial ecology to support evidence-based solutions and theory-driven arguments.
- Obtain, manage and process information gathered from literature or through experimentation. This includes being able to independently validate the reliability of information or data.

- Students should also be able to communicate information and research findings in well-formulated arguments in written and oral reports.
- Interpret and manage tasks related to microbial ecology. This include monitoring the progress of teams and taking responsibility for task outcomes.
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes.
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety.

Method of delivery: Full Time

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

MKBS317	**Semester 1**	**NQF Level: 7**

Environmental Microbiology and Public Health

Module outcomes:

After completion of the module, the student should:

- Demonstrate an integrated knowledge and clear understanding of the key concepts and theories of environmental microbes and their impacts on public health.
- Demonstrate an understanding of the major microorganisms responsible for bio deterioration, biodegradation and bioremediation.
- Be able to implement appropriate methods and procedures to apply principles from environmental microbiology to wastewater treatment, purification and sanitary analysis as well as the health impact of improperly treated water.
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of environmental microbiology and public health to support evidence-based solutions and theory-driven arguments.
- Obtain, manage and process information gathered from literature or through experimentation. This includes being able to independently validate the reliability of information or data. Students should also be able to communicate information and research findings in well-formulated arguments in written and oral reports.
- Interpret and manage tasks related to practical projects in the module. This include monitoring the progress of teams and taking responsibility for task outcomes.
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes.
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety.

Method of delivery: Full Time

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

MKBS325	**Semester 2**	**NQF Level: 7**

Diversity and Ecology of Microorganisms/
Diversiteit en Ekologie van Mikroörganismes

Module outcomes:

Students should be able to:

- Demonstrate an integrated knowledge and clear understanding of diversity in the microbial kingdom and explain how this relates to humans and the environment;
- Implement standard methods and procedures to evaluate microbial diversity and to study microbial ecology; use practical skills mastered in the module to determine microbial diversity using taxonomic procedures and to study the effect of the environment on microorganisms;
- Effectively identify and analyse complex problems and apply evidence-based solutions and theory-driven arguments;
- Demonstrate the ability to obtain, manage and process information gathered from literature or through experimentation (this includes being able to independently validate the reliability of information or data);
- Be able to interpret and manage tasks related to microbial diversity and ecology in unfamiliar environments, including monitoring the progress of teams and taking responsibility for task outcomes;
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes;
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety. /

Module uitkomste:

Studente moet in staat wees om

- *'n Geïntegreerde kennis van mikrobiese diversiteit te kan demonstreer en te kan verduidelik hoe dit op die mens en die omgewing impakteer;*
- *Standaard metodes en prosedures te implementeer om mikrobiese diversiteit te evalueer en om die impak op die omgewing te meet; gebruik te maak van praktiese vaardighede wat in die module bemeester is om mikrobiese diversiteit te bepaal met behulp van taksonomiese prosedures;*
- *Komplekse probleme effektief te identifiseer en te analiseer en bewysgebaseerde oplossings en teoriegedrewe argumente toe te pas;*
- *Die vermoë demonstreer om inligting te versamel uit literatuur en ander bronne, of deur eksperimentering, en om hierdie inligting te analiseer en te verwerk (dit sluit ook in die vermoë om onafhanklik te bevestig of die inligting en data betroubaar is of nie);*
- *In staat wees om take wat verband hou met mikrobiese diversiteit en ekologie in onbekende omgewings te interpreteer en te bestuur, insluitend die monitering van groepwerk en om verantwoordelikheid te aanvaar vir die uitkomste van 'n span se take;*
- *Effektief sy/haar leerbehoeftes kan identifiseer, evalueer en aanspreek op 'n self-gedrewe wyse om gesamentlike leerprosesse te fasiliteer;*
- *Die vermoë demonstreer om volle verantwoordelikheid te neem vir sy of haar werk, insluitend professionele en etiese gedrag wanneer daar met mikroörganismes gewerk word, terselfdertyd ook bewustheid handhaaf vir publieke- en/of omgewingsveiligheid.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKBS326	**Semester 2**	**NQF Level: 7**
Industrial Microbiology and Biotechnology		

Module outcomes:

After completion of the module, the student should:

- Demonstrate an integrated knowledge and clear understanding of the key concepts of food preservation and microbial growth.
- Be able to use appropriate methods and procedures to sample and assess microbial contaminants and toxicants in food.
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of biotechnology to support evidence-based solutions and theory-driven arguments.
- Obtain, manage and process information gathered from literature or through experimentation. This includes being able to independently validate the reliability of information or data. Students should also be able to communicate information and research findings in well-formulated arguments in written and oral reports.
- Interpret and manage tasks related to biotechnology projects in the module. This include monitoring the progress of teams and taking responsibility for task outcomes.
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes.
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety.

Method of delivery: Full Time

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester tests.

Exam at the end of the semester.

MKBS327	**Semester 2**	**NQF Level: 7**

Virology and Immunology

Module outcomes:

After completion of the module, the student should:

- Demonstrate an integrated knowledge and clear understanding of the key concepts and theories of virology and immunology and the impacts and applications thereof.
- Be able to use appropriate methods and procedures to apply principles from virology and immunology to characterise and study microorganisms in their various environments.
- Demonstrate an advanced ability to effectively identify and analyse complex problems, use practical skills mastered in the module and apply principles of virology and immunology to support evidence-based solutions and theory-driven arguments.
- Obtain, manage and process information gathered from literature or through experimentation. This includes being able to independently validate the reliability of information or data.
- Students should also be able to communicate information and research findings in well-formulated arguments in written and oral reports.
- Interpret and manage tasks related to projects in the module. This include monitoring the progress of teams and taking responsibility for task outcomes.
- Effectively identify, evaluate and address his/her learning needs in a self-directed manner, and to facilitate collaborative learning processes.
- Demonstrate the ability to take full responsibility for his or her work, including acting professionally and ethically when working with microorganisms, always maintaining an awareness of public and/or environmental safety.

Method of delivery: Full Time

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

MKBX213	Semester 1	NQF Level: 6
Microbiology for Food and Nutrition/ ***Mikrobiologie vir Voedsel en Voeding***		

Module outcomes:

Students should be able to:

- Demonstrate knowledge concerning microbiological aspects of laboratory techniques, preparation and storage of food and microbiological food safety in a selective way;
- Apply basic laboratory techniques used in microbiological laboratories;
- Demonstrate competency with regard to elementary research techniques, group work, writing of reports and problem solving by means of case studies;
- Maintain strict ethical principles in all circumstances and show respect for life throughout. /

Module uitkomste:

Studente moet in staat wees om

- *Kennis met betrekking tot die Mikrobiologiese aspekte van laboratoriumtegnieke, voedselvoorbereiding en -berging, asook die mikrobiologiese veiligheid van voedsel op 'n geselekteerde wyse te demonstreer;*
- *Basiese laboratoriumtegnieke wat in 'n Mikrobiologiese laboratorium gebruik word, toe te pas;*
- *Vaardighede met betrekking tot elementêre navorsings-tegnieke, groepwerk, die skryf van verslae en probleem-oplossing deur middel van gevallestudies te toon;*
- *Streng etiese beginsels in alle omstandighede te handhaaf en deurgaans respek vir lewe te toon.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

MKPN111	Semester 1	NQF Level: 5
Microbiology for Pharmacy/ ***Mikrobiologie vir Farmasie***		

Module outcomes:

Students should be able to:

- Demonstrate knowledge of microbiology and its relation to pharmaceutical and occupational health sciences;
- Apply knowledge of infectious diseases, infection control and related procedures within the health care context;
- Demonstrate and apply specific microbiology laboratory techniques;
- Exhibit skills in elementary research techniques, group work, report writing and problem solving through case studies;
- Uphold strict ethical principles in all situations and show respect for life without exception. /

Module uitkomste:

Studente moet in staat wees om

- *Kennis van mikrobiologie en die verband met farmaseutiese en beroepsgesondheid wetenskappe te demonstreer;*
- *Kennis toe te pas van aansteeklike siektes, beheer van infeksie en verwante prosedures binne die gesondheidsorg konteks;*
- *Spesifieke mikrobiologiese laboratoriumtegnieke te kan demonstreer en toepas;*

- *Vaardighede te toon in basiese navorsingstegnieke, groepwerk, skryf van verslae en probleemoplossing deur gevallestudies;*
- *Streng etiese beginsels in alle situasies toe te pas en sonder uitsondering respek te toon vir lewe.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes: Class tests, practical tests, assignments in groups or individually; exam at the end of the semester.

Assesseringsmetodes: *Klastoetse, praktiese toetse, opdragte in groepe of individueel; eksamen aan die einde van die semester.*

NAS.2.9.17 BOTANY / PLANTKUNDE

PLKS111 / PLKS171	Semester 1	NQF Level: 5
Plant Structure and Function/ ***Plantstruktuur en -funksie***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of the relevance of plants to life on earth and how plants are structurally and functionally adapted;
- Select, distinguish and organize standard methods and procedures to identify basic plant structures and their respective functions;
- Access and process information from different sources with a view to compare and summarise scientific information on plant uses;
- Demonstrate coherent understanding of the ethical implications of decisions, actions and practices pertaining to the use of plants;
- Identify and apply acceptable and independent self-study methods and exhibit adherence to rules on plagiarism and copyright principles. /

Module uitkomste:

Studente moet in staat wees om

- *Fundamentele kennis van die belang van plante vir lewe op aarde en hoe plante struktureel en funksioneel aangepas is, te demonstreer;*
- *Standaardmetodes en prosedures te selekteer, onderskei en organiseer om basiese plantstrukture en hul onderskeie funksies te kan identifiseer;*
- *Inligting vanuit verskeie bronne te bekom en te prosesseer met die oogmerk om wetenskaplike kennis oor plantgebruike te vergelyk en op te som;*
- *Samehangende begrip van die etiese implikasies van besluite, aksies en praktyke met betrekking tot die gebruike van plante te demonstreer;*
- *Aanvaarbare- en onafhanklike selfstudiemetodes te identifiseer en toe te pas en gehoorsaamheid aan reëls oor plagiaat en kopiereg beginsels te demonstreer.*

Method of delivery: Full Time (Lectures & practicals)

Metode van aflewering: *Voltyds (Lesings en prakties)*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

PLKS122 / PLKS172	Semester 2	NQF Level: 5
Biodiversity/ ***Biodiversiteit***		

Module outcomes:

After completion of the PLKS122/172 module, the student should demonstrate:

- Knowledge and informed understanding of key terms, principles, concepts, facts, rules and theories used in the field of Biodiversity.
- Basic knowledge and informed understanding of taxonomic principals, including evolution and classification, in order to distinguish and compare different prokaryotic organisms, algae, fungi and plants.
- The ability to apply standard methods, procedures and techniques commonly used in botanical studies to study characteristics of living organisms in order to identify, name, illustrate and classify them.
- The ability to communicate verbally and in writing and gather information reliably and accurately from a range of sources in order to do elemental research in a scientific way by using conventional methods and basic technologies.
- An ability to monitor his/her own learning progress individually and in groups, and implement relevant learning strategies in Biodiversity.
- Ethical and professional behaviour within the academic environment, inclusive of adherence to rules on plagiarism and copyright principles. /

***Module uitkomste*:**

Na voltooiing van die PLKS122/172 module, moet die student die volgende kan demonstreer:

- *Kennis en ingeligte begrip van sleutelterme, beginsels, konsepte, feite, reëls en teorieë wat gebruik word in die veld van Biodiversiteit.*
- *Basiese kennis en ingeligte begrip van taksonomiese beginsels, insluitende evolusie en klassifikasie, om sodoende verskillende prokariotiese organismes, alge, fungi en plante te kan onderskei en met mekaar te kan vergelyk.*
- *Die vermoë om standaard metodes, prosedure en tegnieke wat algemeen in plantkundige studies gebruik word, toe te pas om die eienskappe van lewende organismes te bestudeer ten einde hulle te identifiseer, benaam, illustreer en klassifiseer.*
- *Die vermoë om te kommunikeer, beide verbaal en in geskrewe vorm, asook die vermoë om inligting in te samel op ’n betroubare en akkurate wyse deur gebruik te maak van ’n verskeidenheid bronne om sodoende elementêre navorsing te doen op ’n wetenskaplike manier deur die gebruik van konvensionele metodes en basiese tegnologie.*
- *Die vermoë om sy/haar eie studievordering te monitor, individueel en in groepe, en om relevante leerstrategieë te implementeer in sy /haar studies van Biodiversiteit.*
- *Etiese en professionele gedrag binne die akademiese omgewing, insluitend om hom/haar te onderwerp aan reëls oor plagiaat en kopiereg beginsels.*

Method of delivery: Full Time (Lectures & practicals|)

Metode van aflewering: *Voltyds (Lesings en prakties)*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

PLKS211	**Semester 2**	**NQF Level: 6**
Environmental Botany/ ***Omgewingsplantkunde***		

Module outcomes:

After completion of the PLKS211 module, the student should demonstrate:

- Detailed knowledge of the ecology of the biosphere and a clear understanding of ecosystem dynamics.
- Ability to evaluate and select the most appropriate methods and procedures to gather necessary evidence to identify environmental problems.
- Basic knowledge and coherent understanding of the ethical implications of decisions, actions and practices that might impact the environment.
- Ability to access, process, present and communicate information on a discipline-related topic concerned with environmental legislation and global treaties.
- Ability to recognize major threats to southern Africa's flora, and to propose possible solutions to address and mitigate such threats.
- Responsibility to develop learning strategies to sustain professional development as an environmentalist.
- Appreciation for the rich floristic diversity and ecosystems of southern Africa and a responsibility to develop an understanding thereof.

Module uitkomste:

Na voltooiing van die PLKS211 module, moet die student die volgende kan demonstreer:

- *Gedetailleerde kennis van die ekologie van die biosfeer en 'n duidelike begrip van ekosisteem dinamika.*
- *Die vermoë om die mees geskikte metodes en prosedures te evalueer en te selekteer vir die verkryging van bewyse om omgewingsprobleme te kan identifiseer.*
- *Basiese kennis en samehangende begrip van die etiese implikasies van besluite, aksies en praktyke wat die omgewing kan beïnvloed.*
- *Die vermoë om inligting oor 'n dissipline verwante onderwerp rakende omgewingswetgewing en globale verdrae te verkry, te verwerk, aan te bied en te kommunikeer.*
- *Die vermoë om hoofbedreigings van die suider-Afrikaanse flora te herken en moontlike oplossings voor te stel om sulke bedreigings aan te spreek en te versag.*
- *Verantwoordelikheid om leerstrategieë te ontwikkel om professionele ontwikkeling as omgewingsbewuste te onderhou.*
- *Waardering vir die ryk floristiese diversiteit en ekosisteme van Suider-Afrika en 'n verantwoordelikheid om 'n begrip daarvan te ontwikkel.*

Method of delivery: Full Time (Lectures & practicals|)

Metode van aflewering: Voltyds (Lesings en prakties)

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

PLKS223	Semester 1	NQF Level: 6

Plant Genomics/
Plantgenomika

Module outcomes

After completion of the PLKS223 module, the student should demonstrate:

- Have at his or her disposal detailed knowledge of the genomic structure of plant cells, plant gene expression and the regulation thereof.
- Have an understanding of certain recombinant DNA technologies.
- Be able to evaluate and select appropriate molecular methods for conducting investigations in plant physiology, plant systematics or plant ecology.
- Be able to demonstrate limited practical molecular skills, including an understanding of the generation, presentation and interpretation of data, as well as the formulation of theories about data.
- Be able to exhibit sensitivity for the role that values play in biotechnology.
- Be able to evaluate relevant ethical issues in terms of a world view. /

Module uitkomste:

Na voltooiing van die PLKS223 module, moet die student die volgende kan demonstreer:

- *Oor breedvoerige kennis van die genomiese struktuur van plantselle, die uitdrukking van plant gene en die regulering daarvan hê.*
- *Begrip van sekere rekombinante DNS-tegnologieë hê.*
- *In staat wees om toepaslike molekulêre metodes vir ondersoek in plantfisiologie of plantsistematiek of plant-ekologie te evalueer en te selekteer.*
- *In staat wees om beperkte praktiese molekulêre vaardighede, met inbegrip van die generering, aanbieding en vertolking van data, asook die vorming van teorieë rondom die data te demonstreer.*
- *In staat wees om sensitiwiteit te toon vir die rol van waardes in biotegnologie.*
- *In staat wees om tersaaklike aangeleenthede uit die oogpunt van 'n wêreldbeskouing te evalueer.*

Method of delivery: Full Time (Lectures & practicals|)

Metode van aflewering: *Voltyds (Lesings en prakties)*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

PLKS314	Semester 1	NQF Level: 7

Plant Physiology/
Plantfisiologie

Module outcomes:

After completion of the PLKS314 module, the student should demonstrate:

- Integrate knowledge related to responses of plants to environmental stress and the essential physiological processes of photosynthesis and respiration.
- Evaluate and interpret energy conservation in the processes of photosynthesis and respiration.
- Show a critical understanding and the ability to interrogate multiple sources of environmental stress and their impacts on plants.

- Demonstrate the ability to identify, analyse and reflect on the environmental influences in relation to photosynthesis and respiration.
- Access and evaluate the scientific evidence supporting hypotheses and assumptions related to environmental stress, photosynthesis and respiration.
- Identify, analyse and critically reflect on addressing complex challenges relating to environmental stress, photosynthesis and respiration through an application of evidence based solutions and theory-driven arguments.
- Demonstrate the ability to identify, evaluate and address his or her own learning needs in a self-directed manner and/or facilitated collaborative learning processes. /

***Module uitkomste*:**

Na voltooiing van die PLKS314 module, moet die student die volgende kan demonstreer:

- *Integrasie van kennis wat verband hou met die reaksie van plante tot omgewingstres en die belangrike fisiologiese prosesse van fotosintese en respirasie.*
- *Die bewaring van energie in fotosintese en respirasie te evalueer en interpreteer.*
- *Kritiese begrip en die vermoë om verskeie bronne van omgewingsstres en die impak daarvan op plante te beoordeel.*
- *Vermoë om die omgewingsinvloede wat betrekking het met fotosintese en respirasie te identifiseer, ontleed en te besin.*
- *Bekom en evalueer die wetenskaplike bewyse wat hipoteses en aannames ondersteun wat verband hou met omgewingsstres, fotosintese en respirasie.*
- *Identifiseer, ontleed en besin krities oor hoe om komplekse uitdagings met betrekking tot omgewingsstres, fotosintese en respirasie aan te spreek deur middel van 'n toepassing van bewysgebaseerde oplossings en teorie-gedrewe argumente.*
- *Vermoë om sy of haar eie leerbehoeftes op selfgerigte wyse en/of gefasiliteerde samewerkende leerprosesse te identifiseer, evalueer en aan te spreek.*

Method of delivery: Full Time (Lectures & practicals)

Metode van aflewering: *Voltyds (Lesings en prakties)*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

PLKS324	**Semester 2**	**NQF Level: 7**
Plant Ecology/ ***Plantekologie***		

Module outcomes:

Third year Botany students registered for PLKS324 must attend a compulsory field trip during the first or second semester (that can include weekends and recess time). The report generated from results obtained during the field trip will contribute to the participation mark. No excuses for absence from the field trip will be accepted, except in the event of illness in which case a medical certificate must be presented.

After completion of the PLKS324 module, the student should demonstrate:

- Integrated knowledge and clear understanding of, as well as have the ability to evaluate and apply key terminology, concepts, facts, rules and theories used in the field of basic and applied aquatic and terrestrial ecology.

- The ability to select, evaluate and apply appropriate quantitative and qualitative survey, monitoring and data analysis techniques commonly used in aquatic and terrestrial ecology.
- The ability to analyse and critically reflect on the ecosystem functioning with particular emphasis on interactions between physical, chemical and biological variables.
- The ability to access, analyse and evaluate current scientific methods to be able to conduct focused research and resolve problems within the fields of aquatic and terrestrial ecology.
- The ability to reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of plant ecology in aquatic and terrestrial ecosystems.
- Full responsibility for his/her own learning needs, monitoring of own learning progress and application of relevant learning strategies and management of all resources to successfully realise all outcomes of this module.
- Accurate and coherent written and verbal communication with understanding of and respect for intellectual property conventions, copyright and rules on plagiarism. /

***Module uitkomste*:**

Derdejaar Plantkunde studente wat vir PLKS324 registreer moet 'n verpligte velduitstappie gedurende die eerste of tweede semester (dit kan die naweke asook die reses insluit) bywoon. Die resultate wat verkry word, moet in verslagvorm ingehandig word en dit sal bydra tot die deelnamepunt. Geen verskonings sal aanvaar word nie, behalwe in die geval van siekte in welke geval 'n mediese sertifikaat voorgelê moet word.

Na voltooiing van die PLKS324 module, moet die student die volgende kan demonstreer:

- *Geïntegreerde kennis en duidelike begrip asook die vermoë om sleutelterminologie, -konsepte, -feite, reëls en teorieë in die veld van basiese, asook toegepaste akwatiese en terrestriële ekologie te evalueer en toe te pas.*
- *Die vermoë om geskikte kwantitatiewe en kwalitatiewe opnames, monitering en data analise tegnieke wat algemeen in akwatiese en terrestriële ekologie gebruik word, te selekteer, evalueer en toe te pas.*
- *Die vermoë om die ekologiese werking van ekosisteme, met klem op die interaksies tussen fisiese, chemiese en biologiese veranderlikes, te analiseer en krities daarop te reflekteer.*
- *Die vermoë om toegang te verkry tot hedendaagse wetenskaplike metodes en dit te analiseer en te evalueer om sodoende in staat te wees tot gefokusde navorsing en die oplossing van probleme binne die velde van akwatiese en terrestriële ekologie.*
- *Die vermoë om te reflekteer oor waardes, etiese gedrag en verantwoordbaarheid van besluite wat van toepassing is op Plantekologie in akwatiese en terrestriële ekosisteme.*
- *Volle verantwoordelikheid vir sy/haar eie leerprosesse, die monitering van sy/haar studievordering en die toepassing van relevante leerstrategieë asook die bestuur van alle hulpbronne om sodoende sukses te behaal met die bereiking van alle uitkomste van hierdie module.*
- *Akkurate en samehangende geskrewe en verbale kommunikasie met die begrip van en respek vir intellektuele eiendomswaardes, kopiereg en reëls met betrekking tot plagiaat.*

Method of delivery: Full Time (Lectures & practicals|)

Metode van aflewering: *Voltyds (Lesings en prakties)*

Assessment modes:

Class tests, practical tests, assignments in groups or individually.

Semester test.

Exam at the end of the semester.

Assesseringsmetodes:

Klastoetse, praktiese toetse, opdragte in groepe of individueel.

Semestertoets.

Eksamen aan die einde van semester.

NAS.2.9.18 URBAN AND REGIONAL PLANNING / *STADS- EN STREEK-BEPLANNING*

SANL225	Semester 2	NQF level 6
Urban Anthropology		
Module outcomes:		
SEE HUMANITIES YEARBOOK		
Method of delivery: Full Time ***Metode van aflewering:*** *Voltyds*		
Assessment modes:		

SBES212	Semester 1	NQF level 6
Layout Planning/ ***Uitlegbeplanning***		

Module outcomes:

Students should be able to:

- Comprise detailed knowledge relating to the different types of layouts, the concepts, approaches and principles applicable thereto and the manner in which it relates to other disciplines;
- Demonstrate a comprehension of what the different sources of cadastral, legal and physical aspects entail and be mindful of the possible impact thereof on the design and planning of a site;
- Acquire and collect the different sources of cadastral, legal and physical data and correctly evaluate, research and select which aspects thereof will affect the planning and design of a terrain;
- Identify, evaluate and solve possible problems relating to the planning of a site within the context of current norms, standards and design principles that are applicable and being presented in professional practice;
- Illustrate the planning and design of a terrain in an ethical and accountable manner through appropriate drawing techniques and display awareness of what the impact of the decisions and actions by the planner could be on the future development of a site;
- Illustrate the planning and design of a site, by applying prevailing norms, standards and design principles in relation and in context to the impact that cadastral, legal and physical constraints have on a site. /

Module uitkomste:

Studente moet in staat wees om

- *Oor gedetailleerde kennis te beskik aangaande verskillende tipes uitlegte, die konsepte, benaderings en beginsels van toepassing hierop en die wyse waarop dit verband hou met ander dissiplines;*
- *Kennis te demonstreer wat die verskillende bronne van kadastrale-, wetlike- en fisiese, aspekte behels en bewus wees van wat die moontlike impak hiervan op die ontwerp en beplanning van ’n terrein sal wees;*
- *Die verkryging en insameling van die verskillende bronne van kadastrale-, wetlike- en fisiese data korrek te kan evalueer, na te vors en te selekteer watter aspekte hiervan wel ’n impak op die beplanning en ontwerp van ’n terrein sal hê;*
- *Moontlike probleme tydens die beplanning en ontwerp van ’n terrein te kan identifiseer, te evalueer en op te los binne die konteks van heersende norms, standaarde en ontwerpbeginsels wat van toepassing is en voorgehou word in die professionele praktyk;*
- *Die beplanning en ontwerp van ’n terrein op eties verantwoordbare wyse, deur toepaslike tekentegnieke te kan illustreer, en bewustheid te toon van wat die besluite en aksies van die beplanner op die toekomstige ontwikkeling van ’n terrein sal wees;*

- *Die beplanning en ontwerp van ’n terrein, deur die toepassing van heersende norme, standaarde en ontwerpbeginsels in verhouding en konteks tot die impak wat kadastrale-, wetlike- en fisiese beperkings op ’n terrein het, te kan illustreer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBES313	**Semester 1**	**NQF level 7**

Infrastructure Planning/

Infrastruktuurbeplanning

Module outcomes:

Students should be able to:

- Comprise knowledge of the integrated work environment in which the planner operates and how it relates to current legislation, rules, theories, design concepts and the disciplines involved in the design and installation of engineering services and the application of other engineering aspects;
- Explain what engineering services and aspects involve in practice and evaluate what the possible impact thereof will be on the planning and design of a site and also on the long-term development of a region;
- Undertake the collection of prevailing norms, standards and design principles involved in engineering services and aspects and to validate and evaluate it in order to determine the impact thereof on the planning and design of a site in order to ensure the effective installation of engineering services and the application of other engineering aspects;
- Identify, analyse and critically reflect on potentially complex problems applicable to the design and installation of engineering services and aspects, when planning and designing a site, and be able to solve it within the context of prevailing norms, standards and design principles applicable and offered in legislation and professional practice;
- Illustrate the planning and design of a site in an ethical and accountable manner through appropriate drawing techniques and display awareness of what the decisions and ethical approach of the planner could be on the design and installation of engineering services and aspects on the future development of a site and of a region; and
- Illustrate the planning and design of a site, by applying prevailing norms, standards and design principles, in relation and context to the potential impact it may have on installation of engineering services and systems. /

Module uitkomste:

Studente moet in staat wees om

- *Oor kennis te beskik rakende die geïntegreerde werksomgewing waarin die beplanner werksaam is en die wyse hoe dit verband hou met heersende wetgewing, reëls, teorieë, ontwerp konsepte en die dissiplines betrokke by die ontwerp en installering van ingenieursdienste en toepassing van ander ingenieursaspekte;*

- *Verduidelik wat ingenieursdienste en -aspekte in die praktyk behels en te evalueer wat die moontlike impak daarvan op die beplanning en ontwerp van ’n terrein en ook op die langtermyn ontwikkeling van ’n streek sal wees;*
- *Die versameling van heersende norme, standaarde en ontwerpbeginsels betrokke by ingenieursdienste en -aspekte te onderneem, dit te valideer en te evalueer ten einde te bepaal wat die impak hiervan op die beplanning en ontwerp van ’n terrein sal wees ten einde die effektiewe installering van ingenieursdienste en toepassing van ander ingenieursaspekte, te verseker;*
- *Moontlike komplekse probleme rakende die ontwerp en installering van ingenieursdienste en -aspekte, tydens die beplanning en ontwerp van’n terrein, te identifiseer, analiseer, krities daaroor te reflekteer en dit op te los binne die konteks van heersende norme, standaarde en ontwerpbeginsels wat van toepassing is en voorgehou word in wetgewing en die professionele praktyk;*
- *Die beplanning en ontwerp van ’n terrein op eties en professionele wyse, deur toepaslike tekentegnieke te kan illustreer, en bewustheid te toon van wat die besluite en etiese benadering van die beplanner op die ontwerp en installering van ingenieursdienste en -aspekte, op die toekomstige ontwikkeling van ’n terrein en ’n streek sal wees;*
- *Die beplanning en ontwerp van ’n terrein, deur die toepassing van heersende norme, standaarde en ontwerpbeginsels, in verhouding en konteks tot die impak wat dit moontlik kan hê op die installering van ingenieursdienste en sisteme, te illustreer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBRS221	**Semester 2**	**NQF Level: 5**
Regional Plans/ ***Streekplanne***		

Module outcomes:

Students should be able to:

- Demonstrate detailed knowledge and understanding of the principles and theories of regional planning, as well as the application thereof in regional plans;
- Demonstrate insight into the origin and development of policy approaches and applications of regional plans in Africa and South Africa;
- Demonstrate the ability to identify and analyse regional planning approaches, as well as evaluate metropolitan and regional plans in developed countries;
- Demonstrate the ability to identify, analyse and solve complex problems with regard to regional plans, regional policy and regional planning instruments;
- Demonstrate an understanding of the relationship between urban systems and regional plans in order to formulate a well-founded written and verbal opinion; and
- Demonstrate coherent understanding of the ethical implications of decisions, actions and practices specifically relevant to proposals for regional plans.

Module uitkomste:

Studente moet in staat wees om

- *Detail kennis en begrip te demonstreer van die beginsels en teorieë van streekbeplanning, asook die toepassing daarvan in streekplanne;*
- *Insig te demonstreer in die ontstaan en ontwikkeling van beleidsbenaderings en toepassings van streekplanne in Afrika en Suid-Afrika;*
- *Die vaardigheid te demonstreer vir die evaluering en toepassing van streekbeplannings-benaderings, metropolitaanse- en streekplanne in ontwikkelde lande; die vermoë te demonstreer om streekbeplanningbenaderings te identifiseer en te ontleed, asook om metropolitaanse en streekplanne in ontwikkelde lande te evalueer;*
- *Die vermoë demonstreer ten einde komplekse probleme te identifiseer, analiseer en op te los met betrekking tot streekplanne, beplanningsbeleide en -instrumente;*
- *Die verhouding tussen stedelike sisteme en streekplanne te verstaan ten einde 'n eie begronde mening skriftelik en mondelings te kan weergee; en*
- *Samehangende begrip te demonstreer van die etiese implikasies van besluite, aksies en praktyke wat spesifiek relevant is vir voorstelle vir streekplanne.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBRS313	**Semester 1**	**NQF Level: 7**
Regional Development Theory/ ***Streekontwikkelingsteorie***		

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of various forms of economic development, including an understanding of regional economics and its application to local economic development;
- Demonstrate an understanding of various regional analysis techniques as well as the ability to demarcate and analyse regions using different scientific methods;
- Identify, analyse and critically reflect on complex regional development problems and address these problems by applying evidence-based solutions and theory-driven arguments;
- Identify alternative regional analysis techniques and to select and execute logical solutions and calculations;
- Develop appropriate processes of information gathering within the context of regional development and analysis as well as the ability to independently validate the source of information, evaluate and manage the information;
- Develop and communicate ideas and opinions on regional development and analysis in well-formed arguments, using appropriate academic, professional, or occupational discourse. /

Module uitkomste:

Studente moet in staat wees om

- *Geïntegreerde kennis te demonstreer van verskeie vorme van ekonomiese ontwikkeling, insluitend 'n begrip van streeksekonomie en die toepassing daarvan op plaaslike ekonomiese ontwikkeling;*
- *'n begrip van verskeie streeksontledingstegnieke te demonstreer asook die vermoë om deur middel van verskillende wetenskaplike metodes streke af te baken en te analiseer;*
- *Komplekse streekontwikkelingsprobleme te identifiseer, analiseer, krities daaroor te reflekteer en hierdie probleme aan te spreek, met toepassing van bewese oplossings en teorie-gedrewe argumente;*
- *Alternatiewe streeksontledingstegnieke te kan identifiseer en logiese oplossings en berekeninge te kan kies en uitvoer; gepaste inligtingversamelingstegnieke binne die konteks van streekontwikkeling en -ontleding toe te pas, asook die vermoë om onafhanklik die inligtingsbronne te valideer, evalueer en te bestuur;*
- *Ideë en opinies oor streekontwikkeling en -ontleding deur middel van goed gestruktureerde argumente te ontwikkel en te kommunikeer deur gebruik te maak van gepaste akademiese, professionele, of beroepsgerigte diskoerse.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBRS411	**Semester 1**	**NQF Level: 8**
Regional Analysis and Application/ ***Streeksanalise en -toepassing***		

Module outcomes:

Students should be able to:

- Demonstrate coherent understanding and integrated knowledge of the principles and ideas of national policy and legislation of regional planning and development;
- Demonstrate an ability to critically interrogate the complexities in analysing and evaluating planning policy and planning instruments in the realisation of regional planning initiatives in South Africa;
- Demonstrate the ability to critically review the contents of spatial development plans for all the spheres of authorities in order evaluate contexts, based on theoretical and practical foundations;
- Demonstrate an advanced ability to interrogate and critically reflect on and effectively address complex issues related to (i) the role of different aspects of globalisation in contemporary urban environments, (ii) different forms of urban development patterns based on different development pulses on migration; (iii) factors that have impacts on migration patterns in developed and developing worlds;
- Demonstrate an ability to develop and communicate own ideas and opinions in well-formed arguments, using appropriate academic, professional, or occupational discourse;
- Demonstrate the ability to reflect on the values, ethical conduct and justifiability of decisions appropriate to regional plans and policy. /

Module uitkomste:

Studente moet in staat wees om

- *Samehangende begrip en geïntegreerde kennis van die beginsels en ideë van nasionale beleid en wetgewing van streekbeplanning en ontwikkeling te demonstreer;*
- *Die vermoë te demonstreer om die kompleksiteite met betrekking tot die ontleding en evaluering van beplanningsbeleid en beplanningsinstrumente krities te ondersoek, in die verwesenliking van streeksbeplanning inisiatiewe in Suid-Afrika;*
- *Die vermoë te demonstreer om die inhoud van ruimtelike ontwikkelingsplanne krities te hersien vir alle sfere van owerhede ten einde kontekste te evalueer, gebaseer op teoretiese en praktiese grondslae;*
- *Gevorderde vermoë te demonstreer en krities te reflekteer op effektief komplekse vraagstukke rakende (i) die rol van verskillende aspekte van globalisering in kontemporêre stedelike omgewings te bespreek; (ii) verskillende vorme van stedelike ontwikkelingspatrone gebaseer op verskillende ontwikkelingspulse oor migrasie; (iii) faktore wat 'n impak het op migrasiepatrone in ontwikkelde en ontwikkelende wêrelde;*
- *Die vermoë te demonstreer om eie ideë en menings in goed gevormde argumente te ontwikkel en te kommunikeer, deur toepaslike akademiese, professionele of beroepskommunikasie te gebruik;*
- *Die vermoë te demonstreer om te besin oor die waardes, etiese optrede en regverdigbaarheid van besluite wat geskik is vir streekplanne en -beleid.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS111	**Semester 1**	**NQF Level: 5**
Planning and Settlement History/ ***Beplanning- en Nedersettingsgeskiedenis***		

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the establishment, origin and development of cities of different historical civilisations including an understanding of the relevance of a historical study of settlements and cities for urban and regional planning;
- Demonstrate an awareness of how settlements and cities have developed historically and to evaluate their value and impact on urban and regional planning;
- Identify and evaluate problems within the historical establishment, origin and development of cities and to apply solutions based on relevant urban and regional planning principles;
- Communicate information on planning and settlement history reliably, accurately and coherently in written form, or verbally, or by means of practical demonstration. /

Module uitkomste:

Studente moet in staat wees om

- *Geïntegreerde kennis te demonstreer van die vestiging, ontstaan en ontwikkeling van stede van verskillende geskiedkundige beskawings en om ’n begrip te toon van die relevansie van ’n geskiedkundige studie van nedersettings en stede vir stad- en streeksbeplanning;*
- *’n Bewustheid te demonstreer van die wyse waarop nedersettings en stede geskiedkundig ontwikkel het en om die waarde en impak daarvan op stad-en streeksbeplanning te kan evalueer;*
- *Probleme binne die geskiedkundige vestiging, ontstaan en ontwikkeling van stede te identifiseer, evalueer en om oplossings toe te pas gebaseer op relevante stad-en streeksbeplanning beginsels;*
- *Inligting rakende beplannings- en nedersettingsgeskiedenis betroubaar, akkuraat en samehangend te kommunikeer in geskrewe vorm, of verbaal, of d.m.v. Praktiese demonstrasie.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 35% in order to qualify for the summative assessment opportunities.

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag. 'n Minimumpunt van 35% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS121	**Semester 2**	**NQF Level: 5**

Introduction to Planning/

Inleiding tot Beplanning

Module outcomes:

Students should be able to:

- Demonstrate basic knowledge and informed understanding of fundamental Urban and Regional planning theories, concepts, principles, and approaches;
- Demonstrate fundamental knowledge and understanding of the different modern and post-modern planning models, including those that apply to South Africa;
- Display basic research skills in collecting, reading, summarising, interpreting and communicating information reliably, accurately and coherently, using conventions appropriate to the context, either in writing, verbally or in practical demonstration;
- Act ethically in presenting knowledge relating to the planning of cities and regions. /

Module uitkomste:

Studente moet in staat wees om

- *Basiese kennis en ingeligte begrip te demonstreer van fundamentele stedelike en streekbeplanningsteorieë, konsepte, beginsels en benaderings;*
- *Fundamentele kennis en begrip van die verskillende moderne en post-moderne beplanningsmodelle, insluitend dié wat van toepassing is op Suid-Afrika te demonstreer;*
- *Basiese navorsingsvaardighede te openbaar om inligting betroubaar, akkuraat en samehangend te versamel, te lees, op te som, te interpreteer en te kommunikeer deur gebruik te maak van konvensies wat toepaslik is vir die konteks, hetsy skriftelik, mondeling of praktiese;*
- *Eties te handel in die aanbieding van kennis met betrekking tot die beplanning van stede en streke.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities.

Assesseringmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS223	**Semester 2**	**NQF Level: 6**
Urban Design/ ***Stedelike Ontwerp***		

Module outcomes:

Students should be able to:

- Demonstrate insight and understanding of theoretical concepts space, place, place-making, design and urban design;
- Display analytical skills in selecting and applying various urban design methods and procedures;
- Demonstrate critical thinking by evaluating existing areas in the environment as well as urban design proposals for various areas;
- Display practical skills in terms of developing creative urban design solutions for urban and/or rural areas and presenting the designs in written, visual and oral format whether individually or in a group; and
- Display ethical and professional behaviour in terms of urban design applications. /

Module uitkomste:

Studente moet in staat wees om

- *Insig en begrip van teoretiese konsepte ruimte, plek, plek skepping, ontwerp en stedelike ontwerp te demonstreer;*
- *Analitiese vaardighede in die keuse en toepassing van verskeie stedelike ontwerpmetodes en prosedures te openbaar;*
- *Kritiese denke deur die evaluering van bestaande areas in die omgewing sowel as stedelike ontwerp voorstelle vir verskeie areas te demonstreer;*
- *Praktiese vaardighede in terme van die ontwikkeling van kreatiewe stedelike ontwerp oplossings vir stedelike en/of landelike area sowel as die voorlegging van die ontwerpe in geskrewe, visuele en mondelinge formaat hetsy individueel of in groepsverband, te openbaar;*
- *Etiese en professionele optrede in terme van die toepassing van stedelike ontwerp te openbaar.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS313	**Semester 1**	**NQF Level: 7**

Planning for Sustainable Cities/

Beplanning vir Volhoubare Stede

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and logical understanding of theories, planning principles and approaches to plan sustainable cities;
- Demonstrate coherent understanding of the different perspectives and complex problems relating to the interpretation of sustainable cities;
- Demonstrate an advanced ability to analyse, evaluate and consider complex problems relating to the planning of sustainable cities, with sufficient evidence from theory and practice;
- Demonstrate the ability to reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of city planning and broader sustainability thinking; and
- Demonstrate an ability to develop and communicate own ideas and opinions in well-formed arguments, using appropriate academic, professional, or occupational discourse. /

Module uitkomste:

Studente moet in staat wees om

- *Geïntegreerde kennis en logiese begrip te demonstreer van teorieë, beplanningsbeginsels en benaderings vir die beplanning van volhoubare stede;*
- *Samehangende begrip te demonstreer van die verskillende perspektiewe en komplekse probleme met betrekking tot die interpretasie van volhoubare stede;*
- *'n Gevorderde vermoë te demonstreer om komplekse probleme met betrekking tot die beplanning van volhoubare stede te analiseer, evalueer en te oorweeg, met voldoende bewyse uit teorie en praktyk;*
- *Die vermoë te demonstreer om te besin oor die waardes, etiese optrede en regverdigbaarheid van besluite wat toepaslik is vir die praktyk van Stadsbeplanning en breër volhoubaarheidsdenke; en*
- *Die vermoë te demonstreer om eie ideë en menings in goed gevormde argumente te ontwikkel en te kommunikeer, deur gebruik te maak van toepaslike akademiese, professionele of professionele diskoers.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS321	Semester 2	NQF Level: 7
Transport Planning and Systems/ ***Vervoerbeplanning en Stelsels***		

Module outcomes:

Students should be able to:

- Comprise integrated knowledge and be able to demonstrate an understanding of policy and legislation on regional, national and municipal contexts regarding transportation planning and the ability to correctly evaluated the relation it has with settlement and regional planning;
- Explain knowledge and understanding of sustainable transport and the relation it has with the development of settlements in order to achieve optimal transportation planning in South Africa;
- Identify, analyse and critically reflect on potentially complex transport problems arising from the interaction between settlement and transportation planning and solve it within the context of prevailing norms, standards and design principles applicable and proposed in relevant legislation and professional practice;
- Undertake the collection of prevailing norms, standards and design principles involved in restructuring settlements and to validate and evaluate it in order to determine the impact thereof on the planning and design of transport supportive settlements; and
- Illustrate the planning and design of settlements in an ethical and accountable manner through appropriate drawing techniques and display awareness of what the decisions and ethical approach of the planner could be on sustainable and public transport, land use and integration on the future development of settlements. /

Module uitkomste:

Studente moet in staat wees om

- *Oor geïntegreerde kennis te beskik en begrip te demonstreer aangaande beleid en wetgewing op streek, nasionale en munisipale konteks rakende vervoerbeplanning en oor die vermoë beskik om die verband wat dit met nedersetting- en streek beplanning hou, korrek te evalueer;*
- *Kennis en die begrip rakende volhoubare vervoer, en die verband wat dit op die ontwikkeling van nedersettings het, te verduidelik ten einde optimale vervoerbeplanning in Suid-Afrika te bereik;*
- *Moontlike komplekse vervoerprobleme voortspruitend uit die interaksie tussen nedersetting- en vervoerbeplanning te identifiseer, analiseer, krities daaroor te reflekteer en dit op te los binne die konteks van heersende norme, standaarde en ontwerpbeginsels wat van toepassing is en voorgehou word in relevante wetgewing en die professionele praktyk;*
- *Die versameling van heersende norme, standaarde en ontwerpbeginsels betrokke by die herstrukturering van nedersettings te onderneem, dit te valideer en te evalueer ten einde te bepaal wat die impak hiervan op die beplanning en ontwerp van vervoerondersteunende nedersettings is;*
- *Die beplanning en ontwerp van nedersettings op eties en professionele wyse, deur toepaslike tekentegnieke en ontwerpbeginsels, te kan illustreer en bewustheid te toon van wat die besluite en etiese benadering van die beplanner op volhoubare en publieke vervoer, grondgebruik en integrasie op die toekomstige ontwikkeling van nedersettings sal wees.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS323	**Semester 2**	**NQF Level: 7**
Planning Theory/ ***Beplanningsteorie***		

Module outcomes:

Students should be able to:

- Demonstrate an integrated knowledge and clear understanding of the difference between theories in, theories of and theories for planning; various theories of planning and the evolution of planning thought and the implication for planning practice;
- Critically analyse and reflect upon the role of the planner and various stakeholders according to different theories of planning as well as how these theories shape plan-making;
- Display practical skill in terms of accessing and synthesising academic literature with regard to planning theory and presenting the literature in appropriate academic written and oral format whether individually or in a group;
- Display ethical behaviour and a professional attitude with regard to the reading, writing, interpretation and presentation of planning theory. /

Module uitkomste:

Studente moet in staat wees om

- *Geïntegreerde kennis en duidelike begrip te demonstreer van die verkil tussen teorieë in, teorieë van en teorieë vir beplanning; verskeie teorieë van beplanning en die evolusie van beplanningsdenke en die implikasie daarvan vir beplanningpraktyk;*
- *Krities te kan analiseer en reflekteer oor die rol van die beplanner en verskillende rolspelers volgens verskillende teorieë van beplanning sowel as hoe hierdie teorieë die ontwikkeling van planne vorm;*
- *Praktiese vaardighede te demonstreer in terme van die toegang en sintese van akademiese literatuur rakende beplanningsteorie asook die aanbied van die literatuur in gepaste akademiese geskrewe en mondelinge formaat hetsy individueel of in groepsverband;*
- *Etiese gedrag en 'n professionele houding te demonstreer rakende die lees, skryf, interpretasie en aanbied van beplanningsteorie.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS412	Semester 1	NQF Level: 8
Integrated Housing Development/ ***Geïntegreerde Behuisingsontwikkeling***		

Module outcomes:

Students should be able to:

- Demonstrate integrated understanding of the interface between housing and planning;
- Demonstrate critical insight into the complex and multi-dimensional nature of integrated housing development and how various paradigms, theoretical frameworks as well as policy and legislative frameworks shape housing practice in different contexts;
- Demonstrate critical thinking in order to evaluate various theoretical paradigms, theories, policies and acts and the progressive development of these in terms of the application of integrated housing development;
- Display advanced practical skills in terms of applying independent research in order to develop an integrated housing project for a specific context and presenting the project either in written, visual and oral format (or a combination of these) in a group;
- Develop criteria and judge the ethical and professional behaviour with regard to an integrated housing development project. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde begrip van die koppelvlakke tussen behuising en beplanning te demonstreer;*
- *Kritiese insig te toon in die komplekse en multidimensionele aard van geïntegreerde behuisingontwikkeling en hoe verskillende paradigmas, teoretiese raamwerke sowel as beleid- en wetgewende raamwerke behuising praktyk vorm in verskeie kontekste;*
- *Kritiese denke te demonstreer ten einde verskeie teoretiese paradigmas, teorieë, beleide en wette en die progressiewe ontwikkeling van hierdie in terme van behuisingontwikkeling te kan evalueer aan die hand van toegepaste voorbeelde;*
- *Gevorderde praktiese vaardighede te toon in terme van die toepassing van onafhanklike navorsing ten einde 'n geïntegreerde behuisingprojek vir 'n spesifieke konteks te kan ontwikkel en die projek in of geskrewe, visuele of mondelinge formaat (of 'n kombinasie hiervan) te kan aanbied in groepsverband; en*
- *Die vermoë demonstreer om kriteriums te ontwikkel om die etiese en professionele gedrag betreffende 'n geïntegreerde behuisingontwikkelingprojek te kan beoordeel.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS414	Semester 1	NQF Level: 8
Land Use Planning and Development Policy/ ***Grondgebruikbeplanning en Ontwikkelingsbeleid***		

Module outcomes:

Students should be able to:

- Demonstrate comprehensive knowledge of, and coherent understanding of theories, principles and processes of property development in South Africa;
- Demonstrate a relational understanding of the complexities of land markets and the generation of alternative development proposals;
- Demonstrate the ability to critically review spatial planning approaches in the evaluation of property development and land use management processes;
- Demonstrate an advanced skill to effectively analyse, synthesise and evaluate land use management systems in order to formulate a well-founded written and verbal opinion by offering creative insights, rigorous interpretations and solutions to issues appropriate to the context;
- Demonstrate ethical behaviour and a professional attitude with regard to the writing, interpretation and presentation of land use management and property development. /

Module uitkomste:

Studente moet in staat wees om:

- *In-diepte kennis en samehangende insig te demonstreer rakende die teorieë, beginsels en prosesse van eiendomsontwikkeling in Suid-Afrika;*
- *Relasionele begrip te demonstreer van die kompleksiteite van eiendomsmarkte en die daarstelling van alternatiewe ontwikkelingsvoorstelle;*
- *Die vaardigheid te demonstreer om beplanningsbenaderings ten opsigte van eiendomsontwikkeling en grondgebruikbestuur krities te hersien;*
- *Gevorderde vaardigheid te demonstreer om grondgebruikstelsels effektief te analiseer, sintetiseer en te evalueer ten einde goed gefundeerde skriftelike en mondelingse opinies weer te gee; en kreatiewe insigte, streng interpretasies en oplossings te bied vir aangeleenthede wat toepaslik is vir die konteks; en*
- *Etiese gedrag en professionele optrede met betrekking tot die daarstelling, interpretasie en voorstelling van grondgebruikstelsels en ontwikkelingsvoorstelle te demonstreer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS424	Semester 2	NQF Level: 8
Strategic and Participatory Planning/ ***Strategiese- en Deelnemende Beplanning***		

Module outcomes:

Students should be able to:

- Demonstrate knowledge of and engagement in planning and professional practice by demonstrating an understanding of the requirements set by the professional body (SACPLAN) to the registered urban and regional planner, including the way in which this knowledge should be applied during community-based and participatory planning;
- Demonstrate an understanding of the complexities within the needs and aspirations of specific social and cultural groups in the context of urban and regional planning as well as an understanding of the social dimensions that must be taken into account during strategic planning processes;
- Demonstrate an understanding of the complexities of applying project planning and human resource management to community-based and participatory planning as a member of a multi-disciplinary team and also as a project leader;
- Use strategic planning skills to identify, analyse and address complex and abstract problems in community-based and participatory planning by systematically making use of an appropriate strategic approach and relevant project management methods for urban and regional planning;
- Identify and address ethical issues based on a critical reflection on the applicability of different ethical value systems within the context of community-based and participatory planning;
- Display skills in gathering, critically evaluating, accurately interpreting and managing information regarding community-based and participatory planning, as well as to communicate creative recommendations and solutions to problems graphically, in report form and orally by making use of appropriate computer-aided software. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis van en betrokkenheid in die beplannings- en professionele praktyk te demonstreer deur 'n begrip te toon van die vereistes wat deur die professionele liggaam (SACPLAN) aan die geregistreerde stad- en streeksbeplanner gestel word met inbegrip van die wyse waarop hierdie kennis toegepas moet word tydens gemeenskapsgebaseerde- en deelnemende beplanning;*
- *'n begrip te demonstreer van die kompleksiteite binne die behoeftes en aspirasies van spesifieke sosiale en kulturele groepe in die konteks van stad- en streeksbeplanning asook 'n begrip van die sosiale dimensies wat in ag geneem moet word tydens strategiese beplanningsprosesse;*
- *'n begrip te demonstreer van die kompleksiteite om as lid van 'n multidissiplinêre span en ook as projekleier, projekbeplanning en -menslike hulpbronbestuur toe te pas op gemeenskapsgebaseerde- en deelnemende beplanning;*
- *Die vermoë te demonstreer om strategiese beplanningsvaardighede te gebruik om komplekse en abstrakte probleme in gemeenskapsgebaseerde- en deelnemende beplanning te identifiseer, te analiseer en aan te spreek deur sistematies gebruik te maak van 'n gepaste strategiese benadering en toepaslike projekbestuurmetodes vir stad- en streeksbeplanning;*
- *Die vermoë te demonstreer om etiese sake en die toepaslikheid van verskillende etiese waardesisteme binne die konteks van gemeenskapsgebaseerde- en deelnemende beplanning te identifiseer en aan te spreek by wyse van kritiese refleksie; en*
- *Vaardighede te demonstreer om inligting rakende gemeenskapsgebaseerde- en deelnemende beplanning te versamel, krities te evalueer, akkuraat te interpreteer en te bestuur asook om kreatiewe voorstelle en probleemoplossings grafies, in verslagvorm en mondeling aan die hand van gepaste rekenaargesteunde sagteware te kommunikeer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag. 'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SBSS472	**Semester 1 & 2**	**NQF Level: 8**
Research Project/ ***Navorsingsprojek***		

Module outcomes:

Students should be able to:

- Demonstrate the ability to independently conduct research under guidance, and collect, process, analyse, evaluate and interpret information and data, and to document these findings meaningfully in a research paper;
- Demonstrate the ability to apply advanced subject-specific and integrated planning knowledge and skills in addressing urban and regional planning issues and in identifying, analysing and solving complex and abstract problems;
- Demonstrate sufficient knowledge of related literature, mastery of appropriate techniques and analytical methods, and the ability to remain at the forefront of the latest policy and practices in urban and regional planning;
- Demonstrate an ability to effectively present and communicate academic and professional planning recommendations to a range of audiences, in order to offer creative insights, as well as scientific interpretations and solutions to problems and issues appropriate to the urban and regional planning context; and
- Demonstrate an ability to assume full responsibility for own research, learning, decision-making and use of resources, as well as writing of the research paper and presentation thereof.

Module uitkomste:

Studente moet in staat wees om:

- *Die vermoë te demonstreer om selfstandig navorsing uit te voer onder toesig, inligting en data te versamel, te verwerk, te analiseer, te evalueer en te interpreteer en dit sinvol te dokumenteer in ’n navorsingartikel;*
- *Die vermoë te demonstreer om gevorderde vakspesifieke en geïntegreerde beplanningskennis en -vaardighede toe te pas om stad- en -streeksbeplanningsvraagstukke aan te spreek en om komplekse en abstrakte probleme te identifiseer, te ontleed en op te los;*
- *Voldoende bekendheid te demonstreer met verbandhoudende literatuur, bemeestering van toepaslike en analitiese metodes en die vermoë om op die voorpunt te bly van die nuutste wetgewing en praktyke in stad- en -streeksbeplanning;*
- *Die vermoë te demonstreer om akademiese en professionele beplanningsvoorstelle effektief aan te bied en te kommunikeer aan 'n verskeidenheid gehore, ten einde kreatiewe insigte te bied, asook wetenskaplike interpretasies en oplossings vir probleme en kwessies wat toepaslik is in die stad- en streeksbeplanningskonteks; en*
- *Die vermoë te demonstreer om volle verantwoordelikheid te aanvaar vir eie navorsing, leer, besluitneming en gebruik van hulpbronne, as ook vir die skryf van die navorsingsartikel en aanbieding daarvan.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SECO321	**Semester 2**	**NQF Level: 7**

Urban Ecology for Planners/

Stedelike Ekologie vir Beplanners

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and critical understanding of, as well as an ability to correctly evaluate and apply basic ecological principles, urban areas as unique ecosystems and the historical development of the discipline of urban ecology relevant to planning and design of urban areas;
- Demonstrate coherent understanding of the multiple sources of ecological knowledge (e.g. Abiotic aspects such as climate, water, soil and biotic aspects such as producers, consumers and decomposers and the ecosystem services they provide) and to critically evaluate how this knowledge can be integrated in ecological planning and design;
- Select, evaluate and apply different existing approaches and methods in ecological planning and design of urban areas addressing the issues of sustainability and resilience;
- Analyse and evaluate academic literature to demarcate a researchable problem in ecological planning and design and specify an appropriate method that can be used to address the identified problem;
- Identify, analyse and critically reflect on and address complex ecological issues in urban planning and design using arguments from current research with particular emphasis on the development of sustainable and resilient urban areas;
- Demonstrate accurate and coherent written and verbal communication with understanding of and respect for intellectual property conventions, copyright and rules on plagiarism; and
- Reflect on the values, ethical conduct and justifiability of decisions appropriate to the practice of responsible urban ecological planning and design. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis en kritiese begrip van, asook die vermoë om basiese ekologiese beginsels, stedelike gebiede as unieke ekosisteme en die historiese ontwikkeling van die dissipline van stedelike ekologie wat relevant is vir die beplanning en ontwerp van stedelike gebiede, korrek te evalueer en toe te pas, te demonstreer;*
- *Samehangende begrip te demonstreer van die veelvuldige bronne van ekologiese kennis (bv. Abiotiese aspekte soos klimaat, water, grond en biotiese aspekte soos produseerders, verbruikers en ontbinders en die ekosisteemdienste wat hulle verrig) en om krities te evalueer hoe hierdie kennis in ekologiese beplanning en -ontwerp geïntegreer kan word;*
- *Verskillende bestaande benaderings en metodes in ekologiese beplanning en -ontwerp te selekteer, evalueer en toe te pas, deur die vraagstukke van volhoubaarheid en veerkragtigheid aan te spreek;*

- *Akademiese literatuur te analiseer en evalueer om 'n navorsingswaardige probleem in ekologiese beplanning en -ontwerp af te baken en om 'n geskikte metode wat gebruik kan word om die geïdentifiseerde probleem aan te spreek, te spesifiseer;*
- *Komplekse ekologiese vraagstukke in stedelike beplanning en ontwerp te identifiseer, analiseer en krities daarop te reflekteer deur argumente vanuit huidige navorsing te gebruik met 'n spesifieke klem op die volhoubaarheid en veerkragtigheid van stedelike gebiede;*
- *Akkurate en samehangende geskrewe en verbale kommunikasie met die begrip van en respek vir intellektuele eiendomswaarde, kopiereg en reëls met betrekking tot plagiaat te demonstreer;*
- *Op die waardes, etiese gedrag en verantwoordbaarheid van besluite wat geskik is vir die praktyk van verantwoordelike stedelike ekologiese beplanning en ontwerp, te reflekteer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SGSS414	**Semester 1**	**NQF Level: 8**

Research Methodology for Geo- and Spatial Sciences/

Navorsingsmetodologie vir Geo- en Ruimtelike Wetenskappe

Module outcomes:

Students should be able to:

- Demonstrate the ability to independently conduct research under guidance, and collect, process, analyse, evaluate and interpret information and data, and to document these findings meaningfully in a research proposal in the field of Geo- and Spatial Sciences;
- Demonstrate integrated knowledge of and engagement in scientific research, and critical understanding and application of theories, research methodologies and techniques relevant to Geo- and Spatial research;
- Demonstrate an ability to critically interrogate multiple sources of knowledge within the field of Geo- and Spatial Sciences, and critically evaluate and review the knowledge and the manner in which the knowledge was produced;
- Demonstrate the ability to identify, analyse and effectively apply supervised research methods in order to reflect on and address complex or abstract problems in Geo- and Spatial Sciences;
- Demonstrate an ability to assume full responsibility for own research, learning, decision-making and use of resources, as well as writing of the research proposal and presentation thereof.

Module uitkomste:

Studente moet in staat wees om:

- *Die vermoë te demonstreer om selfstandig navorsing uit te voer onder toesig, inligting en data te versamel, te verwerk, te analiseer, te evalueer en te interpreteer en dit sinvol te dokumenteer in 'n navorsingsvoorstel in die veld van Geo- en Ruimtelike wetenskappe;*

- *Geïntegreerde kennis van en deelname aan wetenskaplike navorsing te demonstreer, asook kritiese begrip en toepassing van teorieë, navorsingsmetodes en -tegnieke wat relevant is vir Geo- en Ruimtelike navorsing;*
- *Die vermoë te demonstreer om verskeie bronne van kennis in die veld van Geo- en Ruimtelike navorsing te kan raadpleeg, en daardie kennis en die wyse van produksie van daardie kennis krities te evalueer;*
- *Die vermoë te demonstreer om navorsingsmetodes te identifiseer, analiseer en effektief toe te pas onder leiding van 'n studieleier, ten einde komplekse of abstrakte probleme in Geo- en Ruimtelike Wetenskap te oorweeg en aan te spreek;*
- *Die vermoë te demonstreer om volle verantwoordelikheid te aanvaar vir eie navorsing, leer, besluitneming en gebruik van hulpbronne, as ook vir die skryf van die navorsingsartikel en aanbieding daarvan.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SRSK323	**Semester 2**	**NQF Level: 7**
Urban Risk Management/ ***Stedelike Rampbestuur***		

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge and logical understanding of, disaster risk management concepts and theories and how they relate to urban planning;
- Demonstrate coherent understanding of natural hazards and underlying socio-economic drivers of disaster risk in urban areas;
- Demonstrate the ability to reflect on and apply theoretical knowledge of disaster risk management to assess the level of urban disaster risk in case studies within developing world contexts;
- Demonstrate an advanced ability to analyse, evaluate and consider the efficacy of theories and practices that aim reduce disaster risk and build resilient urban environments; and
- Demonstrate an ability to develop and communicate own ideas and opinions in well-formed arguments, using appropriate academic, professional, or occupational discourse. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis en logiese insig te demonstreer van ramprisikobestuur konsepte en -teorieë die verband daarmee met stedelike beplanning;*
- *Bewys te lewer van duidelike insig van natuurgevare en onderliggende sosio-ekonomiese stukragte van ramprisiko in stedelike gebiede;*
- *Bewys te lewer van die vermoë om teoretiese kennis van ramprisikobestuur ter assessering van die vlak van stedelike ramprisiko in die konteks van ’n ontwikkelende wêreld, te bepeins en toe te pas;*

- *Bewys te lewer van ’n gevorderde vermoë om die probaatheid van teorieë en praktyke wat op ’n verminderde vlak van stedelike ramprisiko gemik is, en om weerstandige stedelike omgewings te bou, te ontleed, evalueer en bedink; en*
- *Bewys te lewer van ’n vermoë om eie ideë en opinies in goed geformuleerde argumente te ontwikkel en oor te dra deur die gebruik van geskikte akademiese, professionele of beroepsredevoering.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

SSBP421	**Semester 2**	**NQF Level: 8**
Planning Practice/ ***Beplanningspraktyk***		

Module outcomes:

Students should be able to:

- Function effectively in relation to other planners, the government and the public, within the context of planning legislation and the systems of ethical codes determined by the Council for Planners and the Planning Institute;
- Apply knowledge in professional practice relating to planning legislation and private law, liaising with other professions, the role and function of the government at national, provincial, district, local and traditional levels and to function effectively with other professions and these institutions;
- Understand the complexities in the practice of identifying legal procedures, analysing existing policies and development guidelines and consultation with stakeholders and the general public in order to propose cost effective procedures to clients at the submission of development applications;
- Collect and critically reflect on cadastral, legal and physical data relevant to development applications, criteria, norms, standards and design principles applicable in professional practice in order to propose creative, legally correct and cost effective procedures to clients;
- Through the application of specialised skills, analyse and address complex issues relating to the preliminary investigation, submission, assessment and approval of development applications within the context of current legislation, policies and development guidelines applicable in the professional practice;
- Reflect on what the planner's decisions and ethical value systems will be on the design of a site and the subsequent submission of a development application and to address it within the context of prevailing design principles, policy, legislation and professional practice principles. /

Module uitkomste:

Studente moet in staat wees om:

- *Binne die konteks van beplanningswetgewing en die sisteme van etiese kodes, bepaal deur die Raad vir Beplanners en die Beplanningsinstituut, effektief te funksioneer in verhouding met ander beplanners, die owerheid en die publiek;*

- *Kennis toe te pas in die professionele praktyk aangaande beplanningswetgewing en privaatreg, skakeling met ander professies, die rol en funksie van die owerheid op nasionale-provinsiale-, distrik-, plaaslike- en tradisionele vlak en verantwoordelik met ander professies en hierdie instellings te skakel;*
- *Begrip te demonstreer van die kompleksiteite betrokke in die praktyk rakende die identifisering van wetlike prosedures, analisering van bestaande beleid en ontwikkelingsriglyne en konsultasie met belanghebbendes en die algemene publiek ten einde koste-effektiewe prosedures aan kliënte voor te stel by die loods van ontwikkelingsaansoeke;*
- *Die insameling van kadastrale-, wetlike- en fisiese data betrokke by ontwikkelingsaansoeke en kriteriums, norme, standaarde en ontwerpbeginsels van toepassing in die professionele praktyk, krities te ondersoek ten einde kreatiewe, wetlik korrekte en koste-effektiewe prosedures aan kliënte voor te stel;*
- *Deur die toepassing van gespesialiseerde vaardighede, komplekse probleme by die voorafgaande ondersoek, indiening, assessering en goedkeuring van ontwikkelingsaansoeke te analiseer en aan te spreek binne die konteks van heersende wetgewing, beleid en ontwikkelingsriglyne wat van toepassing is in die professionele praktyk; en*
- *Te reflekteer wat die besluite en etiese waardesisteme van die beplanner op die ontwerp van 'n terrein en daaropvolgende indiening van 'n ontwikkelingsaansoek sal wees en dit binne die konteks van heersende ontwerpbeginsels, beleid, wetgewing en professionele praktykbeginsels, aan te spreek.*

Method of delivery: Full-time

Metode van aflewering: *Voltyds*

Assessment modes:

The final module mark is the non-weighted average of the formal formative and the summative assessment marks.

The average module mark has to be above 50% for the student to pass the module.

Students need at least 40% in order to qualify for the summative assessment opportunities. /

Assesseringsmetodes:

Die finale modulepunt is die ongeweegde gemiddeld van die formele formatiewe assesseringspunt en die summatiewe assesseringspunt.

'n Student benodig ten minste 50% vir die gemiddelde punt om die module te slaag.

'n Minimumpunt van 40% word benodig om te kwalifiseer vir die summatiewe assesseringsgeleenthede.

NAS.2.9.19 STATISTICS / *STATISTIEK*

STTN111	**Semester 1**	**NQF Level: 5**
Descriptive Statistics/ ***Beskrywende Statistiek***		

Module outcomes:

A student who has completed this module should be able to demonstrate the following knowledge:

- Fundamental knowledge of the most important elementary statistical techniques used every day, such as sampling methods, determining sample size, graphical representation of data, descriptive measures of locality and scattering, least squares line fitting, predictions by means of least squares line fitting, correlation coefficients, time series data and movement components in order to predict future outcomes, practical considerations with regard to questionnaires; fundamental knowledge of probabilities and probability distributions, the central limit theorem, to demonstrate problem solving skills by solving familiar and unfamiliar problems; to implement the acquired knowledge to problems involving the above-mentioned skills and techniques. /

***Module uitkomste*:**

'n Student wat hierdie module voltooi het behoort die volgende kennis te kan toon:

- *Fundamentele kennis van die belangrikste elementêre statistiese tegnieke wat daagliks gebruik word, soos steekproefnemingsmetodes, bepaling van steekproefgroottes, grafiese voorstelling van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste kwadrate lynpassing, voorspellings deur middel van kleinste kwadrate lynpassing, die korrelasiekoëffisiënt, tydreeks data-analise, beweginskomponente om toekomstige uitkomstes te voorspel, praktiese oorwegings aangaande vraelyste, fundamentele kennis van waarskynlikhede en waarskynlikheidsverdelings, die sentrale limietstelling, probleemoplossingsvaardighede deur bekende en onbekende probleme op te los, en om kennis wat opgedoen is aan te wend in toepassings rakende bogenoemde onderwerpe en tegnieke.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN115	**Semester 1**	**NQF Level: 5**
Descriptive Statistics and Inference/ ***Beskrywende Statistiek en Inferensie***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge and understanding of the most important elementary statistical techniques that are used daily, such as sampling methods, graphical representation of data, descriptive measures of location and spread, least squares line fitting, prediction from least squares lines, the coefficient of correlation, multiple regression, time series data, movement components to predict future outcomes, practical considerations regarding sample surveys and sample sizes;
- Demonstrate knowledge and understanding of the normal and probability distributions, the central limit theorem, estimation of population parameters by the use of point and interval estimation, hypothesis testing for population means and proportions for one and two samples (parametric and non-parametric);
- Demonstrate skills to use statistical knowledge and techniques to solve known and unknown real world problems and to communicate methods, solutions and conclusions as an individual and/or part of a group, orally and in writing in an ethical, responsible and acceptable way. /

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis en begrip te demonstreer van die belangrikste elementêre statistiese tegnieke wat daagliks gebruik word, soos steekproefneming metodes, grafiese voorstelling van data, beskrywende maatstawwe van lokaliteit en spreiding, kleinste kwadrate lynpassing, voorspellings deur middel van kleinste kwadrate lynpassing, die korrelasiekoëffisiënt, meervoudige regressie, tydreeks data, beweginskomponente om toekomstige uitkomstes te voorspel, en praktiese oorwegings aangaande vraelyste en steekproefgroottes;*
- *Die student behoort ook kennis en begrip te demonstreer van die normaal en waarskynlikheidsverdelings, die sentrale limietstelling, beraming van populasie parameters deur middel van punt- en intervalberaming, hipotesetoetsing vir populasiegemiddelde en -proporsies vir een en twee steekproewe (parametries en nie-parametries);*
- *Vaardighede te demonstreer om statistiese kennis en tegnieke te gebruik om bekende en onbekende werklikheidsgetroue probleme op te los en metodes, oplossings en gevolgtrekkings as individu en/of as lid van 'n groep op eties, verantwoordelike en aanvaarbare wyse skriftelik en mondeling te kommunikeer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN121	Semester 2	NQF Level: 5

Introductory Statistical Inference/

Inleidende Statistiese Inferensie

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of probabilities and probability distributions, the central limit theorem, estimation of population parameters by means of point and interval estimation, hypothesis testing for population averages and proportions for one and two samples, one-way analysis of variance (ANOVA) and categorical data analysis, contingency tables and basic tests on categorical data;
- Demonstrate problem solving skills by analyzing familiar and unfamiliar problems, using acquired knowledge to solve simple probability problems, applying the knowledge gained above on data where applicable. /

Module uitkomste:

Studente moet in staat wees om

- *Fundamentele kennis van waarskynlikhede en waarskynlikheidsverdelings, die sentrale limietstelling, beraming van populasie parameters deur middel van punt- en intervalberaming, hipotesetoetsing vir populasiegemiddeldes en -proporsies vir een en twee steekproewe, eenrigting variansieanalise (ANOVA) en kategoriese data analise, gebeurlikheidstabelle en basiese toetse op kategoriese data te demonstreer;*
- *Probleemoplossingsvaardighede te demonstreer deur oplossing van bekende en onbekende probleme, om kennis wat opgedoen is te gebruik om eenvoudige probleme op te los rakende bostaande onderwerpe.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN122	Semester 2	NQF Level: 5

Introductory Statistics/

Inleidende Statistiek

Module outcomes:

Students should be able to:

- Demonstrate statistical techniques used every day, for example sampling methods, graphical representation of data and descriptive measures of locality and scattering;
- Use fitting linear regression curves to bivariate data and using the least squares method;
- Make simple predictions by using appropriate curves, as well as by interpreting the correlation coefficient;
- Handle time series data and calculate movement components in order to predict future outcomes;
- Carry out simple probability calculations and use probability distributions;
- Demonstrate the central limit theorem and applying it to practical problems;

- Estimate population parameters by means of point and interval estimation;
- Demonstrate hypothetical testing for population averages and population proportions in one or two sampling cases.
- Identify the presence and applicability of the above statistical concepts in a practical situation, as well as to perform statistical methods using manual analysis or statistical software. /

Module uitkomste:

Studente moet in staat wees om:

- *Statistiese tegnieke wat daagliks gebruik word bv. Steekproefmetodes, grafiese voorstelling van die data en beskrywende maatstawwe van lokaliteit en "spreading", te demonstreer;*
- *Lineêre regressie krommes te pas op tweeveranderlike data en die kleinste kwadrate metode te kan gebruik;*
- *Eenvoudige voorspellings te maak met die gepaste kromme, asook die interpretasie van die korrelasiekoeffisiënt;*
- *Die hantering van tydreeksdata en die berekening van bewegingskomponente te demonstreer ten einde toekomstige uitkomstes te kan voorspel;*
- *Eenvoudige waarskynlikheidsberekeninge uit te voer en van waarskynlikheidsverdelings te gebruik;*
- *Die sentrale limietstelling en die toepassing daarvan op praktiese probleem te demonstreer;*
- *Die beraming van populasieparameters m.b.v. Punt- en intervalberaming te demonstreer;*
- *Hipotesetoetsing vir populasiegemiddeldes en populasieproporsies vir een en twee steekproef gevalle te demonstreer;*
- *Die teenwoordigheid en toepasbaarheid van bostaande statistiese konsepte te kan herken in 'n praktiese situasie, asook die uitvoering van statistiese metodes deur gebruik te maak van ontleding per hand of d.m.v. Statistiese sagteware.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN124	**Semester 2**	**NQF Level: 5**
Practical Statistics/ ***Praktiese Statistiek***		

Module outcomes:

Students should be able to:

- Demonstrate correlation and its interpretation, the method of least squares fitting to a regression function prediction by means of a regression function, multiple linear regression and selection of predictors;
- Do basic factor analysis and the interpretation of its results, interpretation of factor matrices and construct validity;
- Demonstrate the hypothesis testing procedure, probability calculations, the central limit theorem, level of significance and p values;
- Demonstrate one-way ANOVA testing procedures and the interpretation of results;
- Discuss the practical significance of effect sizes of differences in averages and proportions for one and two populations;
- Do categorical data analysis by means of contingency tables, chi-squared tests and independence tests;
- Demonstrate distribution-free methods: the difference between parametric and nonparametric methods of inference, as well as deciding which method to use in a specific situation;

- Identify the presence and applicability of statistical concepts in a practical situation, as well as to perform statistical methods using manual analysis or statistical software. /

Module uitkomste:

Studente moet in staat wees om:

- *Korrelasie en die interpretasie daarvan, die metode van kleinste kwadrate, passing van 'n regressiefunksie, voorspelling m.b.v. 'n regressiefunksie, meervoudige lineêre regressie en die seleksie van voorspellers, te demonstreer;*
- *Basiese faktoranalise en die interpretasie van resultate daarvan, interpretasie van faktor matrikse en konstrukgeldigheid uit te voer;*
- *Die hipotesetoetsingsprosedure, waarskynlikheidsberekeninge, die sentrale limietstelling, betekenispeil en p-waardes te demonstreer;*
- *Een-rigting ANOVA toetsingsprosedures, die interpretasie van resultate te demonstreer;*
- *Praktiese betekenisvolheid van effekgroottes van verskille in gemiddeldes en proporsies vir een en twee populasies te bespreek;*
- *Kategoriese data-analise m.b.v. Gebeurlikheidstabelle, chi-kwadraat passingstoetse en toetse vir onafhanklikheid uit te voer;*
- *Verdelingsvrye metodes te demonstreer: die verskil tussen parametriese en nie-parametriese metodes van inferensie asook om te besluit welke metode om te gebruik in 'n bepaalde situasie;*
- *Die teenwoordigheid en toepasbaarheid van bostaande statistiese konsepte te kan herken in 'n praktiese situasie, asook die uitvoering van statistiese metodes daarvan deur gebruik te maak van ontleding per hand of d.m.v. Statistiese sagteware.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN125	**Semester 2**	**NQF Level: 5**
Introductory Probability Theory/ ***Inleidende Waarskynlikheidsleer***		

Module outcomes:

On completion of the module the learner should be able to:

- Demonstrate knowledge and understanding of concepts such as:
  - the sample space, events, probability measures, counting methods, random outcomes of events and the independence of events;
  - important probability theorems such as the law of total probability and the theorem of Bayes;
  - random variables, distribution functions and mass function, discrete random variables and the following distributions: binomial, geometric, negative binomial, hyper geometric, and Poisson as well as exponential, gamma and normal distributions and the functions of these variables;
- Demonstrate skills to use statistical knowledge and techniques to solve known and unknown real world problems and to communicate methods, solutions and conclusions as an individual and/or part of a group, orally and in writing in an ethical, responsible and acceptable way. /

***Module uitkomste*:**

Na voltooiing van die module behoort die student:

- *Kennis en begrip te demonstreer van:*
  - *konsepte soos die uitkomsruimte, gebeurtenisse, waarskylikheidmate, telprosesse, stogastiese uitkomstes van gebeurtenisse en die onafhanklikheid van gebeurtenisse;*

- *belangrike waarskylikheidsleerstellings soos die wet van totale waarskylikheid en die stelling van Bayes;*
- *stogastiese veranderlikes, verdelingsfunksies en massafunksies, diskrete stogastiese veranderlikes en die volgende verdelings: binomiaal, geometries, negatief binomiaal, hipergeometries en Poisson sowel as die kontinue stogastiese veranderlikes tesame met hul verdelingsfunksies: eksponensieel, gamma en normaalverdelings en funksies van die veranderlikes;*

- *Vaardighede te demonstreer om statistiese kennis en tegnieke te gebruik om bekende en onbekende werklikheidsgetroue probleme op te los en metodes, oplossings en gevolgtrekkings as individu en/of as lid van 'n groep op eties, verantwoordelike en aanvaarbare wyse skriftelik en mondeling te kommunikeer*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN215	**Semester 1**	**NQF Level: 6**
Probability and Sampling Theory/ ***Waarskynlikheidsleer en Steekproefteorie***		

Module outcomes:

On completion of the module the student should be able to:

- Demonstrate knowledge of:
  - the probability structure of two or more random variables as well as their joint distributions;
  - copulas and their properties;
  - conditional distributions and the application of probability calculations on conditional distributions;
  - order statistics and the application thereof;
  - the expected value and variance of all the important discrete and continuous random variables that were discussed in earlier work;
  - the covariance and correlation of two random variables, in addition to conditional expected values and moment generating functions;
  - two of the most important theorems of Probability theory, the so-called Law of Large Numbers and the Central Limit Theorem.
  - distributions derived from the normal distribution;
- Demonstrate problem solving skills by analysing problems that had been previously encountered and problems that are new and unfamiliar.
- Use computer programming software to apply these concepts practically. /

***Module uitkomste*:**

Na voltooiing van die module behoort die student in staat te wees om:

- *Kennis te toon van:*
  - *die waarskynlikheid struktuur van twee of meer stogastiese veranderlikes sowel as hul gesamentlike verdelings;*
  - *copulas en die eienskappe daarvan;*
  - *voorwaardelike verdelings en die toepassing van waarskynlikheidsberekeninge op voorwaardelike verdelings;*
  - *orde-statistieke en die toepassing daarvan;*
  - *die verwagte waarde en variansie van belangrike diskrete en kontinue stogastiese veranderlikes wat in vorige werk behandel is;*

- *die kovariansie en korrelasie van twee stogastiese veranderlikes, sowel as voorwaardelike verwagte waardes en moment voortbringende funksies;*
- *twee van die belangrikste stellings in Waarskynlikheidsleer, die sogenaamde Wet van Groot Getalle en die Sentrale Limietstelling;*
- *verdelings afgelei uit die normaalverdeling;*

- *Probleemoplossingstegnieke te demonstreer deur bekende en nuwe, onbekende probleme te ontleed;*
- *Programmerings sagteware te kan gebruik om hierdie konsepte prakties toe te pas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN225	**Semester 2**	**NQF Level: 6**

Statistical Inference and Data Analysis/

Statistiese Inferensie en Data-analise

Module outcomes:

On completion of the module the student should be able to:

- Demonstrate fundamental knowledge of the following statistical concepts: method of moments and the method of maximum likelihood to estimate parameters, efficiency of an estimator, sufficient statistics, the testing of hypotheses, the duality of confidence intervals and hypothesis testing, informal techniques for assessing goodness of fit, methods for summarizing data, measures of location and spread, density estimation, and the bootstrap.
- Demonstrate problem solving skills by analysing familiar and unfamiliar problems, estimating parameters by means of the method of moments and maximum likelihood, determining if an estimator is efficient and finding sufficient statistics in a variety of problems.
- Demonstrate the ability to construct complete and sufficient statistics, use the Neyman-Pearson paradigm to perform a hypothesis test, apply the connection between hypothesis testing and confidence intervals in the context of estimation, make conclusions using descriptive statistics, apply methods for summarizing data, calculate measures of location and spread, be able to use the bootstrap to (a) construct confidence intervals for a parameter and (b) estimate the variability of an estimator.
- Apply these concepts to real-world data.
- Use computer programming software to apply these concepts practically. /

***Module uitkomste*:**

Met afhandeling van hierdie module moet die student in staat wees om:

- *Fundamentele kennis te demonstreer van die volgende statistiese konsepte: metode van momente en die metode van maksimum aanneemlikheid ten einde parameters te beraam, doeltreffendheid van 'n beramer, voldoende statistieke, hipotesetoetsing, die dualiteit tussen vertrouensintervalle en hipotesetoetsing, informele tegnieke vir pasgehaltetoetsing, metodes van data-opsomming, maatstawwe van lokaliteit en spreiding, digtheidsfunksieberaming, en die skoenlusmetode.*
- *Probleemoplossing kundigheid ten toon te stel vir die analisering van bekende en onbekende probleme, parameters te beraam deur middel van die metode van maksimum aanneemlikheid en momente, bepaal welke 'n beramer doeltreffend is en voldoende statistieke te vind vir 'n verskeidenheid probleme.*
- *Kundigheid ten toon stel in die opstel van volledige en voldoende statistieke, gebruik van die Neyman-Pearson paradigma ten einde hipotesetoetsing uit te voer, toepassing van die verband tussen hipotesetoetsing en vertrouensintervalle in die konteks van beraming, gevolgtrekkings te maak deur*

beskrywende statistiek te gebruik, metodes van data-opsomming toe te pas, berekening van maatstawwe van lokaliteit en spreiding, in staat te wees om die skoenlusmetode toe te pas vir (a) die opstel van vertrouensintervalle vir parameters en (b) beraming van 'n beramer se variasie.

- *Bogenoemde konsepte toe te pas op data soos gevind in die praktyk.*
- *Programmeringssagteware te kan gebruik om hierdie konsepte prakties toe te pas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN316	Semester 1	NQF Level: 7

Linear Models I/

Lineêre Modelle I

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of linear statistical models including an understanding of, and an ability to apply, these models in theoretical and real-world settings;
- Identify, analyse, critically reflect on and address complex statistical problems, applying theory driven arguments based on linear statistical models;
- Display problem solving skills by analysing problems that had been previously encountered and problems that are new and unfamiliar. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis van die toepassing van lineêre statistiese modelle insluitende begrip van, en 'n vermoë om, hulle toe te pas in teoretiese en werklike wêreld scenario's, te demonstreer;*
- *Komplekse statistiese probleme te identifiseer, te analiseer, krities daaroor te reflekteer en aan te spreek, met toepassing van teoriegedrewe argumente gebaseer op lineêre statistiese modelle;*
- *Probleemoplossingstegnieke te openbaar deur bekende en nuwe, onbekende probleme te ontleed.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN317	Semester 1	NQF Level: 7

Statistical software and Applications I/

Statistiese Sagteware en Toepassings I

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the application of statistical software to conduct various statistical analyses;
- Display problem solving skills by analysing problems that had been previously encountered and problems that are new and unfamiliar.
- Communicate his or her statistical results and conclusions in a well-formed argument using appropriate academic and professional language. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis van die toepassing van statistiese sagteware om verskillende statistiese ontledings uit te voer, te demonstreer;*
- *Probleemoplossingstegnieke te openbaar deur bekende en nuwe, onbekende probleme te ontleed;*
- *Sy of haar statistiese resultate en gevolgtrekkings in 'n goed gevormde argument te kommunikeer deur gebruik te maak van toepaslike akademiese en professionele taal.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN326	**Semester 2**	**NQF Level: 7**

Analysis of Dependent Data/

Analise van Afhanklike Data

Module outcomes:

Students should be able to:

- *Demonstrate integrated knowledge of time series models and critical understanding and application of these models;*
- *Demonstrate integrated knowledge of copulas and critical understanding and application of copulas;*
- *Select, apply, and critically judge the effectiveness of the implementation of relevant time series models and various types of copulas. /*

Module uitkomste:

Studente moet in staat wees om

- *Geïntegreerde kennis van tydreeks modelle en 'n kritiese begrip en toepassing van hierdie modelle te demonstreer;*
- *Geïntegreerde kennis van copulas en 'n kritiese begrip en toepassing van copulas te demonstreer;*
- *Krities die doeltreffendheid van die implementering van toepaslike tydreeks modelle en verskeie soorte copulas te beoordeel.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTN327	**Semester 2**	**NQF Level: 7**

Statistical Software and Applications II/

Statistiese Sagteware en Toepassings II

Module outcomes:

Students should be able to:

- Demonstrate integrated knowledge of the application of statistical software to conduct various statistical analyses;
- Display problem solving skills by analysing problems that had been previously encountered and problems that are new and unfamiliar;

- Communicate his or her statistical results and conclusions in a well-formed argument using appropriate academic and professional language. /

Module uitkomste:

Studente moet in staat wees om:

- *Geïntegreerde kennis van die toepassing van statistiese sagteware om verskillende statistiese ontledings uit te voer, te demonstreer;*
- *Probleemoplossingstegnieke openbaar deur bekende en nuwe, onbekende probleme te ontleed;*
- *Sy of haar statistiese resultate en gevolgtrekkings in 'n goed gevormde argument te kommunikeer deur gebruik te maak van toepaslike akademiese en professionele taal.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

STTK214	**Semester 1**	**NQF Level: 6**
Statistics for Life Sciences/ ***Statistiek vir Lewenswetenskappe***		

Module outcomes:

Students should be able to:

- Demonstrate knowledge and the ability to effectively apply the following:
  - the most important statistical techniques that are used daily, such as sampling methods, graphical representation of data, descriptive measures of location and spread;
  - linear regression curves to bivariate data using the least squares technique;
  - simple predictions by means of the fitted curve, and interpretation of the coefficient of correlation;
  - time series data and the calculation of the movement components to predict future outcomes;
  - simple probability calculations and probability distributions;
  - the central limit theorem and the application of the theorem to practical problems;
  - estimating population parameters by using point and interval estimation;
  - hypothesis testing for population means and population proportions for one and two samples;
  - one way and two-way ANOVA;
  - chi squared test for independence;
  - principle component analysis.
- Recognise the presence and applicability of statistical concepts in a practical situation and perform statistical methods to summarise, understand and analyse data sets by using statistical computer software.
- Identify the appropriate statistical technique applicable to the problem presented. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis te dra van die volgende begrippe en in staat te wees om die volgende toe te pas:*
  - *statistiese tegnieke wat daagliks gebruik word bv. steekproefmetodes, grafiese voorstelling van die data en beskrywende maatstawwe van lokaliteit en spreiding;*
  - *lineêre regressie krommes te pas op tweeveranderlike data en die kleinste kwadrate metode te kan gebruik;*
  - *eenvoudige voorspellings te maak met die gepaste kromme, asook die interpretasie van die korrelasiekoeffisiënt;*
  - *die hantering van tydreeksdata en die berekening van bewegingskomponente ten einde toekomstige uitkomstes te kan voorspel;*

- *die uitvoering van eenvoudige waarskynlikheidsberekeninge en die gebruik van waarskynlikheidsverdelings;*
- *die sentrale limietstelling en die toepassing daarvan op praktiese probleme;*
- *die beraming van populasieparameters m.b.v. punt- en intervalberaming;*
- *hipotesetoetsing vir populasiegemiddeldes en populasieproporsies vir een en twee steekproef gevalle;*
- *eenrigting- en tweerigting ANOVA;*
- *chi-kwadraat toets vir onafhanklikheid; en*
- *hoofkomponentontleding.*

- *Die toepaslikheid van bostaande statistiese konsepte in 'n praktiese omgewing te erken en statistiese metodes daarop kan toepas om datastelle op te som, te verstaan en te ontleed d.m.v. Statistiese rekenaarsagteware;*
- *Die statistiese tegniek te kan identifiseer wat toepaslik is vir 'n bepaalde probleem.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessments: Class Tests, Assignments, and Class Work.

Summative assessments: Exam

NAS.2.9.20 APPLIED MATHEMATICS / *TOEGEPASTE WISKUNDE*

APPM111 / APPM171	Semester 1	NQF Level: 5
Introduction to Mechanics		

Module Outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in:

- The understanding of classical mechanics, in particular regarding the topics of vector algebra, forces at a point, friction, kinematics, composition of velocities, Newton's laws of motion, motion under gravity, work, power, energy, circular motion, simple harmonic motion;
- The identification of problems and the application of classical mechanics to solve the problems; and
- The interpretation of results and ability to communicate principles of classical mechanics to relevant stake holders.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

APPM121	Semester 2	NQF Level: 5
Statics and Mathematical Modelling/ ***Statika en Wiskundige Modellering***		

Module outcomes:

Students should be able to:

- Demonstrate fundamental knowledge of geometric vectors and their operational rules, vectors, forces, components, scalar and vector product, Cartesian forms, resultant of two- and three-dimensional systems of force through a point, the principle of transmissibility, moments, couples, reduction of systems of forces to a single force and a single couple, equilibrium in a plane and equilibrium in space, friction and moments rotating about axes, the modelling process, geometric similarity and proportionalities, dimensional analysis and the theorem of Buckingham;
- Demonstrate problem solving skills by analysing familiar and unfamiliar problems, by using knowledge of techniques to determine resultants of different types of systems of force, by solving equilibrium problems in two and three dimensions, by forming and solving models by means of proportionality relations and dimensional analysis, by fitting models to data and by solving simple differential equations./

Module uitkomste:

Studente moet in staat wees om:

- *Fundamentele kennis demonstreer van meetkundige vektore en hul bewerkingsreëls, vektore, kragte, komponente, skalaar- en vektorproduk, Cartesiese vorme, resultant van 2 en 3-dimensionele kragtestelsels deur ’n punt, die beginsel van voortplaasbaarheid, momente, koppels, herleiding van stelsels kragte na ’n enkele krag en ’n enkele koppel, ewewig in die platvlak en ewewig in die ruimte, wrywing en momente om asse, die modelleringsproses, meetkundige soortgelykheid en eweredighede, dimensionele analise en die stelling van Buckingham;*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende probleme te analiseer, kennis van tegnieke gebruik om resultante van verskillende tipes kragtestelsels te bepaal, ewewigsprobleme in 2 en 3-dimensies oplos, modelle met eweredigheidsverbande en deur dimensionele analise te vorm en op te los en modelle by data te pas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM122 / APPM172	Semester 2	NQF Level: 5
Mathematical Modelling and Vector Algebra/ ***Wiskundige Modellering en Vektoralgebra***		

Module Outcomes:

On completing this module, students should demonstrate an advanced knowledge and applied insight into:

- Understanding the process of mathematical modelling, identifying and constructing models.
- Geometric similarity and Proportionalities.
- Fitting of curves to data by means of: graphical fitting, Chebyshev approximation and least-squares criterion.
- Separable and first-order differential equations.
- Growth and decay processes: Malthus growth and logistic growth.
- Dimensional analysis: dimensions, theorem of Buckingham, a damped pendulum and similitude.
- Vector algebra: force systems, coplanar equilibrium analysis and three-dimensional equilibrium. /

***Module-uitkomste*:**

By voltooiing van die module, behoort studente gevorderde kennis en toepasbare insig kan demonstreer rakende:

- *Begrip vir die proses van wiskundige modellering, identifisering en konstruksie van modelle.*
- *Meetkundige soortgelykheid en eweredighede.*
- *Krommepassing aan data met behulp van: grafiese passing, Tsjebisjeff benadering en kleinste-kwadrate kriterium.*
- *Skeibare en eerste-orde differensiaal vergelykings.*
- *Groei en verval prosesse: Malthus groei en logistiese groei.*
- *Dimensionele analise: dimensies, stelling van Buckingham, ʼn gedempte pendulum en gelykvormigheid.*
- *Vektor algebra: kragstelsels, saamvlakkige ewewigsanalise en drie-dimensionele ewewig.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM211	Semester 1	NQF Level: 6
Dynamics I/ ***Dinamika* I**		

Module outcomes:

On completion of this module, students should be able to do the following:

- Demonstrate fundamental knowledge of kinematics and kinetics of a single particle, a system of particles and a rigid body, all moving along a straight line or a curved trajectory.
- Demonstrate problem solving skills by analysing familiar and unfamiliar problems and using knowledge of kinematics and kinetics to calculate time duration, displacements, velocities, accelerations, forces, work done, energy, momentum, impulse, moment of inertia, angular impulse and angular momentum./

Module-uitkomstes:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Fundamentele kennis demonstreer van die kinematika en kinetika van ’n enkel deeltjie, ’n stelsel deeltjies en ’n starre liggaam vir reglynige en kromlynige bane.*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende probleme te analiseer en kennis van kinematika en kinetika te gebruik om tydsverloop, verplasings, snelhede, versnellings, kragte, arbeid verrig, energie, momentum, impuls, traagheidsmoment, hoekimpuls en hoekmomentum te bereken.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM212	Semester 1	NQF Level: 6
Differential Equations/ ***Differensiaalvergelykings***		

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Solution methods for separable, linear, Bernoulli, homogenous, and exact first order differential equations;
- Euler's method for approximating the solution of a differential equation;
- Solution of homogenous linear second order differential equations with constant coefficients;
- Solution of linear second order differential equations using the methods of undetermined coefficients and of variation of parameters;
- Laplace transforms and inverse Laplace transforms;
- Solution of first and second order initial value differential equations using Laplace transforms of continuous and discontinuous functions;
- Elementary modelling of practical problems using differential equations. /

Module-uitkomstes:

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie

rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Oplossingstegnieke vir lineêre, Bernoulli, skeibare, homogene en eksakte eerste-orde differensiaalvergelykings;*
- *Euler se metode om 'n differensiaalvergelyking se oplossing te benader;*
- *Oplossing van tweede-orde lineêre homogene differensiaalvergelykings met konstante koëffisiënte;*
- *Oplossing van tweede-orde differensiaalvergelykings met behulp van die metodes van onbepaalde koëffisiënte, en van variasie van parameters;*
- *"Laplace transform" en inverse "Laplace transforms";*
- *Oplossing van eerste- en tweede-orde differensiaalvergelykings met behulp van "Laplace transforms" vir kontinue en diskontinue funksies;*
- *Elementêre modellering van praktiese probleme met behulp van differensiaalvergelykings.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM213	**Semester 1**	**NQF Level: 6**

Linear Programming

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in

- The understanding of linear programming, in particular regarding the topics of simplex algorithm; duality problems; sensitivity analysis; revised simplex algorithm; integer programming; transportation programming; dynamic programming;
- The identification of problems and the application of linear programming to solve these problems; and
- The interpretation of results and ability to communicate principles of linear programming to relevant stake holders.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

APPM221	**Semester 2**	**NQF Level: 6**

Dynamics II/

Dinamika II

Module outcomes:

On completing this module student should be able to do the following:

- Demonstrate fundamental knowledge of the theory of flexible cables, internal forces and deformation of simple beams, kinetics of rigid bodies and the motion of satellites and planets;
- Demonstrate problem solving skills by solving familiar and unfamiliar problems involving deformations in beams and cables and motion of rigid bodies acted on by forces, and determining the orbits and positions of satellites. /

Module-uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Fundamentele kennis demonstreer van die teorie van buigbare kabels, inwendige kragte en vervorming van eenvoudige balke, kinetika van starre liggame en die beweging van satelliete en planete;*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende probleme oor die vervormings in balke en kabels en beweging van starre liggame onder werking van kragte, sowel as bepaling van bane en posisies van satelliete te doen.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM222	**Semester 2**	**NQF Level: 6**
Numerical Methods/ ***Numeriese Metodes***		

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, the application of the theory, and the proper use of computer algebra systems (such as MATLAB) regarding selected aspects of the following topics:

- Solution of non-linear equations: Bisection method, Newton's method (single equations), Secant method, Newton's method (systems of non-linear equations);
- Interpolation and polynomial approximation: Lagrange interpolation, Newton divided difference interpolation, Linear and Cubic splines;
- Numerical integration and differentiation: Trapezoidal method, Simpson's method, Gauss-quadrature;
- Numerical solution of initial value differential equations, Taylor's first order and second order method, Runge-Kutta methods. /

Module-uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en gevorderde kennis van, en vaardigheid in die onderliggende beginsels, die metodes, die toepassings van die teorie, en die behoorlike gebruik van rekenaar-algebra stelsels (soos MATLAB), rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Oplossings van nie-lineêre vergelykings: halveermetode, Newton se metode (enkel vergelykings), Secant (snylyn) metode, Newton se metode (stelsels nie-lineêre vergelykings);*
- *Interpolasie en polinoombenadering: Lagrange interpolasie, Newton se gedeelde differensie-interpolasie, lineêre en kubiese latfunksies;*
- *Numeriese integrasie en differensiasie: Trapesiummetode, Simpson se metode, Gauss-kwadratuurreël;*
- *Numeriese oplossing van aanvangswaardedifferensiaalvergelykings: Taylor se eerste-orde- en tweede-ordemetode, Runge-Kutta-metodes.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM223	**Semester 2**	**NQF Level: 6**

Mathematical Methods

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in:

- The understanding of mathematical methods, in particular as regards ssystems of linear ordinary differential equations, Riccati's equation, Clairaut's and Lagrange's equation, envelopes, reduction of order, equations of the form $Pdx + Qdy + Rdz = 0$, $dx/P = dy/Q = dz/R$, first-order partial differential equations, characteristics;
- The identification of problems and the application of mathematical methods to solve the problems; and
- The interpretation of results and ability to communicate the principles of this module to relevant stake holders.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

APPM311	**Semester 1**	**NQF Level: 7**

Partial Differential Equations/

Parsiële Differensiaalvergelykings

Module outcomes:

On completing this module, the student should be able to do the following:

- Demonstrate fundamental knowledge of real-life problems where the mathematical model led to partial differential equations and the analytical solving of partial differential equations such as the wave, heat and potential equation and the electric charge problem, Fourier series, orthogonal functions and polynomial methods and the Sturm-Liousvile problem;
- Demonstrate problem solving skills by analysing familiar and unfamiliar problems, applying knowledge of techniques that are used to solve differential equations with methods using power series, to determine Fourier series and handling standard problems with the Fourier method. /

Module-uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Fundamentele kennis demonstreer van werklikheidprobleme waarin die wiskundige model lei tot parsiële differensiaalvergelykings en die analitiese oplos van parsiële differensiaalvergelykings soos die golf-, warmte- en potensiaalvergelyking en die elektriese-lading-probleem; Fourier-reekse, ortogonale funksies en magreeksmetodes en die Sturm-Liousville-probleem;*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende probleme te analiseer, kennis van tegnieke gebruik om differensiaalvergelykings met magreeksmetodes op te los, Fourier-reekse te bepaal en standaardprobleme met die Fourier-metode te hanteer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM312	**Semester 1**	**NQF Level: 7**

Numeric Methods for Partial Differential Equations/

Numeriese Metodes vir Parsiële Differensiaalvergelykings

Module outcomes:

On completing this module, the student should be able to do the following:

- Demonstrate fundamental knowledge and insight into the discretisation of ordinary and partial linear differential equations, the special properties of tri-diagonal matrices, calculation problems caused by ill-conditioned and sparse systems of linear equations, convergence properties of iterative methods of systems of linear equations and stability properties of numerical methods, solving parabolic, elliptical and hyperbolic differential equations numerically, performing iterative methods with MATLAB on a computer;
- Demonstrate problem solving skills in numerically solving, by means of finite difference methods, two-point boundary value problems, the heat equation, the potential equation and the wave equation with the finite difference methods and in implementing these by computer; and
- Demonstrate insight into the relation between reality and abstraction, model and solution. /

Module-uitkomste:

Na voltooiing van hierdie module behoort die student die volgende te kan doen:

- *Fundamentele kennis en insig demonstreer in die diskretisering van gewone en parsiële lineêre differensiaalvergelykings, spesiale eienskappe van tridiagonale matrikse, berekeningsprobleme wat sleggeaardheid en yl stelsels lineêre vergelykings meebring, konvergensie-eienskappe van iteratiewe*

metodes vir stelsels lineêre vergelykings en die stabiliteitseienskappe van numeriese metodes, die numeriese oplossing van paraboliese, elliptiese en hiperboliese differensiaalvergelykings, en die uitvoering van iteratiewe metodes per rekenaar met MATLAB;

- *Probleemoplossingsvaardighede demonstreer in die numeriese oplos, deur middel van eindige-verskille-metodes, van tweepuntrandwaardeprobleme, die warmtevergelyking, die potensiaal-vergelyking en die golfvergelyking en die rekenaarimplementering daarvan; en*
- *Begrip te toon vir die verband tussen werklikheid, abstraksie, model en oplossing.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM313	**Semester 1**	**NQF Level: 7**

Numerical Analysis

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill regarding selected aspects of the following topics:

- The understanding of numerical analysis, in particular regarding the topics of discrete least squares approximation; Taylor`s method and Richardson`s extrapolation; convergence and stability of numerical methods; Euler`s method and modified Euler`s method revisited; Runge-Kutta method of order four revisited; Multistep methods; numerical methods for systems of equations; numerical methods for higher order differential equations; introduction to finite difference approximations; introduction to the Crank-Nicolson method;
- The identification of problems and the application of numerical analysis to solve the problems; and
- The interpretation of results and ability to communicate principles of numerical analysis to relevant stake holders.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

APPM321	Semester 2	NQF Level: 7
Dynamical Systems/ ***Dinamiese Stelsels***		

Module outcomes:

On completion of this, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of one or more of the following topics:

- Linear and non-linear systems for both discrete and continuous time, in particular Markov chains (linear systems); fixed points, linearization, Lyapunov functions, periodicity, chaos and bifurcations (non-linear systems);
- Elementary theory of fractals. /

Module-uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en gevorderde kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Lineêre en nie-lineêre stelsels vir beide diskrete en kontinue tyd, in besonder Markov kettings (lineêre stelsels); dekpunte, linearisering, Lyapunov funksies, periodisiteit, chaos en bifurkasies (nie-lineêre stelsels);*
- *Elementêre teorie van fraktale.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM322	Semester 2	NQF Level: 7
Optimization/ ***Optimalisering***		

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill regarding selected aspects of the following topics:

- One-dimensional constrained optimisation: function comparison methods (Fibonacci search methods and golden section search methods); interpolation methods (curve fitting): quadratic interpolation (Powell's method), line minimisation technique, cubic interpolation (Davidson's method).
- Multi-dimensional unconstrained optimisation: test functions; direct search methods (Hooke and Jeeves, Nelder & Mead); gradient methods & Quasi-Newton methods.
- Constrained optimisation: theory of constrained optimisation (Equality Constraints, Inequality Constraints); numerical constrained optimisation: penalty functions, the complex method of Box, revised simplex method. /

Module-uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en gevorderde kennis van, en vaardigheid in geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Eendimensionele beperkte optimalisering: funksie-vergelykingstegnieke (Fibonacci, goue snede); Interpolasietegnieke (Kromme passing): kwadratiese interpolasie (Powell se metode), minimalisering langs 'n lyn en kubiese interpolasie (Davidson metode).*
- *Meerdimensionele onbeperkte optimalisering: toetsfunksies; direkte soekmetodes (Hooke & Jeeves, Nelder & Mead); gradiëntmetodes & Quasi-Newtonmetodes.*
- *Beperkte optimalisering: teorie vir beperkte optimalisering (gelykheidsbeperkings; ongelykheidsbeperkings); numeriese beperkte optimalisering: straffunksies, die komplekse metode van Box, aangepaste simpleksmetode.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

APPM323	Semester 2	NQF Level: 7
Fluid Mechanics		

Module outcome:

1. **Unit 1:** Kinematics of Fluids in Motion
- **Themes:** Velocity of a fluid at point; local and particle rate change; acceleration of a fluid; streamlines; stream tubes; density; equation of continuity.
2. **Unit 2:** Equations of Motion
- **Themes:** Euler's Equations of motion; Bernoulli Equation; steady motion under conservative body forces; some flows involving axial symmetry; flow past a sphere.
3. **Unit 3:** Two-Dimensional Flows
- **Themes:** meaning of two-dimensional flow; steam function; complex potential; uniform streams; line sources and sinks (doublets); line vortices (vortex street, Karman's vortex street); Milne-Thomson circle Theorem.
4. **Unit 4:** Viscous Flow
- **Themes:** Navier-Stokes Equations; some problems in viscous flow (steady motion between parallel, Poiseuille flow, steady flow between concentric rotating cylinders, steady viscous flow in tubes of uniform cross-section); diffusion of vorticity; similarity (geometrical similarity, dynamical similarity, Froude number, Reynolds number); Navier-Stokes Equations in non-dimensional form; Prandtl's boundary layer (estimate of boundary layer thickness).

Method of delivery: Full Time

Assessment modes:

NAS.2.9.21 MATHEMATICS / *WISKUNDE*

MTHS111 / MTHS171	Semester 1	NQF Level: 5
Introductory Algebra and Calculus I/ ***Inleidende Algebra en Calculus I***		

Module outcome:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Fundamental knowledge of the system of natural numbers including mathematical induction, integer numbers including the Euclidean algorithm and their applications, rational numbers, irrational numbers, real numbers and complex numbers including De Moivre's theorem and its applications, the concept of functions, absolute value functions, circle measure and trigonometric functions, inverse functions and inverse trigonometric functions, polynomials in one variable , rational functions, exponential and logarithmic functions, limits, continuity, differentiability and indefinite integrals of all the above mentioned functions, l'Hospital's rule and its applications;
- Problem solving skills to calculate the domain and range, limits, continuity, derivatives and indefinite integrals of all the above mentioned functions, calculate limits using l'Hospital's rule, prove theorems with mathematical induction, determine greatest common divisors and use it to solve Diophantine equations, and perform operations with complex numbers. /

Module-uitkomstes:

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie

rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Fundamentele kennis van die stelsels van natuurlike getalle insluitend wiskundige induksie, heelgetalle insluitend Euklidiese algoritme en sy toepassings, rasionale getalle, irrasionale getalle, reële getalle en*

komplekse getalle insluitend De Moivre se stelling en sy toepassings, funksiebegrip, absolutewaardefunksies, sirkelmaat en trigonometriese funksies, inverse funksies en inverse trigonometriese funksies, polinome in een veranderlike, rasionale funksies, eksponensiale en logaritmiese funksies, limiete, kontinuïteit, differensieerbaarheid en onbepaalde integrale van al bogenoemde funksies, l'Hospital se reël en sy toepassings;

- *Probleemoplossingsvaardighede om definisie- en waardeversamelings te bereken, limiete, kontinuïteit, afgeleides en onbepaalde integrale van al bogenoemde funksies te bereken, limiete met behulp van l'Hospital se reël te bereken, stellings deur wiskundige induksie bewys, grootste gemene delers bepaal en dit gebruik om Diofantiese vergelykings op te los, en bewerkings met komplekse getalle uit te voer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS112 / MTHS123	**Semester 1**	**NQF Level: 5**
Mathematical Techniques/ ***Wiskundige Tegnieke***		

Module outcomes:

On completion of the module, the student should be able to demonstrate:

- Basic knowledge and skills to manipulate and solve algebraic equations, including fractional and exponential and logarithmic equations.
- Domain specific knowledge and skills to solve systems of linear equations using matric reduction and matrix algebra.
- Domain specific knowledge and skills to solve systems of linear inequalities using graphical solutions (linear programming).
- Informed understanding of the concept of a mathematical function, which include linear functions, quadratic functions, exponential functions and logarithmic functions.
- Basic knowledge and informed understanding of the theory of arithmetic and geometric series and sequences.
- Basic knowledge and informed understanding of the terminology, principles and procedures of differentiation and integration.
- Basic knowledge of every day economical and financial concepts such as percentages, interest rates, demand and supply, cost, revenue and profit, budget equations, tax problems, growth of investments, annuities, marginal quantities.

- The ability to select and apply applicable mathematical concepts, procedures, rules, principles, methods and formulae to solve problems in financial and economic contexts, such as percentages, interest rates, demand and supply, cost, revenue and profit, budget equations, tax problems, growth of investments, annuities, marginal quantities. /

Module uitkomste:

Aan die einde van hierdie module behoort studente die volgende te demonstreer:

- *Basiese kennis en vaardighede om algebraïese vergelykings te manipuleer en op te los, insluitende breuke en eksponensiële en logaritmiese vergelykings.*
- *Domein spesifieke kennis en vaardighede om stelsels lineêre vergelykings op te los deur van matriks reduksie en matriksalgebra gebruik te maak.*
- *Domein spesifieke kennis en vaardighede om stelsels lineêre ongelykhede op te los deur gebruik te maak van grafiese oplossings (lineêre programmering).*
- *Ingeligte begrip van die konsep 'n wiskundige funksie, wat lineêre funksies, kwadratiese funksies, eksponensiële funksies en logaritmiese funksies insluit.*
- *Basiese kennis en ingeligte begrip van die teorie van rekenkundige en meetkundige rye en reekse.*
- *Basiese kennis en ingeligte begrip van die terminologie, beginsels en prosedures van differensiasie en integrasie.*
- *Basiese kennis van daaglikse ekonomiese en finansiële konsepte soos persentasies, rentekoerse, vraag en aanbod, koste, inkomste en wins, begrotingsvergelykings, belastingprobleme, groei van beleggings, annuïteite en marginale hoeveelhede.*
- *Die vermoë om toepaslike wiskundige begrippe, prosedures, reëls, beginsels, metodes en formules te kies en toe te pas om probleme in finansiële en ekonomiese kontekste op te los, byvoorbeeld persentasies, rentekoerse, vraag en aanbod, koste, inkomste en wins, begrotingsvergelykings, belastingprobleme, groei van beleggings, annuïteite en marginale hoeveelhede.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS113	Semester 1	NQF Level: 5
Basic Mathematical Techniques/ ***Basiese Wiskundige Tegnieke***		

Module outcomes:

At the end of this module, students have mastered the following topics at an introductory level:

- The concept of a mathematical function elucidated from examples that include exponential and logarithmic functions, the concept of differentiation and integration, a method to solve sets of linear equations, matrix algebra, linear programming problems in two variables, analysis of the rate of change of mathematical functions by using differentiation to investigate the characteristics of the function.
- The student acquires skills to recognize the presence and applicability of mathematical concepts in a scientific situation and to construct a mathematical model of the problem situation in order to reach a solution by applying differentiation techniques, integration, arithmetic techniques or linear algebra. /

Module uitkomste:

Aan die einde van hierdie module het die student die volgende onderwerpe op inleidende vlak bemeester:

- *Die konsep van 'n wiskundige funksie vanuit voorbeelde wat eksponensiale en logaritmiese funksies insluit, die konsep van differensiasie en integrasie, 'n oplosmetode vir stelsels lineêre vergelykings, matriksalgebra, lineêre programmeringsprobleme in twee veranderlikes, analise van die tempo van verandering van wiskundige funksies met die gebruik van differensiasie om die eienskappe van die funksie te ondersoek.*
- *Die student verwerf die vaardigheid om die teenwoordigheid en toepasbaarheid van wiskundige konsepte in 'n natuurwetenskaplike situasie te herken en 'n wiskundige model van die probleemsituasie te konstrueer ten einde 'n oplossing te verkry deur die toepassing van differensiasietegnieke, integrasie, rekenkundige tegnieke of lineêre algebra.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS114 / MTHS173	Semester 1	NQF Level: 5

Applied Calculus I

Toegepaste Calculus I/

Module outcomes:

Students will not be credited for more than one of MTHS111 and MTHS114. MTHS114 is intended for students who require mathematics at first year level only, and does not lead to admission to any second year mathematics or applied mathematics module.

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the basic principles,

and the application of the theory regarding selected aspects of the following topics:

- Functions;
- Rates of change, limiting behaviour, and the derivative;
- Techniques of differentiation;
- Functions revisited (exponential and logarithmic and trigonometric);
- Applications of the derivative;
- The concept of integration, its interpretation, and basic properties and basic integration rules.

All topics are studied in the context of applications. /

Module-uitkomste:

Studente sal nie met meer as een van MTHS111 en MTHS114 gekrediteer word nie. MTHS114 is bedoel vir studente wat wiskunde slegs op eerstejaar vlak nodig het, en gee geensins toegang tot enige tweedejaar Wiskunde of Toegepaste Wiskunde modules nie.

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die basiese beginsels,

en die toepassing van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Funksies;*
- *Tempo van verandering, limiet gedrag, en die afgeleide;*
- *Differensiasietegnieke;*
- *Verdere funksies (eksponensieel, logaritmies, trigonometries);*
- *Toepassings van die afgeleide;*
- *Die konsep van integrasie, interpretasie daarvan, en basiese eienskappe en basiese integrasiereëls.*

Alle onderwerpe word in die konteks van toepassings bestudeer.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS115	**Semester: 1**	**NQF-Level: 5**

Pre-Calculus for Science I

Module outcomes:

After completing this module, the learner should demonstrate:

- Knowledge (on an introductory level) of real number systems, exponents and radicals, algebraic expressions, rational expressions, equations and inequalities;
- Domain specific knowledge and skills to perform basic arithmetic operations and to manipulate functions, graph of functions, average rate of change, maxima and minima, one-to-one functions and compute inverse of functions;
- Basic knowledge and informed understanding of the properties of polynomial and rational functions;
- Basic knowledge of the algebra of complex numbers;
- The ability to select and apply applicable mathematical concepts, procedures, rules, principles, methods and formulae to solve problems. The ability to select and apply applicable mathematical concepts, procedures, rules, principles, methods and formulae to solve problems.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

MTHS119	**Semester: 1**	**NQF-Level: 5**

Pre-Calculus for Commerce I

Module outcomes:

After completing this module, the learner should:

- Demonstrate knowledge (on an introductory level) of number systems and exponential laws;
- Perform basic arithmetic operations and simplifications, solve simple equations and inequalities, solve quadratic equations, convert currencies and calculate percentages;
- Identify straight lines, formulate linear functions as simple models, apply these models to represent demand, supply, cost and revenue functions and interpret the models of these functions;
- Solve and apply linear simultaneous equations in two variables and inequalities algebraically and graphically.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS121 / MTHS172	**Semester 2**	**NQF Level: 5**
Introductory Algebra and Calculus II/ ***Inleidende Algebra en Calculus II***		

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Fundamental knowledge of vectors in three dimensional space, their properties and applications, permutation, combinations, the Binomial theorem, introduction to linear algebra and its applications to systems of linear equations, the use of derivatives in optimisation and curve sketching, Taylor series including the basic theorems on the convergence of series, the fundamental theorems of differential and integral calculus, Riemann sums, the basic properties and applications of the definite integral, advanced integral techniques (including rational functions and partial fractions), hyperbolic and inverse hyperbolic functions, and applications of integration to surfaces, lengths and volumes;
- Problem solving skills to describe three dimensional spaces, to calculate dot, cross and triple products and use it to solve a variety of problems, decompose rational functions into partial fractions, determine the number of arrangements and selections from a set, do binomial expansions, solving systems of linear equations with Gauss-reduction, manipulating matrices, sketch functions, formulate optimisation problems mathematically and use knowledge of derivatives to solve them, calculate Taylor series and judge its convergence, determine Riemann sums, determine definite integrals, and calculate surfaces, lengths and volumes. /

Module-uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Fundamentele kennis van vektore in die driedimensionele ruimte, hul eienskappe en gebruike, permutasies, kombinasies, die binomiaalstelling, inleiding tot lineêre algebra en toepassing op stelsels lineêre vergelykings, die gebruik van afgeleides in optimalisering en kromme sketsing, Taylor-reekse insluitend die basiese stellings oor die konvergensie van reekse, die fundamentele stellings van differensiaal- en integraalrekene, Riemann somme, die bepaalde integraal se basiese eienskappe en gebruike, gevorderde integrasietegnieke (insluitend rasionale funksies en parsiële breuke), hiperboliese en inverse hiperboliese funksies, en toepassings van integrasie op oppervlaktes, lengtes en volumes;*
- *Probleemoplossingsvaardighede om drie-dimensionele ruimtes te beskryf, punt-, kruis- en trippelprodukte te bereken en gebruik om ’n verskeidenheid van probleme op te los, rasionale funksies in parsiële breuke te ontbind, die aantal rangskikkings en keuses uit ’n versameling te bepaal, binomiaaluitbreidings te doen, oplos van stelsels lineêre vergelykings met Gauss-reduksie, manipulasie*

van matrikse, funksies te skets, optimeringsprobleme in 'n wiskundige formulering te giet en die kennis van afgeleides gebruik om dit op te los, Taylor-reekse te bereken en die konvergensie daarvan te beoordeel, Riemann somme te bepaal, bepaalde integrale te bepaal, en oppervlaktes, lengtes en volumes te bereken.

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS124 / MTHS174	**Semester 2**	**NQF Level: 5**

Applied Calculus II/

Toegepaste Calculus II

Module outcomes:

Students will not be credited for more than one of MTHS121 and MTHS124. MTHS124 is intended for students who require mathematics at first year level only, and does not lead to admission to any second year mathematics or applied mathematics module.

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the basic principles,

and the application of the theory regarding selected aspects of the following topics:

- Anti-derivatives and integration techniques;
- Applications of the integral;
- Introduction to functions of several variables (understanding two-variable functions, partial derivatives, basic optimisation);
- Review of trigonometric functions; differentiation and integration rules;
- Modelling with differential equations: introductory concepts;
- Introduction to series and their applications;
- Introduction to the basic concepts of elementary probability.
- All topics are studied in the context of applications. /

Module uitkomste:

Studente sal nie met meer as een van MTHS121 en MTHS124 gekrediteer word nie. MTHS124 is bedoel vir studente wat wiskunde slegs op eerstejaar vlak nodig het, en gee geensins toegang tot enige tweedejaar Wiskunde of Toegepaste Wiskunde modules nie.

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die basiese beginsels,

en die toepassing van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Anti-afgeleides en integrasie tegnieke;*
- *Toepassings van die integraal;*
- *Inleiding tot meerveranderlike funksies (verstaan van twee-veranderlike funksies, parsiële afgeleides, basiese optimering);*
- *Oorsig oor trigonometriese funksies; differensiasie en integrasiereëls;*
- *Modellering met differensiaalvergelykings: inleidende konsepte;*
- *Inleiding tot reekse en toepassings;*
- *Inleiding tot die basiese konsepte van elementêre waarskynlikheid.*
- *Alle onderwerpe word in die konteks van toepassings bestudeer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS125	**Semester: 2**	**NQF-Level: 5**

Pre-Calculus for Science II

Module outcomes:

After completing this module, the learner should demonstrate:

- Domain specific knowledge and understanding of exponential and logarithmic functions;
- Knowledge and skills to manipulate trigonometric identities, equations, functions and angles;
- Understanding and skills to manipulate equations and functions in polar coordinates;
- Basic knowledge and skills to manipulate and solve algebraic equations;
- Basic knowledge of calculus (limit of functions, tangent lines and derivatives);
- The ability to select and apply applicable mathematical concepts, procedures, rules, principles, methods and formulae to solve problems.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

MTHS129	**Semester: 2**	**NQF Level: 5**

Pre-Calculus for Commerce II

Module Outcomes:

After completing this module, the learner should:

- Demonstrate knowledge (on an introductory level) of functions, exponential laws, logarithmic laws and limit laws;
- Recognize the general form of equations representing quadratic, exponential and logarithmic functions as well as their graphs;
- Apply and demonstrate mathematical concepts and properties to exponential equations and logarithmic equations;
- Demonstrate knowledge on the rate of change of functions;
- Determine the slope of a curve and the derivatives of a range of functions;
- Apply differentiation to determine various marginal functions and average functions;
- Apply differentiation principles to graph polynomials;
- Identify arithmetic- and geometric sequences and series, solve problems based on these sequences, series and applications;
- Calculate present and future values based on simple and compound interest;
- Calculate depreciation, annuities and debt repayments.

Method of delivery: Full Time

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions.

MTHS175	Year Module	NQF Level: 5
Foundation Mathematics II (LLB extended programme)		

After the successful completion of this module, the student must be able to demonstrate the following:

- Demonstrate knowledge (on an introductory level) of number systems and exponential laws;
- Perform basic arithmetic operations and simplications, solve simple equations and inequalities, solve quadratic equations, convert currencies and calculate percentages;
- Identify straight lines, formulate linear functions as simple models, apply these models to represent demand, supply, cost and revenue functions and interpret the models of these functions;
- Demonstrate basic knowledge on descriptive statistics (range, standard deviation, coefficient of variation, mean, median and mode, frequency tables, box-and-whisker plots, cumulative percentage, frequency curves);
- Demonstrate basic knowledge on probability theory (sample, events, random or unpredictable phenomena, conditional probability, contingency tables and a few applications of probability theory).
- The learner should attain the following critical outcomes:
- Factual knowledge and understanding that problem-solving does not exist in isolation,
- Skills and abilities (critically and creatively identify and solve problems,
- Integrate and evaluate knowledge, be accurate),
- O values (pursuing of excellence, dedication and integrity).

Method of delivery: Full Time

Assessment modes:

MTHS211	Semester 1	NQF Level: 6
Multivariable Calculus I/ ***Meerveranderlike Calculus I***		

Module outcomes:

On completing this module, students should be able to do the following:

- Demonstrate a thorough knowledge and insight into all the aspects of the differential calculus of multivariate functions: partial and directional derivatives, the gradient function, optimisation problems, including Lagrange's method, directional derivatives and gradients, and double and triple integrals.
- Demonstrate problem solving skills by analysing familiar and unfamiliar problems, using knowledge of techniques to solve practical problems modelled with multivariate functions.
- Students should demonstrate the ability to use the geometric and physical meaning of the above-mentioned concepts describe the underlying mathematical structure of applied problems and to interpret the significance of the mathematical solutions. /

Module uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Grondige kennis en begrip demonstreer in al die aspekte van differensiaalrekening van meerveranderlike funksies: parsiële- en rigtingafgeleides, die gradiëntfunksie; optimeringsprobleme insluitende Lagrange se metode, rigtingsafgeleides en gradiënte, asook berekening van dubbel- en drievoudige-integrale.*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende probleme analiseer, kennis van tegnieke gebruik om praktiese probleme wat deur meer veranderlike funksies gemodelleer word, op te los.*
- *Die meetkundige en fisiese betekenis van die bogenoemde konsepte gebruik om die onderliggende wiskundige struktuur van toegepaste probleme te kan formuleer, en die betekenis van die wiskundige oplossing kan interpreteer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS212	**Semester 1**	**NQF Level: 6**

Linear Algebra I/

Lineêre Algebra I

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Systems of linear equations and their solution(s), including geometrical interpretations where applicable;
- Matrices and their operations, including inverses of matrices;
- The vector spaces R^n and subspaces, including the column space and zero space of a matrix, linear dependence and independence, bases, dimension and the rank and nullity of a matrix;
- Linear transformations, including geometrical interpretations in two dimensions;
- Determinants with applications such as Cramer's rule, the area of a parallelogram and volume of a parallelepiped;
- Eigenvalues and eigenvectors of matrices.
- Applications to systems of linear differential equations. /

Module uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Stelsels lineêre vergelykings en hulle oplossing(s), insluitend meetkundige interpretasies waar toepaslik;*
- *Matrikse en hulle bewerkings, insluitende inverses van matrikse;*
- *Die vektorruimtes R^n en deelruimtes, insluitend die kolomruimte en nulruimte van 'n matriks, lineêr afhanklikheid en onafhanklikheid, basisse, dimensie en die rang en kerndimensie (nulheidsgraad) van 'n matriks;*
- *Lineêre transformasies, insluitend meetkundige interpretasies in twee dimensies;*

- *Determinante met toepassings soos Cramer se reël, die oppervlakte van ŉ parallelogram en die volume van ŉ parallelepipedum;*
- *Eiewaardes en eievektore van matrikse.*
- *Toepassings op stelsels lineêre differensiaalvergelykings.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS221	**Semester: 2**	**NQF-Level: 6**

Multivariable Calculus II/

Meerveranderlike Calculus II

Module outcomes:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Functions from R^n to R^m (vector fields), the differentiation of and chain rule for such functions, Taylor's theorem, line integrals and the Fundamental Theorem of line integrals, Green's theorem, oriented surfaces and surface integrals, rotation and divergence, the theorems of Stokes and Gauss.
- Convergence criteria for sequences of real numbers (monotone convergence, Cauchy sequences, limsup = liminf), description of topological aspects in terms of sequences (Bolzano-Weierstrass property for sequences, limits and continuity of functions, properties of continuous functions).
- Convergence of series, standard convergence tests, absolute and conditional convergence, power series and convergence intervals for power series, power series representations of functions, differentiation and integration of power series, Taylor and Maclaurin series (approximating functions with polynomials).

Module uitkomste:

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Funksies van R^n na R^m (vektorvelde), die differensiasie van en kettingreël vir sulke funksies, Taylor se stelling, lynintegrale en die Grondstelling van lynintegrale, Green se stelling, gerigte oppervlakke en oppervlakintegrale, rotasie en divergensie, die stellings van Stokes en Gauss.*

- *Konvergensie kriteriums vir rye reële getalle (monotone konvergensie, Cauchy rye, limsup = liminf), beskrywing van topologiese aspekte in terme van rye (Bolzano-Weierstrass eienskap vir rye, limiete en kontinuïteit van funksies, eienskappe van kontinue funksies).*
- *Konvergensie van reekse, standaard konvergensie toetse, absolute en voorwaardelike konvergensie, magreekse en konvergensieintervalle vir magreekse, magreeks voorstellinge van funksies, differensiasie en integrasie van magreekse, Taylor- en Macluarin reekse (benadering van funksies met polinome).*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS222	**Semester 2**	**NQF-Level: 6**

Linear Algebra II/

Lineêre Algebra II

Module outcomes*:*

On completion of this module the student should:

- Demonstrate a thorough knowledge of and insight into general vector spaces and bases; inner products; vector norms; linear transformations, the use of eigenvalues and eigenvectors, diagonalization and the advanced skill to apply vector norms, orthogonalisation, symmetric matrices, quadratic forms, and matrix factorisations.
- Demonstrate skill in problem solving and proof techniques by analysing known and unknown problems and applications and applying the knowledge and techniques of linear algebra. /

Module uitkomste:

By voltooiing van die module, behoort studente:

- *'n Deeglike kennis te hê van en insig te toon in algemene vektorruimtes en basisse; inprodukte; vektornorme; lineêre transformasies; die gebruik van eiewaardes en eievektore; diagonalisering; vaardigheid in die toepassing van elk van vektornorme, ortogonalisering, simmetriese matrikse, kwadratiese vorme en matriks faktoriserings.*
- *Vaardigheid in probleemoplossing en bewystegnieke te toon deur bekende en onbekende probleme en toepassings te ontleed en die kennis en tegnieke van lineêre algebra toe te pas.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS223	**Semester 2**	**NQF Level: 6**

Engineering Analysis/

Ingenieursanalise

Module outcomes:

On completing this module, students should be able to demonstrate advanced knowledge of and insight into the application of:

- Vector fields, line integrals and the Fundamental Theorem of line integrals, Green's theorem, oriented surfaces and surface integrals, curl and divergence, the theorems of Stokes and Gauss.
- Convergence criteria for sequences of real numbers and the monotone convergence principle, Convergence of series, standard convergence tests, absolute and conditional convergence, introduction to power series, Taylor's theorem.
- Definition of derivatives and contour integrals of complex functions, Laurent's theorem (as an extension of Taylor's theorem), algebraic manipulation of Laurent series, formal definition of the Z-transform and basic rules for Z-transforms, partial fraction method for computing inverse transforms, applications to difference equations. /

Module uitkomste:

By voltooiing van die module, behoort studente gevorderde kennis en insig in die toepassing van die onderstaande kan demonstreer:

- *Vektorvelde, lynintegrale en die Grondstelling van lynintegrale, Green se stelling, gerigte oppervlakke en oppervlakintegrale, rotasie en divergensie, die stellings van Stokes en Gauss.*
- *Konvergensie kriteriums vir rye reële getalle en die monotoon konvergensiebeginsel, konvergensie van reekse, standaard konvergensie toetse, absolute en voorwaardelike konvergensie, inleiding tot magreekse, Taylor se stelling.*
- *Definisie van afgeleides en kontoerintegrale van komplekse funksies, Laurent se stelling (as 'n uitbreiding van Taylor se stelling), algebraïese manipulasie van Laurent reekse, formele definisie van die" Z-transforms" en basiese reëls vir Z-transforms, die parsiële breuke metode om inverse transforms te bereken, toepassings op verskilvergelykings.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS224	**Semester 2**	**NQF Level: 6**

Applied Linear Algebra/

Toegepaste Lineêre Algebra

Module outcomes*:*

On completion of this module the student should:

- Demonstrate advanced knowledge of and insight into bases and linear independence of functions, and be able to use it in applications;
- Be able to use concepts like eigenvalues and eigenvectors in applications such as diagonalization, discrete dynamical systems and systems of linear differential equations;
- Be able to use the concepts of inner product, length and orthogonality to find orthogonal bases and master their applications such as for example the least squares method and linear models; symmetric matrices and further applications;
- Demonstrate problem-solving skills by analysing known and unknown problems and applications and applying the knowledge and techniques of linear algebra.
- Be able to do different matrix decompositions of matrices and know where and how it is applicable in applications. /

Module uitkomste:

By voltooiing van die module, behoort studente:

- *'n Deeglike kennis van en insig te toon in basisse en lineêr onafhanklikheid van funksies en in staat wees om dit in toepassings te gebruik;*
- *In staat te wees om begrippe soos eiewaardes en eievektore in toepassings soos diagonalisering, diskrete dinamiese stelsels en stelsels lineêre differensiaalvergelykings te gebruik;*
- *In staat wees om die begrippe van inproduk, lengte en ortogonaliteit te gebruik om ortogonale basisse te vind en hulle toepassings te bemeester, soos byvoorbeeld die kleinste-kwadrate-metode en lineêre modelle, simmetriese matrikse en verdere toepassings;*
- *Probleemoplossingsvaardighede te demonstreer deur bekende en onbekende probleme en toepassings te ontleed en die kennis en tegnieke van lineêre algebra te gebruik.*
- *In staat wees om verskillende matriks ontbindings te doen en te weet hoe en waar dit van toepassing is.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS225	**Semester 2**	**NQF Level: 6**

Discrete Mathematics/

Diskrete Wiskunde

Module outcomes:

On completing this module, students should demonstrate an advanced knowledge and applied insight into:

- Propositional- and predicate logic and logical argumentation, also in practical situations;
- General proof techniques, including direct and indirect arguments and counter examples;
- Basic notation and the properties of set theory and Boolean algebras;
- Calculation of probabilities by means of basic counting techniques;
- Properties of mathematical functions and the pigeonhole principle;
- Introductory graph theory;
- The correct programming of mathematical concepts. /

***Module uitkomste*:**

By voltooiing van die module, behoort studente gevorderde kennis en toepasbare insig kan demonstreer rakende:

- *Proposisionele- en predikaatlogika en logiese argumentering, ook in praktiese situasies;*
- *Algemene bewystegnieke, insluitende direkte en indirekte argumente asook teenvoorbeelde;*
- *Basiese notasie en die eienskappe van versamelingsteorie en Boole algebra;*
- *Die berekening van waarskynlikhede deur gebruik te maak van basiese teltegnieke;*
- *Eienskappe van wiskundige funksies en die vakkiebeginsel;*
- *Inleidende grafiekteorie;*
- *Die korrekte programmering van wiskundige konsepte.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS311	**Semester: 1**	**NQF-Level: 7**

Real Analysis/

Reële Analise

Module outcomes:

After the completion of this module the students should be able to do the following:

- Demonstrate a fundamental knowledge of the theory of real numbers; the topology of finite dimensional vector spaces; compactness and connectedness; continuous and uniformly continuous functions; continuous images of compact and connected sets; convergence and uniform convergence of sequences of functions; Riemann- integration; differentiation of vector functions of several variables revisited; the principle of nested sets and the Heine-Borel theorem; inequalities of Cauchy-Schwarz, Hölder and Minkowski; introduction to the theory of metric spaces;
- Demonstrate the ability to solve problems in the area of real analysis; be able to test functions for their continuity and differentiability, be able to solve problems in integration and differentiation theory, able to see how real analytic concepts and theory extend to the metric space context. /

Module uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Fundamentele kennis demonstreer van die teorie van reële getalle; die topologie van eindig dimensionele vektorruimtes; kompaktheid en samehangendheid van versamelings; kontinue en gelykmatig kontinue funksies; kontinue beelde van kompakte en samehangende versamelings; konvergensie en gelykmatige konvergensie van rye funksies; Riemann- integrasie; differensiasie van meerveranderlike vektorfunksies herbesoek; die beginsel van geneste versamelings en die Heine-Borel stelling; ongelykhede van Cauchy-Schwarz, Hölder en Minkowski; inleiding tot die teorie van metriese ruimtes;*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende analise-probleme te analiseer, funksies te toets vir kontinuïteit, probleme uit integrasie en differensiasieteorie op te los, in staat om te sien hoe reële analitiese konsepte en teorieë na die metriese ruimtes konteks uitbrei.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS312	**Semester 1**	**NQF Level: 7**

Combinatorics/

Kombinatorika

Module outcomes:

On completing this module, students should be able to do the following:

- Demonstrate a rounded and systematic knowledge and insight into the fundamental counting principles; the binomial theorem; the pigeon hole principle; generalised permutations and arrangements; recursion relations and their solutions, and generating functions; fundamental graph theoretical concepts; partition numbers; imbedding of graphs into surfaces; concept of connectedness; Menger's theorem; independence numbers; factorisation; Hamilton cycles and Eulerian revolutions; colouring of graphs;
- Demonstrate problem solving skills by interpreting familiar and unfamiliar combinatorial problems and using known techniques to solve them; by formulating problems in terms of graphs; by applying and calculating generating functions; by recognising classical discrete probability problems and solving them; by understanding the arguments and their motivations in proving of theorems and being able to give own formulations of them, and applying these results to solve concrete or abstract problems./

Module uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen:

- *Afgeronde en sistematiese kennis en begrip demonstreer van grondliggende telbeginsels, die binomiaalstelling, die vakkiebeginsel, veralgemeende permutasies en rangskikkings, rekursierelasies en hulle oplossings, en voortbrengende funksies, asook van grondliggende grafiekteoretiese begrippe, partisiegetalle, inbeddings van grafieke in oppervlakke, begrippe van samehang, Menger se stelling, onafhanklikheidsgetalle, faktoriserings, Hamiltonsiklusse en Eulertoere, en kleurings van grafieke;*
- *Probleemoplossingsvaardighede demonstreer deur bekende en onbekende kombinatoriese probleme te interpreteer en met behulp van die bekende tegnieke op te los, probleme in terme van grafieke te formuleer, voortbrengende funksies toe te pas en te bereken, probleme in klassieke diskrete waarskynlikheid herken en oplos, die argumente en motiverings in die bewyse van stellings te verstaan en in eie formulerings te kan weergee, en hierdie resultate toe te pas om konkrete of abstrakte probleme op te los.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS321	**Semester 1**	**NQF Level: 7**

Complex Analysis/

Komplekse Analise

Module outcomes:

After completion of this module students ought to be able to do the following:

- Be able to define and determine the derivatives of complex and vector functions, demonstrate knowledge of the concept of differentiability and analyticity and be familiar with its use, demonstrate knowledge of the concept of a line integral and complex contour integral, be familiar with the theorems of Cauchy and their application in computing complex contour integrals.
- Be familiar with diverse consequences of Cauchy's theorem and their application, demonstrate knowledge of the theorems of Taylor and Laurent and their applications, demonstrate knowledge of singular points and residues of complex functions, be familiar with the description of singular points and the computation of residues, be familiar with Cauchy's Residue theorem and its use.
- Be able to solve several improper integrals and other important real integrals by means residue theory and be able to calculate the maxima and minima of complex functions, be able to apply these theorems in other areas. /

Module uitkomste:

Na voltooiing van hierdie module behoort die studente die volgende te kan doen

- *Die afgeleide van komplekse- asook vektorfunksies van meer veranderlike funksies kan definieer en bepaal, kennis demonstreer van die begrippe differensieerbaar en analities en vertroud wees met die gebruike daarvan, kennis demonstreer van die begrip van 'n lynintegraal en komplekse kontoerintegraal, vertroud wees met die stellings van Cauchy en die gebruik daarvan in die berekening van kontoerintegrale.*
- *Vertroud wees met diverse gevolge van Cauchy se stelling en die toepassing daarvan, kennis demonstreer oor die stellings van Taylor en Laurent en die gebruike daarvan, kennis demonstreer oor singuliere punte en residu van komplekse funksies, vertroud wees met die beskrywing van singuliere punte en berekening van residu, vertroud wees met Cauchy se residustelling en die gebruik daarvan.*
- *Verskeie oneintlike integrale en ander belangrike integrale kan oplos met behulp van residurekening, die maksima en minima van komplekse funksies kan bereken, en kan toepas in ander gebiede.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

MTHS322	**Semester 2**	**NQF Level: 7**

Algebraic Structures/

Algebraïese Strukture

Module outcome:

On completion of this module, the student will demonstrate a thorough and advanced knowledge of, and skill in the underlying principles, the methods, and the application of the theory regarding selected aspects of the following topics:

- Group theory, including the definition, elementary properties, subgroups, permutation groups, in particular of a finite set, isomorphism's, homomorphism's, the concept of order of an element, cyclic groups, normal subgroups, cosets and quotient groups;
- Ring theory, including the definition, elementary properties, subrings, ideals, isomorphism's and homomorphism's, quotient rings, examples of special rings such as commutative rings, integral domains and fields;
- The integers, its ideals, prime factorisation, division algorithm;
- The integers modulo n, its invertible elements and application in codes such as product or ISBN codes (self-study)
- Polynomial rings, factorisation of polynomials over a field in general and more specifically over the known number systems. /

***Module uitkomstes*:**

Na voltooiing van die module, sal die student 'n deeglike en geordende kennis van, en vaardigheid in die onderliggende beginsels, die metodes, en die toepassings van die teorie rakende geselekteerde aspekte van die volgende onderwerpe demonstreer:

- *Groepteorie, insluitend die definisie, elementêre eienskappe, ondergroepe, permutasiegroepe, in besonder van 'n eindige versameling, isomorfismes, homomorfismes, die konsep van die orde van 'n element, sikliese groepe, normale ondergroepe, neweklasse en faktorgroepe;*
- *Ringteorie, insluitend die definisie, elementêre eienskappe, deel ringe, ideale, isomorfismes en homomorfismes, faktorringe, voorbeelde van spesiale ringe soos kommutatiewe ringe, integriteitsgebiede en liggame;*
- *Die heelgetalle, sy ideale, priemfaktorisering, delingsalgoritme;*
- *Die heelgetalle modulus 'n, sy omkeerbare elemente en toepassing in kodes soos produk- of ISBN-kodes (selfstudie);*
- *Polinoomringe, faktorisering van polinome oor 'n liggaam in die algemeen en meer spesifiek oor die bekende getalstelsels.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

Formative assessment:

Assignments, formal tests and class tests, homework, and projects that integrate the various outcomes of the module.

Summative assessment:

A written examination integrating the various aspects of the module wherein the extent to which students have attained the outcomes of the module will be assessed by means of both applied and theoretical questions. /

Assesseringsmetodes:

Formatiewe assessering:

Opdragte, formele toetse en klastoetse, huiswerk, en projekte wat die verskillende uitkomstes van die module integreer.

Summatiewe assessering:

'n Geskrewe eksamen waarin die verskillende aspekte van die module geïntegreer word, waarin die mate waarin studente die uitkomste van die module bereik het, deur middel van beide toegepaste en teoretiese vrae geassesseer word.

NAS.2.9.22 UNDERSTANDING THE ECONOMIC AND NATURAL WORLDS/ *VERSTAAN DIE EKONOMIESE EN NATUURLIKE WÊRELD*

WVES222	Semester 2	NQF Level: 6
Understanding the Economic World/ ***Verstaan die Ekonomiese Wêreld***		

Module outcomes:

Students should be able to:

- Have a fundamental knowledge base of a selection of world views and ideologies;
- Demonstrate their critical understanding through an ability to compare the nature and function, as well as different contemporary manifestations of these world views and ideologies;
- Have the ability to understand the interrelatedness of phenomena such as occurs in natural and social systems, and from this vantage point, analyse and evaluate real life problems or case studies based on core issues of our time, such as poverty, constant change, human rights, HIV-aids, power abuse, corruption, racism, xenophobia, etc.;
- Articulate their personal world view and use it as a point of departure for arguing and communicating feasible solutions to core issues and problems of our time in a typical academic manner. /

Module uitkomste:

Studente moet in staat wees om:

- *'n Grondige kennisbasis te hê van 'n verskeidenheid wêreldbeskouings en ideologië;*
- *Sy/haar kritiese verstaan daarvan te demonstreer deur die aard en funksie, sowel as die verskillende moderne/kontemporêre manifestasies van die wêrelbeskouings en ideologië te vergelyk;*
- *Die verbande van fenomene soos dit in die natuurlike en sosiale sisteme voorkom te verstaan en vanuit sy/haar vertrekpunt, werklike lewensvraagstukke of gevalle studies te analiseer en evalueer, gebasseer op kernvraagstukke van ons tyd, soos armoede, voortdurende verandering, menseregte, hiv-vigs, magsmisbruik, korrupsie, rassisme, rassehaat, ens.;*
- *Sy/haar persoonlike wêreldbeskouing te kan oordra en dit te gebruik as 'n vertrekpunt om werkbare oplossings vir kernvraagstukke en probleme van ons tyd, op 'n tipies akademiese wyse te kan argumenteer en kommunikeer.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of the NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed. The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final examination mark (50%)

The examination subminimum requirement is 40%.

WVES312	**Semester 1**	**NQF Level: 7**

Business Ethics/
Bedryfsetiek

Module outcomes:

Students should be able to:

- Possess knowledge of:
  - selected ethical theories;
  - moral decision-making strategies;
  - selected socio-economic ethical issues;
  - selected issues and approaches with regard to business ethics;
  - the nature of organizations and management from an ethical perspective;
- Possess the ability and skills to apply the above knowledge to case studies;
- Possess the ability and skills to analyse and evaluate the abovementioned theories and issues from different philosophical and ideological perspectives. /

Module uitkomste:

Studente moet in staat wees om:

- *Kennis te dra van:*
  - *geselekteerde etiese teorieë;*
  - *strategieë vir morele besluitneming;*
  - *geselekteerde sosio-ekonomiese etiese kwessies;*
  - *geselekteerde kwessies en benaderings in besigheidsetiek; en*
  - *die aard van organisasies en van bestuur vanuit 'n etiese perspektief.*
- *Oor die vermoë en vaardighede te beskik om bogenoemde kennis toe te pas op gevallestudies;*
- *Die bogenoemde teorieë en kwessies te kan analiseer en evalueer vanuit verskillende filosofiese en/of ideologiese perspektiewe.*

Method of delivery: Full Time

Metode van aflewering: *Voltyds*

Assessment modes:

The participation mark is calculated using formal formative assessment activities that could include, but might not be limited to the following:

Class tests, principle tests, assignments, e-assignments/quizzes (utilising the e-learning platform of the NWU) and scheduled tests.

The weightings will be communicated to students in a module overview document.

A participation mark of 40% allows a student admission to the final examination (summative assessment).

Additional proof of participation requirements may also be set out in the module study guide, which must also be satisfied before examination admission is allowed. The final module mark is calculated using the following weightings:

- Participation mark (50%)
- Final examination mark (50%)

The examination subminimum requirement is 40%.

WVNS211	Semester 1	NQF Level: 6

Understanding the Natural World/
Verstaan die Natuurlike Wêreld

This module will, upon its successful completion, serve as a fundamental source of knowledge for students regarding the nature and function of worldviews and ideologies as these have developed historically from science, from the ancient to the postmodern era.

Student will also understand the relationship between norms and science, the influence of science and technology on the spiritual, cultural and material worldview of mankind, its community and environment.

Students must be able to understand, discuss and explain key concepts regarding the development of science in the context of value systems as they function in their worldview

Module outcomes:

Students should be able to:

- Develop a knowledge base consisting of a selection of world pictures/views and ideologies and be able to demonstrate their critical understanding thereof in the light of an ability to set out, analyse and evaluate the nature, function and various contemporary manifestations thereof;
- Demonstrate and make allowance for the influence of various world pictures/views on the scientific and technological development in their own forming of paradigm;
- Understand the interrelationship between scientific and social phenomena and to analyse and evaluate from this paradigm contemporary problems and to offer appropriate solution;
- Articulate and defend their personal world picture/view while using this as a point of departure in a quest for effective solutions for the major problems of our time. /

Hierdie module sal, ná die suksesvolle voltooiing daarvan, vir die student as fundamentele kennisbron dien van die aard en funksie van wêreldbeskouings en ideologieë soos dit geskiedkundig uit die wetenskap ontwikkel het van die antieke tot die postmoderne era.

Die student sal ook die verhouding tussen norme en wetenskap, die invloed van wetenskap en tegnologie op die geestelike, kulturele en materiële wêreldbeskouing van die mens, sy gemeenskap en omgewing, verstaan.

Die student moet kernbegrippe rondom die ontwikkeling van die wetenskap in die konteks van waardesisteme, soos dit in hulle wêreldbeskouing funksioneer, kan verstaan en bespreek en verduidelik.

Module uitkomste:

Studente moet in staat wees om:

- *Kennisbasis van 'n seleksie van wêreldbeelde en ideologieë sal ontwikkel en hul kritiese begrip daarvan sal kan demonstreer aan die hand van 'n vermoë om die aard, funksie en verskillende kontemporêre manifestasies daarvan te kan weergee, analiseer en evalueer;*
- *Die invloed van verskillende wêreldbeelde op die natuurwetenskaplike en tegnologiese ontwikkeling sal kan demonstreer en verdiskonteer in hul eie paradigmavorming;*
- *Die interverwantskap van natuurwetenskaplike en sosiale fenomene te verstaan, en vanuit hierdie paradigma hedendaagse probleme te analiseer, te evalueer en oplossings aan te bied;*
- *Hul persoonlike wêreldbeeld te artikuleer en te verdedig, en dit as vertrekpunt te gebruik in 'n soeke na effektiewe oplossings vir die hoof-probleme van ons tyd.*

Method of delivery:

Flipped classroom approach (blended learning) with on-campus students attending classes and off-campus students being engaged via the internet (eFundi).

Metode van aflewering:

Omgekeerde klaskamerbenadering (gemengde leer) met kampusstudente wat lesings bywoon en afkampusstudente wat via die internet (eFundi) betrek word.

Assessment modes:

Process assessment is done by 11 online preparatory tests (eFundi) as well as 3 written assignments.

Summative assessment includes a semester assignment on the scientific method, as well as an exam project in the form of a written research paper on a relevant topic which requires students to apply all knowledge gained during the semester.

The traditional semester test and exam paper are replaced by the semester assignment and the exam project./

Assesseringsmetodes:

Proses assessering geskied dmv 11 voorbereidende toetse of eFundi sowel as 3 geskrewe werksopdragte.

Summatiewe assessering geskied deur 'n semester referaat oor die wetenskaplike navorsingsmetode (wat die tradisionele semestertoets vervang) sowel as 'n geskrewe eksamenprojek wat handel oor die toepassing van alle verworwe kennis op 'n gekose aktuele onderwerp wat jaarliks wissel.

Die eksamenprojek vervang eweneens 'n tradisionele eksamenvraestel.

WVNS221	**Semester 2**	**NQF Level: 6**
Science, Technology and Society/ ***Wetenskap, Tegnologie en Samelewing***		

Module outcomes:

Students should be able to:

- Develop the ability to identify, analyse and evaluate the reciprocal influence of world views and ideologies (society) on the development and continuation of science and technology;
- Able to demonstrate and make allowance for the influence of various world views on the natural scientific and technological development in forming their own paradigm;
- Develop the ability to understand the interrelationship of natural scientific and social phenomena and to analyse from this paradigm by means of systems thinking and an interdisciplinary approach, the ethical aspects of contemporary problems that pose a threat to sustainable development on earth;
- Write down their personal convictions regarding STS, put these into words and present it by means of a PowerPoint presentation;
- Apply scientific research methodology with integrity;
- The specific outcomes for this module (WVNS211) as expressed in the NWU yearbook/calendar are as follows:
  - on successful completion of this module, the student must be able to identify, demonstrate and critically respond to the basic issues in contemporary discussions with regard to science, technology and society, with specific reference to the scientific and technology systems in South Africa;
  - the student must also be able to identify the most important ethical issues in the subject areas of a programme and react critically to these in accordance with a value-based orientation within a specific world view;
  - students must be able to form a carefully thought-out, reasoned point of view regarding the idea of sustainable development, one including the socio-economic implications thereof;
  - students must be able to discuss perspectives with regard to different systems of thought and to look closely at contemporary issues in science and technology within a system perspective. /

Module uitkomste:

Studente moet in staat wees om:

- *Vermoë te ontwikkel om die wedersydse invloed van wêreldbeelde en ideologieë (samelewing) op die ontwikkeling en voortgang van die wetenskap en tegnologie te kan identifiseer, analiseer en evalueer;*

- *Die invloed van verskillende wêreldbeelde op die natuurwetenskaplike en tegnologiese ontwikkeling te kan demonstreer en verdiskonteer in hul eie paradigmavorming;*
- *Die interverwantskap van natuurwetenskaplike en sosiale fenomene te verstaan, en vanuit hierdie paradigma m.b.v. stelsel denke en 'n interdissiplinêre benadering die etiese aspekte hedendaagse probleme wat volhoubare ontwikkeling op aarde bedreig te analiseer, te evalueer en oplossings aan te bied;*
- *Om hul persoonlike oortuiginge oor wetenskap, tegnologie en samelewing te kan neerskryf in referaatvorm, dit te kan artikuleer en dit te kan oordra m.b.v. 'n PowerPoint aanbieding;*
- *Die wetenskaplike navorsingsmetodiek met integriteit toe te pas;*
- *Die spesifieke uitkomste van hierdie module (WVNS211), soos in die jaarboek verwoord, is soos volg:*
  - *na suksesvolle voltooiing van hierdie module, moet die student die basiese kwessies in kontemporêre gesprekke oor wetenskap, tegnologie en die gemeenskap, met spesifieke verwysing na die wetenskap- en tegnologiesisteme in SA kan identifiseer, demonstreer en krities daarop reageer;*
  - *die student moet ook van die belangrikste etiese kwessies in die onderwerpareas van 'n program kan identifiseer en krities daarop reageer volgens 'n waarde gebaseerde oriëntasie binne 'n spesifieke wêreldbeskouing;*
  - *'n deurdagte, beredeneerde standpunt oor die idee van volhoubare ontwikkeling, wat die sosio-ekonomiese implikasies daarvan insluit, moet deur die student gevorm kan word;*
  - *die student moet perspektiewe op verskillende denksisteme kan bespreek en kontemporêre kwessies in wetenskap en tegnologie moet binne 'n sisteemperspektief beskou kan word."*

Method of delivery:

Flipped classroom approach (blended learning) with on-campus students attending classes and off-campus students being engaged via the internet (e-Fundi).

Metode van aflewering:

Omgekeerde klaskamerbenadering (gemengde leer) met kampusstudente wat lesings bywoon en afkampusstudente wat via die internet (eFundi) betrek word.

Assessment modes:

Process assessment is done by 7 online revision tests (e-Fundi). Summative assessment includes an individual written semester assignment on a topic of interest which differs annually, as well as a group exam project in the form of a written research paper on a relevant topic which requires students to apply all knowledge gained during the semester, as well as a group presentation requiring every student to present a part of the presentation.

The traditional semester test and exam paper are replaced by the semester assignment and the group exam project.

***Assesseringsmetodes*:**

Prosesassessering geskied dmv 7 hersienings toetse op -eFundi. Summatiewe assessering geskied deur 'n individuele semester-referaat oor 'n geskikte aktuele onderwerp (wat die tradisionele semestertoets vervang) sowel as 'n geskrewe groeps-eksamenprojek wat handel oor die toepassing van alle verworwe kennis op 'n gekose aktuele onderwerp wat jaarliks wissel. Die groep-eksamenprojek behels ook 'n voordrag waartydens elke student die geleentheid kry om 'n deel van die voordrag aan te bied. Hierdie groepsreferaat en -voordrag vervang die tradisionele eksamenvraestel.

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