CALENDAR 2009

FACULTY OF NATURAL SCIENCES

UNDERGRADUATE

PROGRAMMES

Potchefstroom Campus

This Calendar was originally published in Afrikaans. Great care was taken during the translation into English. In the unfortunate instances where the English version may differ from the Afrikaans version, the Afrikaans version is considered to be the correct version.

Correspondence may be conducted in either Afrikaans or English.

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PLEASE MENTION YOUR UNIVERSITY NUMBER IN ALL CORRESPONDENCE

The General Academic Rules of the University, to which all students have to subject themselves and which apply to all the qualifications offered by the University, appear in a separate publication and are available on the web page.

Selection: Please take cognisance 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.

Warning against plagiarism: Assignments are individual tasks and not group activities (unless explicitly indicated as group activities). For further details see:
http://www.nwu.ac.za/beheer-bestuur/beleid-reels/index_e.html

Please note: Although the information in this Calendar has been compiled with the utmost care and accuracy, the Council and the Senate of the University accept no responsibility whatsoever for errors that may occur. Before students finally decide on the selection of modules, they must consult the class timetable. If a clash occurs in the planned selection of a student, the relevant module combination is not permitted.

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FACULTY OF NATURAL SCIENCES

OFFICIALS

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Botany
Prof. K. Kellner, Ph.D. (PU for CHE)

Computer Sciences and Information Systems
Prof. H.M. Huisman, Ph.D. (PU for CHE)

Urban and Regional Planning
Prof. C.B. Schoeman, D.Sc. (Eng.) (Century University, VSA), D.Phil. (PU for CHE)

Statistics and Operational Research
Prof. F.C. van Graan, Ph.D. (PU for CHE)

Mathematics and Applied Mathematics
Dr. M. Hitge , Ph.D. (PU for CHE).

N.1 RULES: FACULTY OF NATURAL SCIENCES

N.1.1 INTRODUCTION

N.1.1.1 Authority of the A-rules

The faculty rules that apply to the different programmes of the Faculty of Natural Sciences and are included in this Calendar of the Faculty are subject to the general academic rules of North West University, as determined by the Council of the University from time to time, and therefore the faculty rules have to be read together with the general academic rules (hence referred to as general rule(s)).

The *General Academic Rules* is found at "General"/"General Calendar/"Rules" in the WebPages of the University at http://www.nwu.ac.za. Printed copies of the rules may be consulted in the Ferdinand Postma Library and at the Director: Academic Administration.

EVALUATION OF ACADEMIC LITERACY

a) In order to evaluate their ability to function in an academic environment, all undergraduate students who register at the University for the first time must report for a compulsory skills test in academic literacy, at a time and place determined by the University. The purpose of this test is to identify students who, due to inadequate academic skills, may fail to complete their study programme within the stipulated period.

b) The test will be written in the language in which the programme is presented and for which the student has registered [Afrikaans or English]. 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.

c) Students who are regarded as borderline cases, must register for the module AGLA111 [Afrikaans] or AGLE111 [English]. These modules are not calculated in terms of curriculum credits, but the credits earned in this way are regarded as additional credits.

d) Admission to the examination for AGLA111 / AGLE111 requires a participation mark of 35%. Students who are not admitted to the examination for AGLA111 / AGLE111 or, who fail the relevant examination as well as two or more other modules, will have to be re-evaluated by the Evaluation Committee if they want to continue their studies in the following semester. In order to avoid the termination of studies, AGLA111/AGLE111 must be completed at the end of the student's second historic year, at the very latest.

e) Admission to the module AGLA121 / AGLE121, which is compulsory for all students who register at the University for the first time, requires that a student should first complete AGLA111 / AGLE111 and must obtain a mark of at least 40% for AGLA111 / AGLE111. The modules AGLA121 / AGLE121 constitute a value of 12 credits that form part of the curriculum for which the student has registered.

f) Students who failed the module AGLA111 / AGLE111, but were allowed to continue with AGLA121 / AGLE121 and who passed the examination in

this module, may have the result of AGLA111 / AGLE111 condoned by the relevant School Director to allow for a pass mark in the module.

g) Students who have already successfully completed a module [s] / course[s] equivalent to AGLA111, 121 / AGLE111, 121 at another institution and can provide proof of this qualification, may apply in writing to the Head of the Centre for Academic and Professional Language Practice for formal recognition.

N.1.2 SCHOOLS AND FOCUS AREAS IN THE FACULTY

The Faculty of Natural Sciences consists of three schools, of which each one is made up of one or more subject groups. At the head of each school is a director and he/she is assisted by the subject chairpersons, one from each of the various subject groups. The schools are responsible for teaching graduate, honours and lectured master's programmes. These schools, as well as the subjects groups that make up each school, are represented in the following table:

SCHOOL/CENTRE	SUBJECT GROUP
School of Physical and Chemical Sciences	Biochemistry Chemistry Physics Natural Science, Mathematics and Technology Education
School of Environmental Science and Development	Zoology Geography and Environmental Studies Geology Microbiology Botany Urban and Regional Planning
School of Computer, Statistical and Mathematical Sciences	Computer Science and Information Systems Statistics and Operational Research Mathematics and Applied Mathematics
Centre for Business Mathematics and Informatics	Actuarial Science Business Mathematics

Research in the Faculty is managed in research units and a research focus area. The research units and focus area are further responsible for the master's (M.Sc.) and doctorate (Ph.D.) training programmes, i.e. programmes that contain a significant research component. At the moment there are three research units, each of them connected to a programme, viz. Business Mathematics and Informatics, Environmental Sciences and Management, Space Physics, and the focus area, Chemical Resource Benefication.

N.1.2.1 QUALIFICATIONS, PROGRAMMES AND CURRICULA

Different qualifications (degrees) may be taken in the Faculty of Natural Sciences. A specific qualification may be taken in one or more programmes (the term *programme* indicates a specific field of study), and in each programme one or more curricula are available. A prospective student must therefore first decide which qualification he wants to take. For example, after a student has decided to take a B.Sc. degree he has to select a programme, for instance the chemical-physical-mathematical-computer science programme or

the biological programme, etc. If the student decides on the biological programme, he must then study the different curricula presented in this programme and finally decide on a curriculum. Information on and the rules for the different qualifications, programmes and curricula are explained in this Calendar.

N.1.2.2 Degrees

North West University is authorised to award the following degrees in graduate studies in the Faculty of Natural Sciences:

Qualification and abbreviation	**Programme/Curriculum/-a**	**Qualification/ Curriculum Code**
Baccalaureus Scientiae (B.Sc.)	Programme: Physical-Chemical, Computer and Mathematical Sciences	200117
	Chemistry-Physics-C	N101P
	Physics-Chemistry-F	N102P
	Chemistry-Computer Science	N103P
	Chemistry-Mathematics & Applied Mathematics	N104P
	Physics-Computer Science	N105P
	Physics-Statistics	N106P
	Physics-Mathematics	N107P
	Physics-Mathematics & Applied Mathematics	N108P
	Computer Science-Statistics	N109P
	Computer Science-Mathematics	N110P
	Statistics-Mathematics	N111P
	Mathematical	N112P
	Chemistry-Mathematics*	N142P
	Physics-Mathematics*	N143P
	Physics-Chemistry*	N144P
Baccalaureus Scientiae (B.Sc.)	Programme: Environmental and Biological Sciences	200118
	Zoology-Biochemistry	N113P
	Zoology-Chemistry*	N114P
	Zoology-Geography	N115P
	Zoology-Microbiology	N116P
	Zoology-Botany*	N117P
	Zoology-Computer Science	N118P
	Geography-Botany	N119P
	Geography-Computer Science	N120P
	Geology-Geography	N147P
	Geology-Botany	N148P
	Microbiology-Biochemistry	N121P ##
	Microbiology-Chemistry	N122P
	Microbiology-Botany	N123P
	Botany-Biochemistry	N124P

Qualification and abbreviation	Programme/Curriculum/-a	Qualification/ Curriculum Code
	Botany-Chemistry*	N125P
The attention of prospective students is also drawn to the curricula of the Faculty of Health Sciences below. For full information on these curricula consult the Calendar of the Faculty of Health Sciences.		
	Biochemistry-Physiology	G341P
	Chemistry-Physiology	G342P
	Zoology-Physiology	G343P
	Microbiology-Physiology	G344P
Baccalaureus Scientiae (B.Sc.)	Programme: Tourism	200119
	Tourism-Botany with Geography modules	N126P
	Tourism-Botany with Zoology modules*	N127P
	Tourism-Zoology with Botany modules*	N128P
	Tourism-Geography with Botany modules*	N129P
	Tourism-Geography with Zoology modules	N145P
Baccalaureus Scientiae (B.Sc.)	Programme: Chemical-Biological	200120
	Chemistry-Biochemistry A	N130P ##
	Chemistry-Biochemistry B	N131P ##
Baccalaureus Scientiae (B.Sc.)	Programme: Computer, Economic and Mathematical Sciences	200121
	Computer Science-Economics	N132P
	Mathematics-Economics	N133P
Baccalaureus Scientiae (B.Sc.)	Programme: Business Economics and Informatics	200122
	Quantitative Risk Management (B)	N134P
	Financial Mathematics (M)	N135P
	Data Mining (I)	N136P
Baccalaureus Scientiae (B.Sc.)	Programme: Actuarial Science	200123
	Actuarial Science	N137P
Baccalaureus Scientiae in Information Technology (B.Sc.IT)	Programme: Information Technology	264100
	Information Technology	N138P
Baccalaureus Scientiae (Industrial Science) B.Sc.(Ind.Sc.)	Programme: Chemical-Technological	265100
	Chemistry-Chemical Engineering	N139P
Baccalaureus Artium et Scientiae (B.Art. et Scien.)	Programme: Urban and Regional Planning	118101

Qualification and abbreviation	Programme/Curriculum/-a	Qualification/ Curriculum Code
	With Geography and Environmental Studies	N140P
	With Economics	N141P

*These curricula give entrance to the Postgraduate Certificate of Education (PGCE)

These curricula grant admission to Hons.B.Sc. (Full-time) in Biochemistry. After this qualification has been taken the successful student may apply to be registered as a Medical Scientist.

N.1.3 MODULES AND CREDITS

Subjects are presented in modules of which everyone is awarded a specific credit value. Each module must be passed individually (general rule A.1.29).

Each module has a code and a descriptive name, for example FSKN111. The meaning of the digital codes of these names is explained in general rule A.1.38.

Each module is classified according to its level of advance, which may also be relevant to the study year in which the module is taken, provided the curriculum is completed in the minimum period of study.

In the description of each qualification and programme a number of possible curricula from which the student must select one are described and an explanation is given of the manner in which the modules of each curriculum are divided into the different semesters of each study year. The curricula are compiled for the minimum study period of three or four years, as applicable to the relevant qualification. A student may apply to distribute the modules of a curriculum over a longer period. Exceeding the maximum study period of a curriculum as a result of the student not progressing satisfactorily will only be granted in exceptional cases.

The order in which modules are taken in a curriculum is not voluntary, but has been designed to ensure that ensuing learning will always be built on prior learning.

N.1.4 LIST OF PROGRAMME MODULES

The list of modules, from which the curricula for all the programmes in this Calendar are compiled, as well as the credit value of each module, is found in the table below. The details of the assumed learning required by each module (see A.1.59) are indicated in the right hand column.

These requirements must be interpreted as follows:

a) When a first semester module of a specific year level is the assumed learning requirement of a second semester module at the same year level, it means that the learner must already have achieved a module mark of at least 40% in the examination of the first semester module referred to before he may take the second semester module referred to at the same year level.

b) When a module from one year level is the assumed learning requirement of a module at the following year level, it means that the learner must already have passed the module prescribed as learning requirement.

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
Biochemistry			
BCHI211	Introduction to Biochemistry for Engineers	8	CHEN111 CHEN121, 122
BCHI422	Biotechnology	16	BCHI211
BCHN213	Introduction to Biochemistry	16	CHEN111, 121, 122
BCHN221	Enzymology A	8	
BCHN222	Metabolism A	16	
BCHN311	Enzymology B	8	BCHN221
BCHN312	Metabolism B	8	BCHN222
BCHN313	Molecular Biochemistry	8	BCHN213
BCHN321	Analytical Biochemistry	8	
BCHN322	Independent Project	24	BCHN311, 312, 313
Management Accounting			
BRKP321	Decision Making and Financial Management	16	BRKP211, 221
Industrial and Personnel Psychology			
BSKP161	Diversity in Work Context	8	
Industrial Sociology			
BSOP161	Social Change	8	
BSOP211	Occupational Sociology	16	
Business Mathematics			
BWIN123	BMI Project: Financial Mathematics	8	WISK111
BWIN313	Financial Mathematics CT1	24	WISK221, STTK221
BWIN321	BMI Project: Capital Markets Modelling and Analysis	8	BWIN313, STTK311
BWIN322	Finance and Financial Reporting CT2	16	REKP211, REKP221
BWIN324	Statistical Methods CT6	24	BWIN313
Chemical Engineering			
CEMI212	Process Principles I	16	CHEN111, CHEN121
CEMI222	Chemical Thermodynamics I	16	CEMI212
CEMI223	Process Principles II	16	CEMI212
CEMI311	Transport Phenomena I	16	CEMI212
CEMI313	Chemical Thermodynamics I	16	CEMI223
CEMI322	Separation Processes I	16	CEMI314
CEMI323	Reactor Theory I	16	CEMI212, CEMI223
CEMI411	Separation Processes II	16	CEMI314
CEMI621	Process Control II	16	
Chemistry			
CHEN111	Chemical Principles	8	
CHEN121	Introductory Organic Chemistry	8	CHEN111
CHEN122	Introductory Inorganic Physical Chemistry	8	CHEN111

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
CHEN211	Analytical Methods I	8	CHEN111 CHEN121 CHEN122
CHEN212	Physical Chemistry II	8	CHEN111 CHEN121 CHEN122
CHEN213	Organic Chemistry II for Biologists	8	CHEN111, 121, 122
CHEN221	Analytical Methods II	8	CHEN211
CHEN222	Inorganic Chemistry II	8	CHEN111 CHEN121 CHEN122
CHEN223	Inorganic Chemistry II	8	CHEN111 CHEN121 CHEN122
CHEN311	Analytical Methods III	8	CHEN222
CHEN312	Physical Chemistry III	16	CHEN212
CHEN321	Inorganic Chemistry III	16	CHEN222
CHEN322	Organic Chemistry III	16	CHEN223
CHEN611	Advanced Organic Chemistry	16	CHEN322
CHEN612	Advanced Physical Chemistry	16	CHEN312
CHEN613	Advanced Inorganic chemistry	16	CHEN321
CHEN671	Project	48	CHEN311, 312 CHEN321, 322
Elective Modules (KEUS62*) for N139P			
CHEN621	Homogeneous catalysis	8	CHEN311, 312 CHEN321, 322
CHEN622	Carbon Chemistry	8	CHEN311, 312 CHEN321, 322
CHEN623	Membrane science and technology	8	CHEN311, 312 CHEN321, 322
CHEN624	Molecular modelling	8	CHEN311, 312 CHEN321, 322
CHEN625	Reactions under non classic conditions	8	CHEN311, 312 CHEN321, 322
CHEN626	Femto Chemistry	8	CHEN311, 312 CHEN321, 322
CHEM621	Polymer Chemistry	8	CHEN311, 312 CHEN321, 322
CHEM622	Advanced structural clarification	8	CHEN311, 312 CHEN321, 322
CHEM623	Environmental Chemistry	8	CHEN311, 312 CHEN321, 322
CHEM624	Techniques for organic synthesis	8	CHEN311, 312 CHEN321, 322
CHEM625	Platinum Group Metal Chemistry	8	CHEN311, 312 CHEN321, 322
Zoology			
DRKN111	Lower Invertabrata	8	
DRKN123	Higher Invertebrata and Chordata	16	

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
DRKN211	Developmental Biology	16	DRKN111, DRKN123
DRKN221	Comparative Animal Physiology	24	DRKN111, DRKN123
DRKN311	Ecology	24	DRKN221
DRKN321	Parasitology	16	DRKN311
DRKN322	Community and Behavioural Ecology	16	DRKN321
DRTN221	Comparative Animal Physiology: Tourism	8	DRKN111, DRKN123
DRTN311	Ecology: Tourism	8	DRTN221
Economics, Risk Management and International Trade			
EKRP211	Introduction toe Risk Management	16	
ECON111	The Functioning of the South African Economic System	12	
ECON121	Basic Macro- and Micro-economics	12	
ECON211	Macro-economics	16	
EKRP221	Investment Management	16	
EKNP311	Development, Regional and labour Economics	16	
EKNP321	Economic Analysis	16	
EKRP311	Risk Management	16	
EKRP321	Financial Markets	16	
Physiology			
FLGX111	Introductory Physiology	8	
FLGX121	Muscle Physiology and Digestion	16	FLGX111
FLGX211	Endocrinology	8	FLGX111
FLGX212	Metabolism	8	FLGX121
Physics			
FSKN111	Mechanics	8	
FSKN112	Physics for Biology I	8	
FSKN121	Electricity and Magnetism I	8	FSKN111 WISK111
FSKN122	Physics for Biology II	8	FSKN112
FSKN123	Modern Physics	8	FSKN111
FSKN211	Electricity and Magnetism II	8	FSKN121 WISK121
FSKN212	Waves, Fluids and Thermodynamics	8	FSKN111
FSKN221	Special Relativity	8	WISK121
FSKN222	Introduction to Quantum Physics	8	FSKN123
FSKN223	Optics	8	FSKN212
FSKN311	Electromagnetism	8	FSKN211 WISK211
FSKN312	Waves Mechanics	8	FSKN222 WISK211
FSKN313	Astrophysics	8	FSKN211 WISK211
FSKN321	Thermodynamics	16	FSKN212 WISK211

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
FSKN322	Nuclear Physics and Elementary Particles	16	FSKN222
Geography and Environmental Studies			
GGFN111	Introduction to Environmental Aspects I	8	
GGFN121	Introduction to Environmental Aspects II	16	
GGFN211	Economic Geography, Applied Climatology and Statistics	16	GGFN121
GGFN221	Physical Geography	16	GGFN111, 121
GGFN222	Anthropogenic Environmental Issues	8	GGFN111, 121
GGFN313	Advanced Geographical Information Systems	16	GGFN111, 121
GGFN312	Introductory Geographic Information Systems	8	GGFN111, 121
GGFN321	Development and Urbanisation in Africa and the South African City	16	GGFN111, 121 GGFN221
GGFN323	Environmental geography	16	GGFN111 GGFN312
Geology			
GLGN111	Environmental Geology	8	
GLGN121	South African Geology	16	
GLGN211	Mineralogy and Igneous Petrology	16	GLGN111,121
GLGN221	Sedimentology, Structural Geology And Neotectonics	16	GLGN111,121
GLGN311	Metamorphic Petrology And Geochemistry	32	GLGN211,221
GLGN321	Hydrogeology	32	GLGN211,221
Soil Sciences			
GDKN211	Advanced Soil Sciences	16	
GDKN221	Soil Degradation And Rehabilitation	16	GDKN211
Computer Science and Information Systems			
IRTW111	Introduction to Programming	8	
ITRW119	Programming for engineers I (C++)	8	
ITRW121	Graphical User Interface Programming I	16	ITRW111
ITRW122	Programming I	16	ITRW111
ITRW129	Programming for engineers II (C++)	8	
ITRW211	Graphical User Interface Programming II	8	ITRW121
ITRW212	Programming II	16	ITRW122
ITRW213	Systems Analysis I	16	ITRW121 or ITRW122
ITRW214	Decision Support Systems I	16	WISK113 or WISK112
ITRW222	Data Structures and Algorithms	16	ITRW212

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
ITRW224	Systems Analysis (for Scientific Applications)	8	ITRW121 or ITRW122
ITRW225	Systems Analysis and Design II	8	ITRW213
ITRW311	Databases I	16	ITRW224 or ITRW225
ITRW312	Artificial Intelligence	8	
ITRW313	Expert Systems	8	ITRW121 or ITRW122
ITRW314	Decision Support Systems II	8	ITRW214
ITRW315	Communication Skills	8	
ITRW321	Databases II	16	ITRW311
ITRW322	Network Programming and Internet	16	ITRW222
ITRW323	Operating Systems	16	ITRW222
ITRW324	IT-trends	16	
Alternative modules (KEUS311)			
AFNV311	Afrikaans vir die Professies	8	
ATSW112	Dumêla: Practical Setswana	8	
AZOE112	Sawubona: Practical Zulu	8	
BYBI311	Interpretation of the Bible for Life and Science	8	
EKNP312	Personal Management of Finances	8	
ENSW311	English for the Professions	*8*	
Industrial and Personnel Psychology			
MHBP111	Introduction to Human Resource Management	8	
Microbiology			
MKBN211	Introductory Microbiology	16	CHEN111 CHEN121, 122
MKBN221	Introductory Microbial Ecology	16	MKBN211
MKBN222	Introductory Microbial Genetics	8	MKBN211
MKBN311	Microbial Physiology	16	MKBN211, 222 CHEN211, 213
MKBN312	Advanced Microbial Genetics and Recombinant DNA Technology	8	MKBN211, 222 CHEN211, 213
MKBN321	Microbial Diversity	16	MKBN211, 221 CHEN211, 213
MKBN322	Industrial Microbiology	8	MKBN311, 312 CHEN211, 213
MKBN323	Immunology and Epidemiology	8	MKBN211 CHEN211, 213
Business Management			
BMAN111	Introduction to Business Management	12	
BMAN121	General Management	12	
Tourism Management			

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
TMBP111	Introduction to Tourism Management	12	
ONTP211	Applied Tourism management	16	
ONTP221	Entrepreneurial tourism	16	
ONTP311	Ecotourism: Principles and guidelines	16	
ONTP321	Tourism Marketing	16	
Botany			
PLKN112	Plant Structure – Cytology, Morphology and Anatomy	8	
PLKN124	Biodiversity and Environmental Botany	16	
PLKN212	Plant-Water relations: Structure and function (Anatomy and Ecophysiology)	16	PLKN112, PLKN124
PLKN222	Flora of South Africa (Plant Systematics and Phytogeography)	24	PLKN112, PLKN124
PLKN312	Plant Physiology: energy conversion and metabolism	24	PLKN212
PLKN323	Plant Ecology	32	PLKN222, PLKN312
PLTN222	Flora of South Africa (Plant Systematics and Phytogeography): Tourism	8	
PLTN323	Plant Ecology: Tourism	24	
Private law			
PVRR221	Private Law	8	
Financial Accountancy			
ACCF111	Financial Accounting: Basic Concepts, Accounting Cycle, Accounting Systems and Elementary Financial Reporting	16	Mathematics level 3 (40-50%)
ACCF121	Financial Accounting: Special Accounts, Partnerships and Close Corporations	16	ACCC/F (40%), or ACCS111 (65%)
REKP211	Financial Accounting: Financial Reporting	16	ACCF111, 121
REKP221	Financial Accounting: Special Topics and Elementary Group Statements	16	REKP211
REKP311	Generally Accepted Accountancy Practice	16	REKP211, 221
REKP321	Group Statements	16	REKP311
ACCS111	Accounting: Framework, Assumptions and Applications	16	Mathematics level 4 (50-60%)
ACCS121	Accounting: Introductory Corporate Accounting	16	ACCS111 (55%)or ACCF111 (65%)
Social Anthropology			

Module code	Descriptive name of module	Cr	Requirements regarding assumed learning
SANL211	Introduction to Social Anthropology	16	
Urban and Regional Planning			
SBEL111	Historical Development of Cities and Planning Thought	16	
SBEL121	Garden Cities and Neighbourhood Theory	16	
SBEL311	Engineering for Planners I	16	
SBEL321	Engineering for Planners II	16	
SBEL421	Integrated Planning Management	16	
SBEL471	Planning project	72	All preceding modules in the curriculum
SBRL211	Urban Settlement in Urban Systems	16	
SBRL221	Location of Industries, Regional Plans and Formation of Metropolitan Structures	16	
SBRL311	Regional Economics	16	
SBRL321	Regional Theory and Regional Evaluation Techniques	16	
SBRL411	Demographical Aspects of Planning	8	
SBRL412	Application of Regional Planning in South Africa	8	
SBSL211	Land Use Management and Residential Development	16	
SBSL221	Urban Design	16	
SBSL311	Traffic Planning	16	
SBSL321	Industrial and Business Planning	16	
SBSL411	Housing Policy and Settlement Issues	16	

Sociology			
SOSL111	South Africa: Compilation and Functioning	8	
SOSL121	The Dynamics of Development: Introduction A	8	
Statistics			
STTK111	Descriptive Statistics	8	
STTK121	Introductory Statistical Inference I	8	STTK111
STTK123	Introductory Statistical Inference II	8	STTK111
STTK124	Practical Statistics	8	STTK111
STTK211	Probability Theory	16	WISK121
STTK221	Introductory Sampling Theory and Techniques	24	STTK211
STTK311	Statistical Inference	24	STTK221
STTK321	Linear models	24	STTK311
STTK322	Statistical Project	8	STTK311
Prescribed Modules			
ENTR221	Creative Entrepreneurship	8	
AGLA111#	Introduction to Academic Literacy	12	
AGLA121	Academic Literacy	12	
Applied Mathematics			
TGWS121	Statistics	8	WISK112
TGWS122	Mathematical Modelling	8	WISK111
TGWS211	Dynamics I	8	WISK121 and (TGWS121 or FSKN111)
TGWS212	Differential Equations and Numerical Methods	8	WISK121
TGWS221	Dynamics II	8	TGWS212 and (TGWS121 or FSKN111)
TGWS222	Numerical Analysis	8	WISK121
TGWS311	Partial Differential Equations	16	WISK221
TGWS312	Partial Differential Equations (Numerical)	8	WISK221
TGWS321	Dynamics III	16	TGWS211
TGWS322	Optimisation	16	WISK211, 212
Mathematics			
WISK111	Analysis I	8	
WISK112	Co-ordinate Geometry in 2 or 3 Dimensions	8	
WISK113	Mathematical Techniques	8	
WISK121	Analysis II	8	WISK111
WISK122	Introductory Algebra	8	WISK112
WISK123	Mathematical Techniques	8	

WISK211	Analysis III	8	WISK121
WISK212	Linear Algebra I	8	WISK122
WISK213	Discrete Mathematics	8	WISK111 or WISK113
WISK221	Analysis IV	8	WISK211
WISK222	Linear Algebra II	8	WISK212
WISK311	Real Analysis I	16	WISK221
WISK312	Linear Algebra III	8	WISK222
WISK321	Real Analysis II	16	WISK311
WISK322	Algebraic Structures	16	WISK122
Philosophy of Science			
WTNL221	Philosophy of Science I	8	
WTNL316*	Wetenskapsleer II	8	

* WTNL316 = WTNL317 = WTNL318

Students who did not pass the compulsory skills test in academic literacy, must take AGLA111.

N.1.5 RELATIONSHIP BETWEEN CREDITS, TEACHING PERIODS AND EXAMINATION PAPERS

N.1.5.1 Relation between credits and teaching periods

According to general rule A.1.29 the following rule applies to the relationship between the credits of a module and the number of theoretical periods: A module of which the credit value is 8 (16) takes up a maximum of 2 (4) theoretical periods of 45 minutes each during the first three semesters of a curriculum (the two semesters at the first year level and the first semester at the second year level). In the second semester at the second year level and in the first and second semesters at the third year level a module with a credit value of 8 (16; 24) usually takes up 1 (2; 3) theoretical periods of 45 minutes each. In cases where more than one module of a specific subject is found in the same semester of a curriculum, that subject will not have more than four (4) theoretical periods in that semester. Depending on the nature of the different subjects deviations from this general rule might occur.

Subjects containing practical work (for example Chemistry, Physics, Zoology, etc.) are usually allocated 4 continuous periods every second week at the first year level and 4 continuous periods per week at the second and third year level for practical work sessions. Depending on the nature of the different subjects deviations from this guideline might be found.

The learning outcomes of each module are briefly described in N.6.

N.1.5.2 Relation between credits and examination papers

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

N.1.6 RECOGNITION OF PRIOR LEARNING

a) 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 other institutions, or informally (by

experience), is an indispensable element in deciding on admission to and awarding credits in an explicitly selected teaching-learning programme of North West University.

b) The recognition of prior learning concerns the provable knowledge and learning that an applicant has acquired, whether by having completed formal education programmes, or by 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.

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

d) For processing an application for recognition of prior learning a non-refundable administrative levy is payable as determined by the University from time to time.

N.1.7 PROVISIONAL ADMISSION REQUIREMENTS FOR UNDER-GRADUATE STUDIES (POTCHEFSTROOM CAMPUS) 2009 (FOR ALL FORMS OF TUITION)

General Admission Requirements

Taking due cognisance of the General Rules and Faculty Rules as contained in the relevant yearbooks and with specific reference to Rule A.4.2 (which determines that a National Senior Certificate is obtained and that the minimum statutory requirements for admission to B.degree studies at a university in the RSA have been complied with - i.e. **a pass on level 4 in four Designated Subjects**). The University reserves the right to apply the following selection model, on the basis of which consideration will be given to candidates' applications.

Please take cognisance 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. Owing to the capacity limitations and the high demand from students for admission to particular fields of study, students will be selected on the basis of their scholastic achievements for admission to these fields.

Screening model: ***Determination of the APS Score***

NSC-Scale	APS-score
8 (90-100%)	8
7 (80-89%)	7
6 (70-79%)	6
5 (60-69%)	5
4 (50-59%)	4
3 (40-49%)	3
2 (30-39%)	2
1 (0-29%)	1

1. The results of 6 subjects are used to determine the APS score.
2. The achievement in Life Orientation (LO) will not be rated in computing the APS-score. A achievement level of 5 in LO and higher will be regarded as a recommendation for admission in boundary cases and admission to certain programmes. A pass at level 3 is required to obtain a NSC.
3. A learner who achieves one or two APS scale points less than required for a specific study course, may at the discretion of Senate be admitted conditionally to a particular field of study. Such a learner must prove by successful completion of a Senate-approved admission examination, registered with the Matriculation Board, that he/she has the ability to be admitted to university studies.
4. A learner who achieves three or four APS scale points less than required for a specific study course, may after the successful completion of a Senate-approved admission examination and a Senate-approved bridging programme, be admitted by way of a Senate-discretionary exemption to a particular field of study.
5. A student who obtains Discretionary Exemption may be admitted to certain study programmes on certain conditions.

Admission requirements for the Cambridge and other systems

Note: It is not clear if the admission requirements of the different systems mentioned below will stay the same. It is determined by the Matriculation Board.

Full Exemption on the basis of HIGCSE and IGCSE level examinations of UCLES

The Matriculation Board will issue a certificate of full exemption if the following requirements are met:

1. Must pass 5 subjects.
   Must pass in 4 x HIGCSE (=HG /subjects).
   1 x IGCSE (=SG /subjects).
2. Must have English 1st or 2nd language.
3. At least one subject from group 1 or 2.
4. At least two subjects from group 3, 4, 5.
   (Must have at least 4 different groups).
5. Must pass at least Mathematics on IGCSE to get any subject from group 5 recognised as HIGCSE.

GROUP I	A First Language approved by the Committee of Principals.
GROUP II	A Second Language approved by the Committee of Principals.
GROUP III	A Third Language approved by the Committee of Principals, not taken into account for purposes of Group I or Group II, Biology, Physics and Chemistry or Mathematics.
GROUP IV	Economics, Geography, Biology (if not taken into account under Group III), History, Physics and Chemistry (if not taken into account under Group III) or Mathematics (if not taken into account under Group III).
GROUP V	Design and Technology, Computer Science, Business Studies or Accountancy.

CONVERSION TABLE							
M Score	RSA T-vakke	RSA SS-vakke	*A level* = Gr 13	HIGCSE	*AS level*	IGCSE = Gr 11	*O level* = Gr 11
8			A				
7	7		B	1	A		
6	6	7	C	2	B		
5	5	6	D	3	C		
4	4	5			D	A	A
3	3	4			E	B	B
2	2	3		4 Converted to a pass at IGSE level		C	C
1	1	2					

University Admissions Test:

Implications for holders of the local ACE School of Tomorrow Grade 12 College Entrance Certificate taking the New SAT/AARP is that they also have to be successful in a Senate approved admission test in order to qualify for admission to first degree studies in accordance with the Senate Discretionary Admission Route.

Information is subject to change. Contact the Admissions Section for the latest information.

NATURAL SCIENCES FACULTY

CALCULATION OF APS SCORE

1 APS Score: The results obtained in four prescribed Designated – and two NSC subjects are used for the calculation of the APS Score. The results obtained in Life Orientation are excluded.

2 Language Requirement: a Pass at level 4 (50-59%) in the language of instruction on either the Home or First Additional Language level.

3 Requirement in Mathematics: A learner who wishes to take any course in Mathematics, except for Mathematical Techniques (WISK113 or WISK123) must have obtained at least 50% (level 4) for Mathematics in the Gr12 examination or 60% (level 5) in another examination in Mathematics that is regarded by the Senate as equivalent to the above.

Remarks:

i) Students who do not meet these requirements, but have obtained at least 40% (level 3) in the grade 12 examination or at least 50% (level 4) in another examination in Mathematics that is regarded by the Senate as equivalent to the above, are permitted to a refresher course in Mathematics that will be presented in

January by the School of Computer, Statistical and Mathematical Sciences. If such students perform adequately in the tests that are written during this course, they can be considered admission to study in Mathematic modules for the B.Sc. degree.

ii) Prospective students that do not meet the matriculation requirements to enrol for WISK111 and WISK112, and also haven't attended the refresher course, can obtain permission to WISK111 and WISK112 in the second study year by passing the module in Mathematical Techniques (WISK113 or WISK123) in the first study year, on condition that students who acquire permission along this route to programs that otherwise would have been inaccessible, have to take in consideration that their studies might not be completed in the minimum time.

A student who wishes to take Mathematical Techniques (WISK113 or WISK123), must have obtained at least 40% (level 3) for Mathematics in the grade 12 examination or at least 50% (level 4) in another examination in Mathematics that is regarded by the Senate as equivalent to the above.

DEGREE/DIPLOMA	*REQUIRED NSC SUBJECTS*	APS	*SELEC-TION-TEST*
B.Sc. (3 *yrs)*			
Physico-Chemical, Computer and Mathematical Sciences **2001171**	*Maths level 4 (50-59%) plus level 4 (50-59%) in Physical Science.*	20	
Chemistry-Physics-C* – **N101P			
Chemistry-Physics-F* – **N102P			
* *Chemistry-Computer Science* – **N103P**			
Chemistry-Mathematics & App. Maths* – **N104P			
* *Physics-Computer Science* – **N105P**			
* *Physics-Statistics* – **N106P**			
* *Physics-Mathematics* – **N107P**			
* *Physics-Mathematics & App. Maths* – **N108P**			
* *Computer Science-Statistics* – **N109P**			
* *Computer Science-Mathematics* – **N110P**			
* *Statistics-Mathematics*– **N111P**			
* *Mathematical* – **N112P**			
* *Chemistry-Mathematics* – **N142P**			
* *Physics-Mathematics* – **N143P**			
* *Physics-Chemistry* – **N144P**			

DEGREE/DIPLOMA	*REQUIRED NSC SUBJECTS*	APS	*ELEC-TION TEST*
BSc ***2001191 Tourism*** * *Tourism-Geography-Botany* – **N126P** * *Tourism-Zoology-Botany* – **N127P** * *Tourism-Botany-Zoology* – **N128P** * *Tourism-Botany-Geography* – **N129P** **Tourism-Zoology-Geography* – **N145P**	*Maths 40-49% (3) or as alternative Maths Literacy 50-59% (4); plus Physical Science at level 4 (50-59%)*	20	
BSc ***2001181 Environmental and Biological Sciences*** **Zoology-Geography* – **N115P** **Zoology-Botany* – **N117P** **Geography-Botany* – **N119P** * *Geography-Computer Science* – **N120P** * *Zoology-Microbiology* – **N116P**	*Maths 40-49% (3) or as alternative Maths Literacy 50-59% (4); plus Physical Science at level 4 (50-59%)*	20	
Zoology-Biochemistry*– **N113P **Zoology-Chemistry* – **N114P** **Microbiology-Biochemistry* – **N121P** **Microbiology-Chemistry* – **N122P** **Microbiology-Botany* – **N123P** **Botany-Biochemistry* – **N124P** **Botany-Biochemistry* – **N125P**	*Maths at level 4 (50-59%) plus Physical Science at level 4 (50-59%)*	24	

DEGREE/DIPLOMA	*REQUIRED NSC SUBJECTS*	APS	*SELEC-TION-TEST*
BSc (3yrs) ***Chemical-Biological* 2001201** * *Chemistry-Biochemistry A* – **N130P** * *Chemistry-Biochemistry B* - **N131P**	*Maths at level 4 (50-59%) plus Physical Science at level 4 (50-59%)*	24	

B.Sc. (3*yrs*) ***Business Mathematics and Informatics* 2001221** **Business Mathematics and Informatics* (B) – **134P** **Business Mathematics & Informatics* (W) – **N135P** **Business Mathematics & Informatics* (I) – **N136P**	*Maths (60-69%) level 5*	30	
B.Sc. (3yrs) ***Actuarial Science* 2001231** * *Actuarial Science* – **N137P**	*Maths (60-69%) level 5*	30	
BSc ***Computer, Economic and Mathematical Sciences* 2001211** *Computer Science-Economics – N132P *Mathematics-Economics – N133P	Maths level 4 (50-59%)	24	

B.Sc. in Information Technology (3yrs**)** **2641001** *Information Technology – N138P	Maths level 4 (50-59%) *or level 3 (40-49%) plus one of the following: Physical Science, Life Sciences, Information Technology or Accounting at level 4 (50-59%). Plus the* refresher course in Mathematics.	24	
B.Sc. (Industrial Science) (4yrs**)** Chemical-Technology **2651001** ***** Chemistry-Chemical Engineering **– N139P**	Maths level 5 (60-69%)	30	
B.Art. et Scien. (Planning) (4yrs) **1181011** *****With Geography & Environmental Studies **– N140P** *****With Economics **– N141P** *****With Economics Geography & Environmental Studies **– N146P**	Maths level 3 (40-49%)	24	✓

N.1.8 REGISTRATION FOR ADDITIONAL MODULES

A student may, apart from the required modules of the relevant curriculum, take additional modules in terms of the provisions in general rules A.1.5 and A.5.8.

N.1.9 REGISTRATION

Registration is the prescribed complete process a student has to follow to register as a student of North West University (general rules A.1.45 and A.5).

N.1.10 THE POSTGRADUATE CERTIFICATE OF EDUCATION (PGCE) (SENIOR AND FURTHER EDUCATION AND TRAINING PHASE)

The Faculty of Natural Sciences regards the training of teachers to be of such importance that information regarding the Postgraduate Certificate of Education is summarised below for the convenience of prospective education

students. Students should, however, not neglect to consult the Calendar of the Faculty of Education Sciences for complete information.

In this Calendar an asterisk (*) marks programmes of the Faculty of Natural Sciences complying with education requirements and therefore granting admission to the Postgraduate Certificate of Education.

N.1.10.1 Nature and aims of the certificate

The aims of the qualification are -

a) to develop in students a practical competence based reflexively on educational theories and

b) to provide a general education qualification to round off a three-year qualification (or an achievement of at least 360 credits) that usually does not include training in education.

N.1.10.2 Duration of studies

The minimum duration of the studies is one (1) year or the period necessary to acquire the required number of credits and the maximum duration is two (2) years. The studies may be taken full-time or part-time.

N.1.10.3 Admission requirements

a) A first university degree with 128 credits in recognised learning areas and/or school subjects, or a recognised qualification of which credits at NQF level 6 total 360 and at least 128 credits have been obtained in recognised learning areas and/or school subjects.

b) The composition of the graduate studies should have been of such a nature that the student took at least two subject didactics. (Consult the Calendar of the Faculty of Education Sciences on subject didactics presented and the requirements laid down for all subject didactics.)

c) A student who has as yet not obtained his degree may be allowed under *certain circumstances* to enrol for the PGCE and to follow the course units still lacking for his degree simultaneously with the PGCE studies. *Special permission must be obtained at the relevant faculties.*

d) A student who included only Botany and Zoology (one at least all the way up to the third level) or only Physics and Zoology (one at least all the way up to the third level) and no other school subject in his degree course, will get full recognition for his degree and receive the PGCE with Subject Didactics Biology or Subject Didactic Natural Sciences and Subject Didactics Learning Area Natural Sciences.

N.1.10.4 Directed observation

a) Before starting the course the student must attend an approved school with the view of preparatory practical teaching for at least two weeks.

b) If there are valid reasons for a student not fulfilling this requirement, it may be undertaken earlier/later with the written consent of the Dean of the Faculty of Education Sciences.

N.1.10.5 After hours training

This certificate is also presented after hours through medium English. However, not all subject didactics are presented after hours. (Make enquiries at the Faculty of Education Sciences.)

A student who has already obtained a baccalaureus or higher degree may with the consent of the Dean of the Faculty of Education Sciences take three (3) semester courses at the most in academic subjects in the PGCE study year.

N.1.11 EXAMINATIONS

N.1.11.1 Examination opportunities

Examination opportunities and relevant rules are in accordance with general rule A.8.

N.1.11.2 Composition of the participation mark

The participation mark for a module (general rules A.1.7 and A.8.7.4) is compiled from tests, assignments and practical work. For every teaching-learning task (class tests, assignments, exercises, etc.) that is performed by means of formative assessment in a module, a mark is allocated. A student's participation mark is the weighed mean of all these marks. In the table below the relationship between theory and practical work in calculating the participation marks of the modules of a number of subjects are given.

Subject	Theory	Practical work
Biochemistry	2	1
Chemistry	2	1
Zoology – first level	2	1
Zoology – second and third level	1	1
Physics – first level	3	1
Physics – second and third level	3	2
Physiology	2	1
Geography and Environmental Studies	1	1
Geology	1	1
Microbiology	1	1
Botany (first and second level)	2	1
Botany (third level)	1	1

N.1.11.3 Admission to examinations

a) Admission to examinations in any module is granted by acquiring a proof of participation (general rules A.1.6 and A.8.6).

b) In terms of rule A.8.6 a proof of participation will only be issued to a student in the Faculty of Natural Sciences if he -

   i) has complied with the specific requirements of the module as set out in the relevant **study guide**;

   ii) where applicable, has completed the practical work required for a module; and

   iii) has obtained a participation mark of at least 35% for every first level module and 40% for every second and third level module.

c) The proof of participation obtained for a module for the first examination opportunity is transferred without any change to the second examination opportunity (general rule A.8.1.1).

N.1.11.4 Number of examination opportunities

The number of examination opportunities is regulated by general rule A.8.1. An implication of this rule is that a student who has not passed the second examination opportunity will not be entitled to exemption from classes.

Students in Actuarial Science, i.e. students taking the curriculum N137P, 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 can be obtained from the director of the Centre for Business Mathematics and Informatics.

N.1.11.5 Module mark

The module mark for every module is calculated (general rules A.1.39 and A.8.7.4) from the participation mark and the examination mark at the ratio of 1:1.

N.1.11.6 Pass requirements of a module and a curriculum

a) The terms and conditions for passing modules and curricula are set out in general rules A.8.4-A.8.7.

b) The subminimum in examinations is 40% for every module (general rules A.8.7.5). assumed learning-based progress in a curriculum

In compiling each curriculum care has been taken that assumed learning, i.e. prior knowledge and the general level of insight and experience necessary to comfortably take the modules that are prescribed in a specific semester of a curriculum, 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 below is to make sure that a student will in any semester only take those modules of which he has the minimum prior knowledge.

a) In the Faculty of Natural Sciences a student may only get started on a new curriculum at the beginning of the first semester of the first study year of a curriculum. When students change from one curriculum to another the entrance level in the new curriculum will have to be determined in consultation with the director of the school under which the relevant curriculum falls.

b) 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.

N.1.12 TERMINATION OF STUDIES

In terms of general rule A.9.1.1 the rules following below apply in the Faculty of Natural Sciences. Students who have to apply for readmission in terms of these rules probably either do not have the ability or the motivation to complete the relevant curriculum successfully.

a) A student who has obtained *less* than half of the credits of year level 1 of a curriculum must apply for readmission. If this application is successful, the student will have to plan his curriculum for the second study year in consultation with the school director or his delegated.

b) A student who, having completed his second historic study year, has as yet not obtained half of the prescribed credits of the first two years of a

curriculum, must apply for readmission. If the application is successful, the student will not be permitted to take any modules from year level three in his historic third study year, but he will only be allowed to register for the lacking modules of year levels 1 and 2.

c) A student who, having completed his third historic study year, has as yet not obtained all of the credits of the first two study years of the curriculum, must apply for readmission. If this application is successful, the student's curriculum for his fourth study year will have to be planned in consultation with the director of the relevant school.

Important: The studies of no student will be terminated in terms of these faculty rules before he and/or his parents have been invited in writing to explain his circumstances personally or in writing to the Dean.

N.1.13 PROFESSIONAL STATUS

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

a) 4 year B.Sc. or Hons.B.Sc. plus three years of experience in a natural science profession;

b) M.Sc. plus two years of experience in a natural science profession;

c) D.Sc. or Ph.D. plus one year of experience in a natural science profession.

A Masters degree complying with the requirements as set out by the South African Medical and Dental Council is the minimum qualification for registering as a Medical Scientist in terms of items 32(1) and 61(4) of the *Act on Physicians, Dentists and Additional Health Services*. In the case of clinical biochemistry a B.Sc. degree is required for registration. Students who took the B.Art. et Scien. degree may apply for membership of the South African Council for Town and Regional Planners.

N.2 RULES FOR THE DEGREE BACCALAUREUS SCIENTIAE

This qualification may be taken in one of the programmes and curricula that are found in N.1.3.1 and are described in detail below. The qualification may be taken full-time only.

During their studies students may only with the consent of the school directors involved change from one curriculum to another or change the curriculum for which they are registered.

N.2.1 MINIMUM AND MAXIMUM DURATION

The minimum duration of the studies for this degree is three years and the maximum duration for completing the degree is four years.

N.2.2 RECOGNITION OF PRIOR LEARNING

The requirements for this qualification regarding prior learning are described in N.1.8.

N.2.3 PROGRAMME: PHYSICAL-CHEMICAL, COMPUTER AND MATHEMATICAL SCIENCES

The Faculty of Natural Sciences has approved a number of curricula that offer a sound basic training in the Physical-Chemical, Computer and Mathematical Sciences. In compiling the curricula possible occupations and our country's need for human resources were also considered. These curricula also prepare the student for postgraduate studies (Hons.B.Sc. and/or M.Sc.) in one or more core subjects. These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.3.1 Programme rules

N.2.3.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors involved change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.3.1.2 Total credit value of curricula

The curricula in this programme are compiled from modules with a total credit value of at least 380. In the curricula set out below the 380 credits are divided into three study years, viz. 124 - 128 per year. The only exception to this rule is Curriculum N105P, which consists of a total of 388 credits.

N.2.3.1.3 Selection possibilities

In every curriculum there is a number of *prescribed modules*: AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL317 -318. These modules are compulsory to all students.

When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.2.3.2 Programme outcomes

N.2.3.2.1 General outcomes

At the end of the studies the student will have the ability to integrate the basic knowledge and techniques of the core subjects in the curriculum he completed

in view of investigating phenomena in nature relevant to the core subjects of the curriculum and of solving relevant problems.

N.2.3.2.2 Knowledge

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; to be ready to continue with postgraduate studies in one of the core subjects.

N.2.3.2.3 Skills

The student must have acquired the following skills: the ability to retrieve knowledge and information electronically and otherwise in preparation for lifelong learning; 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.

N.2.3.2.4 Values

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, scientific honesty and integrity towards fellow human beings and the environment in scientific investigations.

N.2.3.3 Articulation possibilities

a) On successful completion of a curriculum the student who has performed adequately will have direct access to honours studies in one of the core subjects of the curriculum, and in the case of some core subjects, direct access to master's studies.

b) 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 concerned.

c) 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.

N.2.3.4 Curricula

All of the curricula in this programme are compiled from modules in the list of modules in N.1.5.

Every year a student registers subject to the rules valid for the specific year. If the curriculum for which a student registered the previous year is changed in this Calendar, the curriculum 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 load of studies will not be aggravated.

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

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

i) The total number of credits of the modules that a student who has to repeat modules may take in any semester at any year level are limited in accordance with rule A.5.8.

ii) The faculty cannot undertake that modules that are to be repeated together with the other modules that must be taken would fit into the class schedule. Clashes that arise as a result of modules that have to be repeated will result in the student having to take those modules in a future year.

iii) If a student has not completed the modules of ‘n specific year level of the curriculum for which he enrolled in the minimum prescribed period of study and the modules of the specific year level of the curriculum 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.

Curricula marked with an asterisk (*) grant admission to studies for the Post-graduate Education Certificate.

The core modules of the curriculum are indicated by an “H” in the types column.

N.2.3.4.1 Curriculum N101P: Chemistry-Physics-C *

This curriculum is meant for students who want to take Chemistry and Physics as core subjects and who intend to continue with postgraduate studies in Chemistry. Students who want to take Chemistry and Physics as core subjects and who intend to continue with postgraduate studies in Physics are advised to select N102P. **With the aim on a Masters Degree in Physics, however, N108P is recommended.**

The curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	H	CHEN212	8	H	CHEN312	16	H
ITRW111	8	X	FSKN211	8	H	FSKN311	8	H
STTK111	8	X	FSKN212	8	H	FSKN312	8	H
WISK112	8	X	ITRW212	16	X	FSKN313	8	H
WISK111	8	X	WISK211	8	X	KEUS311	8	X
			WISK212	8	X	WTNL317	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FSKN121	8	H	CHEN223	8	H	FSKN321	16	H
FSKN123	8	H	ENTR221	8	X	FSKN322	16	H
ITRW122	16	X	FSKN221	8	H			
WISK121	8	X	FSKN222	8	H			
WISK122	8	X	FSKN223	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.3.4.2 Curriculum N102P: Physics-Chemistry-F*

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is meant for students who want to take Chemistry and Physics as core subjects and intend to continue with postgraduate studies in Physics. Students who wish to take Chemistry and Physics as core subjects and intend to continue with postgraduate studies in Chemistry are advised to select curriculum N101P.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	H	CHEN212	8	H	CHEN312	16	H
ITRW119	8	X	FSKN211	8	H	FSKN311	8	H
LEER111	8	X	FSKN212	8	H	FSKN312	8	H
RINL111	8	X	TGWS211	8	X	FSKN313	8	H
STTK111	8	X	WISK211	8	X	KEUS311	8	X
WISK112	8	X	WISK212	8	X	WTNL317	8	X
WISK111	8	X						
Tot 1st sem	64		Tot 1st sem	56		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FSKN121	8	H	CHEN223	8	H	FSKN321	16	H
FSKN123	8	H	ENTR221	8	X	FSKN322	16	H
ITRW129	8	X	FSKN221	8	H			
STTK121	8	X	FSKN222	8	H			
WISK121	8	X	FSKN223	8	H			
WISK122	8	X	WISK221	8	X			
			WTNL221	8	X			
Tot 2nd sem	64		Tot 2nd sem	72		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

N.2.3.4.3 Curriculum N103P: Chemistry- Computer Science*

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	X	CHEN212	8	H	CHEN312	16	H
ITRW111	8	H	ITRW212	16	H	ITRW311	16	H
LEER111	8	X	ITRW214	16	H	ITRW312	8	H
RINL111	8	X	TGWS212	8	X	KEUS311	8	X
STTK111	8	X	WISK211 of WISK212	8	X	WTNL317 or WTNL318	8	X
WISK112	8	X						
WISK111	8	X						
Tot 1st sem	64		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FSKN121	8	X	CHEN223	8	H	ITRW322	16	H
FSKN123	8	X	ENTR221	8	X	ITRW323	16	H
ITRW122	16	H	ITRW222	16	H			
WISK121	8	X	ITRW224	8	H			
WISK122	8	X	WTNL221	8	X			
Tot 2nd sem	64		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

N.2.3.4.4 Curriculum N104P: Chemistry-Mathematics & Applied Mathematics*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	X	CHEN212	8	H	CHEN312	16	H
ITRW111	8	X	FSKN212	8	X	KEUS311	8	X
STTK111	8	X	ITRW212	16	X	TGWS312	8	H
WISK112	8	H	TGWS212	8	H	TGWS311	16	H
WISK111	8	H	WISK211	8	H	WTNL317 or WTNL318	8	X
			WISK212	8	H			
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FSKN121	8	X	CHEN223	8	H	TGWS322	16	H
ITRW122	16	X	ENTR221	8	X	WISK322	16	H
TGWS122	8	H	TGWS222	8	H			
WISK121	8	H	WISK222	8	H			
WISK122	8	H	WISK221	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.3.4.5 Curriculum N105P: Physics-Computer Science*

This curriculum, consisting of 388 credits, is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	FSKN211	8	H	FSKN311	8	H
FSKN111	8	H	FSKN212	8	H	FSKN312	8	H
ITRW111	8	H	ITRW212	16	H	FSKN313	8	H
STTK111	8	X	TGWS211	8	X	ITRW311	16	H
WISK112	8	X	TGWS212	8	X	ITRW312	8	H
WISK111	8	X	WISK211	8	X	KEUS311	8	X
			WISK212	8	X	WTNL317 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	H	ENTR221	8	X	FSKN321	16	H
FSKN123	8	H	FSKN221	8	H	FSKN322	16	H
ITRW122	16	H	FSKN222	8	H	ITRW322	16	H
TGWS121	8	X	FSKN223	8	H	ITRW323	16	H
TGWS122	8	X	ITRW222	16	H			
WISK121	8	X	ITRW224	8	H			
WISK122	8	X	WISK221	8	X			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	72		Tot 2nd sem	64	
Year level 1	124		Year level 2	136		Year level 3	128	
						Total of credits of the curriculum	388	

N.2.3.4.6 Curriculum N106P: Physics-Statistics

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	FSKN211	8	H	FSKN311	8	H
FSKN111	8	H	FSKN212	8	H	FSKN312	8	H
ITRW119	8	X	STTK211	16	H	FSKN313	8	H
STTK111	8	H	TGWS211	8	X	KEUS311	8	X
WISK112	8	X	TGWS212	8	X	STTK311	24	H
WISK111	8	X	WISK211	8	X	WTNL317 or WTNL318	8	X
			WISK212	8	X			
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	H	ENTR221	8	X	FSKN321	16	H
FSKN123	8	H	FSKN221	8	H	FSKN322	16	H
ITRW129	8	X	FSKN222	8	H	STTK321	24	H
STTK121	8	H	FSKN223	8	H	STTK322	8	H
STTK123	8	H	STTK221	24	H			
TGWS122	8	X	WTNL221	8	X			
WISK121	8	X						
WISK122	8	X						
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.3.4.7 Curriculum N107P: Physics-Mathematics

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	FSKN211	8	H	FSKN311	8	H
FSKN111	8	H	FSKN212	8	H	FSKN312	8	H
ITRW119	8	X	STTK211	16	X	FSKN313	8	H
STTK111	8	X	TGWS211	8	X	KEUS311	8	X
WISK112	8	X	TGWS212	8	X	WISK311	16	H
WISK111	8	H	WISK211	8	H	WISK312	8	H
			WISK212	8	H	WTNL317 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	H	FSKN221	8	H	FSKN321	16	H
FSKN123	8	H	FSKN222	8	H	FSKN322	16	H
ITRW129	8	X	FSKN223	8	H	WISK321	16	H
STTK121	8	X	ENTR221	8	X	WISK322	16	H
TGWS121	8	X	TGWS222	8	X			
TGWS122	8	X	WISK221	8	H			
WISK121	8	H	WISK222	8	H			
WISK122	8	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.3.4.8 Curriculum N108P: Physics-Mathematics & Applied Mathematics

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	FSKN211	8	H	FSKN311	8	H
FSKN111	8	H	FSKN212	8	H	FSKN312	8	H
ITRW119	8	X	STTK211	16	X	FSKN313	8	H
STTK111	8	X	TGWS211	8	H	KEUS311	8	X
WISK112	8	H	TGWS212	8	H	TGWS312	8	H
WISK111	8	H	WISK211	8	H	WISK311	16	H
			WISK212	8	H	WTNL317 or WTNL318	8	H
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	H	ENTR221	8	X	FSKN321	16	H
FSKN123	8	H	FSKN221	8	H	FSKN322	16	H
ITRW129	8	X	FSKN222	8	H	TGWS321 of TGWS322	16	H
STTK121	8	X	FSKN223	8	H	WISK321	16	H
TGWS121	8	H	TGWS222	8	H			
TGWS122	8	H	WISK221	8	H			
WISK121	8	H	WISK222	8	H			
WISK122	8	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.3.4.9 Curriculum N109P: Computer Science-Statistics*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ITRW212	16	H	ITRW311	16	H
FSKN111	8	X	STTK211	16	H	ITRW312	8	H
ITRW111	8	H	TGWS211 of WISK213	8	X	KEUS311	8	X
STTK111	8	H	TGWS212	8	X	STTK311	24	H
WISK112	8	X	WISK211	8	X	WTNL318	8	X
WISK111	8	X	WISK212	8	X			
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	X	ENTR221	8	X	ITRW322	16	H
ITRW122	16	H	ITRW222	16	H	ITRW323	16	H
STTK121	8	H	ITRW224	8	H	STTK321	24	H
TGWS121	8	X	STTK221	24	H	STTK322	8	H
TGWS122	8	X	WTNL221	8	X			
WISK121	8	X						
WISK122	8	X						
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	384	

Students having completed the first year of one of the curricula N134P-N137P may switch to this curriculum at the beginning of the second year.

N.2.3.4.10 Curriculum N110P: Computer Science-Mathematics* [#]

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ITRW212	16	H	ITRW311	16	H
FSKN111	8	X	STTK211	16	X	ITRW312	8	H
ITRW111	8	H	TGWS211 of WISK213	8	H	KEUS311	8	X
STTK111	8	X	TGWS212	8	H	WISK311	16	H
WISK112	8	X	WISK211	8	H	WISK312 of TGWS312	8	H
WISK111	8	H	WISK212	8	H	WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	X	ENTR221	8	X	ITRW322	16	H
ITRW122	16	H	ITRW222	16	H	ITRW323	16	H
STTK121	8	X	ITRW224	8	H	WISK321	16	H
TGWS121	8	H	TGWS222	8	X	WISK322 or TGWS322	16	H
TGWS122	8	X	WISK221	8	H			
WISK121	8	H	WISK222	8	H			
WISK122	8	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

[#]Students having completed the first year of one of the curricula N134P-N137P may switch to this curricula at the beginning of the second year.

N.2.3.4.11 Curriculum N111P: Statistics-Mathematics [#]

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ITRW212	16	X	KEUS311	8	X
FSKN111	8	X	STTK211	16	H	STTK311	24	H
ITRW111	8	X	TGWS211 or WISK213	8	H	WISK311	16	H
STTK111	8	H	TGWS212	8	X	WISK312 or TGWS312	8	H
WISK112	8	X	WISK211	8	H	WTNL318	8	X
WISK111	8	H	WISK212	8	H			
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	X	ENTR221	8	X	STTK321	24	H
ITRW122	16	X	STTK221	24	H	STTK322	8	H
STTK121	8	H	TGWS222	8	X	WISK321	16	H
TGWS121	8	X	WISK221	8	H	WISK322 or TGWS322	16	H
TGWS122	8	X	WISK222	8	H			
WISK121	8	H	WTNL221	8	H			
WISK122	8	H						
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

[#]Students having completed the first year of one of the curricula N134P-N137P may switch to this curricula at the beginning of the second year.

N.2.3.4.12 Curriculum N112P: Mathematical

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			First semester			First semester		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ITRW212	16	X	KEUS311	8	X
FSKN111	8	X	STTK211	16	X	TGWS311	16	H
ITRW111	8	X	TGWS211	8	H	WISK311	16	H
STTK111	8	X	TGWS212	8	H	WISK312	8	H
WISK112	8	H	WISK211	8	H	TGWS312	8	H
WISK111	8	H	WISK212	8	H	WTNL318	8	X
			WISK213	8	H			
Tot 1st sem	48		Tot 1st sem	72		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
FSKN121	8	X	ENTR221	8	X	TGWS321	16	H
ITRW122	16	X	ITRW224	8	X	TGWS322	16	H
STTK121	8	X	TGWS221	8	H	WISK321	16	H
TGWS121	8	H	TGWS222	8	H	WISK322	16	H
TGWS122	8	H	WISK221	8	H			
WISK121	8	H	WISK222	8	H			
WISK122	8	H	WTNL221	8	H			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	56		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

The following three curricula are especially designed for students who intend to qualify as science and mathematics teachers.

N.2.3.4.13 Curriculum N142P: Chemistry-Mathematics*

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	X	CHEN212	8	H	CHEN312	16	H
ITRW111	8	X	FSKN211	8	X	KEUS311	8	X
STTK111	8	X	FSKN212	8	X	WISK311	16	H
WISK112	8	X	(TGWS211 **and** TGWS212 **or** WISK213) **or** ITRW212	8+8 **or** 16	H	WISK312	8	H
WISK111	8	H	WISK211	8	H	WTNL317 or WTNL318	8	X
			WISK212	8	H			
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221 or FSKN221	8 or 8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FSKN121	8	X	CHEN223	8	H	WISK321	16	H
FSKN123	8	X	ENTR221	8	X	WISK322	16	H
(TGWS121 **and** TGWS122) **or** ITRW122	8 + 8 16	X	FSKN223	8	X			
WISK121	8	H	WISK221	8	H			
WISK122	8	H	WISK222	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

N.2.3.4.14 Curriculum N143P: Physics-Mathematics*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	CHEN211	8	X	FSKN311	8	H
FSKN111	8	H	CHEN212	8	X	FSKN312	8	H
ITRW111	8	X	FSKN211	8	H	FSKN313	8	H
STTK111	8	X	FSKN212	8	H	KEUS311	8	X
WISK112	8	X	(TGWS211 **and** TGWS212 **or** WISK213) **or** ITRW212	8+8 **or** 16	H	WISK311	16	H
WISK111	8	H	WISK211	8	H	WISK312	8	H
			WISK212	8	H	WTNL317 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	CHEN223	8	X	FSKN321	16	H
CHEN122	8	X	ENTR221	8	X	FSKN322	16	H
FSKN121	8	H	FSKN221	8	H	WISK321	16	H
FSKN123	8	H	FSKN222	8	H	WISK322	16	H
(TGWS121 **and** TGWS122) **or** ITRW122	8 + 8 **or** 16	X	FSKN223 or CHEN222	8	H			
WISK121	8	H	WISK221	8	H			
WISK122	8	H	WISK222	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	64		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

N.2.3.4.15 Curriculum N144P: Physics-Chemistry*

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	CHEN211	8	H	CHEN311	8	H
FSKN111	8	H	CHEN212	8	H	CHEN312	16	H
ITRW111	8	X	FSKN211	8	H	FSKN311	8	H
STTK111	8	X	FSKN212	8	H	FSKN312	8	H
WISK112	8	X	(TGWS211 **and** TGWS212 **or** WISK213) **or** ITRW212	8+8 16	X	FSKN313	8	H
WISK111	8	X	WISK211	8	X	KEUS311	8	X
			WISK212	8	X	WTNL317	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN222	8	H	CHEN321	16	H
CHEN122	8	H	CHEN223	8	H	CHEN322	16	H
FSKN121	8	H	ENTR221	8	X	FSKN321	16	H
FSKN123	8	H	FSKN222	8	H	FSKN322	16	H
(TGWS121 **+** TGWS122) or ITRW122	8 + 8 16	X	FSKN223	8	H			
WISK121	8	X	WISK221	8	X			
WISK122	8	X	WISK222	8	X			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

N.2.3.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.2.4 PROGRAMME: ENVIRONMENTAL AND BIOLOGICAL SCIENCES

The Faculty of Natural Sciences has approved a number of programmes that provide a good basic training in environmental and biological sciences. In compiling the curricula of these programmes the Faculty also considered possible occupations and our country's need for human resources. Furthermore these programmes prepare the student for postgraduate studies (Master's in Environmental Sciences or Master's in Environmental Management). These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.4.1 Programme rules

N.2.4.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.4.1.2 Total credit value of curricula

Each programme in this direction is compiled from modules with a total credit value of at least 380. In every programme set out below the 380 credits are divided into three study years, viz. 124 - 128 per year.

N.2.4.1.3 Alternative possibilities

In each curriculum there is a number of *prescribed modules*: AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.2.4.2 Programme outcomes

N.2.4.2.1 General outcomes

On acquiring this qualification the student will have adequate knowledge, skills and values regarding: original and creative thought and thinking; an awareness that problems cannot be solved in isolation; the application of knowledge of the subject content of fundamental, core and alternative modules of the curriculum that he has passed and the identification of multi-disciplinary environmental fields; identification, analysis and solution of environmental problems; written and electronic communication of information; respect for fellow human beings, creation and authority; realisation of the necessity of lifelong learning and of being at the forefront of the latest technology and experimental methods; identification and development of entrepreneurial opportunities in practice.

N.2.4.2.2 Specific and critical outcomes

On successful completion of this qualification the student ought to have subject knowledge, skills and values with regard to the following exit level outcomes: knowledge of the fundamental content of biological, geographical and other specific subject contents presented in the curriculum; the usage of laboratory apparatus and techniques applied in modern environmental and biological sciences; creative, critical and independent project planning and execution, data collecting, computerised processing, evaluation and reporting that conforms to scientific standards; working together in groups and where necessary, exercising and assuming leadership; electronic and other methods of retrieving knowledge and information; familiarity with different learning

strategies in view of attaining the ideal of lifelong learning; management of own time; the ability to act as an entrepreneur by utilising subject knowledge and skills in environmental consultations; the ability to create an own frame of reference regarding Christian and other views of the world; familiarity with the following values: research ethics, trustworthiness, precision and thoroughness.

N.2.4.3 Articulation possibilities

a) On successfully completing a curriculum for this degree, the student who attained satisfactory achievements may apply for admission to the Master of Environmental Sciences and the Master of Environmental Management degrees or qualifies for post-graduate studies at another university.

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

c) All assumed learning will be evaluated according to merit.

N.2.4.4 Curricula

All of the curricula in this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

Curricula marked with an asterisk (*) grant admission to studies for the Post-graduate Education Certificate.

N.2.4.4.1 Curriculum N113P: Zoology-Biochemistry

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	BCHN213	16	H	BCHN311	8	H
DRKN111	8	H	CHEN211	8	X	BCHN312	8	H
FLGX111	8	X	CHEN213	8	X	BCHN313	8	H
FSKN112	8	X	DRKN211	16	H	DRKN311	24	H
GLGN111	8	X	MKBN211	16	X	KEUS311	8	X
PLKN112	8	X				WTNL316 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	BCHN221	8	H	BCHN321	8	H
CHEN122	8	X	BCHN222	16	H	BCHN322	24	H
DRKN123	16	H	DRKN221	24	H	DRKN321	16	H
FLGX121	16	X	ENTR221	8	X	DRKN322	16	H
PLKN124	16	X	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.2 Curriculum N114P: Zoology-Chemistry

This curriculum is compiled as follows[#]:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	X	CHEN311	8	H
DRKN111	8	H	CHEN211	8	H	CHEN312	16	H
FLGX111	8	X	CHEN212	8	H	DRKN311	24	H
FSKN112 of FSKN111	8	X	DRKN211	16	H	KEUS311	8	X
STTK111	8	X	MKBN211	16	X	WTNL318	8	X
PLKN112	8	X						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
DRKN123	16	H	CHEN223	8	H	DRKN321	16	H
FLGX121 or (FSKN121 and FSKN123)	16	X	DRKN221	24	H	DRKN322	16	H
PLKN124	16	X	ENTR221	8	X			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

[#] To qualify as a teacher FSKN111, 121 and 123 must be selected from this curriculum.

N.2.4.4.3 Curriculum N115P: Zoology-Geography

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	DRKN211	16	H	DRKN311	24	H
DRKN111	8	H	GGFN211	16	H	GGFN313	16	H
GGFN111	8	H	BCHN213	16	X	GGFN312	8	H
GLGN111	8	X	MKBN211	16	X	KEUS311	8	X
STTK111	8	X				WTNL318	8	X
PLKN112	8	X						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRKN221	24	H	DRKN321	16	H
CHEN122	8	X	ENTR221	8	X	DRKN322	16	H
DRKN123	16	H	GGFN221	16	H	GGFN321	16	H
GGFN121	16	H	GGFN222	8	H	GGFN323	16	H
GLGN121	16	X	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.4 Curriculum N116P: Zoology-Microbiology

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	CHEN211	8	X	DRKN311	24	H
DRKN111	8	H	CHEN213	8	X	KEUS311	8	X
FLGX111	8	X	DRKN211	16	H	MKBN311	16	H
GLGN111	8	X	MKBN211	16	H	WTNL318	8	H
STTK111	8	X	PLKN212	16	X	WTNL318	8	X
PLKN112	8	X						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRKN221	24	H	DRKN321	16	H
CHEN122	8	X	ENTR221	8	X	DRKN322	16	H
DRKN123	16	H	MKBN221	16	H	MKBN321	16	H
GLGN121	16	X	MKBN222	8	H	MKBN322	8	H
PLKN124	16	X	WTNL221	8	X	MKBN323	8	H
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.5 Curriculum N117P: Zoology-Botany

This curriculum is compiled as follows[#]:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	CHEN211	8	X	DRKN311	24	H
DRKN111	8	H	CHEN213	8	X	KEUS311	8	X
FLGX111	8	X	DRKN211	16	H	PLKN312	24	H
FSKN112 or FSKN111	8	X	MKBN211 or BCHN213	16	X	WTNL318	8	X
GLGN111	8	X	PLKN212	16	H			
PLKN112	8	H						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRKN221	24	H	DRKN321	16	H
CHEN122	8	X	ENTR221	8	X	DRKN322	16	H
DRKN123	16	H	PLKN222	24	H	PLKN323	32	H
FLGX121 or (FSKN121 and FSKN123)	16	X	WTNL221	8	X			
PLKN124	16	H						
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

[#] To qualify as a teacher FSKN111, 121 and 123 must be selected from this curriculum.

N.2.4.4.6 Curriculum N119P: Geography-Botany

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			First semester			First semester		
Code	Cr	Type	Code	Cr	Type	Code	Cr	Type
CHEN111	8	X	BCHN213	16	X	GGFN313	16	H
DRKN111	8	X	GGFN211	16	H	GGFN312	8	H
FSKN112	8	X	MKBN211	16	X	KEUS311	8	X
GGFN111	8	H	PLKN212	16	H	PLKN312	24	H
GLGN111	8	X				WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			Second semester			Second semester		
Code	Cr	Type	Code	Cr	Type	Code	Cr	Type
CHEN121	8	X	ENTR221	8	X	GGFN321	16	H
CHEN122	8	X	GGFN221	16	H	GGFN323	16	H
GGFN121	16	H	GGFN222	8	H	PLKN323	32	H
GLGN121	16	X	PLKN222	24	H			
PLKN124	16	H	WTNL221	8				
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.7 Curriculum N120P: Geography-Computer Science*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	GGFN211	16	H	GGFN313	16	H
GGFN111	8	H	ITRW212	16	H	GGFN312	8	H
ITRW111	8	H	MKBN211	16	X	ITRW311	16	H
STTK111	8	X	PLKN212	16	X	ITRW313	8	H
PLKN112	8	X				KEUS311	8	X
WISK113	8	X				WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
GGFN121	16	H	ENTR221	8	X	GGFN321	16	H
ITRW122	16	H	GGFN221	16	H	GGFN323	16	H
PLKN124	16	X	GGFN222	8	H	ITRW322	16	H
STTK121	8	X	ITRW222	16	H	ITRW323	16	H
STTK123	8	X	ITRW224	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.8 Curriculum N147P: Geology-Geography and Environmental Studies

 # The presenting of this curriculum is subjected to HEQC approval

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	GDKN211	16	X	GGFN313	16	H
DRKN111	8	X	GGFN211	16	H	GGFN312	8	H
FSKN111	8	X	GLGN211	16	H	GLGN311	32	H
GGFN111	8	H	PLKN212	16	X	KEUS311	8	X
GLGN111	8	H				WTNL318	8	X
PLKN112	8	X						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	72	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	ENTR221	8	X	GGFN321	16	H
CHEN122	8	X	GDKN221	16	H	GGFN323	16	H
GGFN121	16	H	GGFN221	16	H	GLGN321	32	H
GLGN121	16	H	GGFN222	8	H			
PLKN124	16	X	GLGN221	16	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	72		Tot 2nd sem	64	
Year level 1	124		Year level 2	136		Year level 3	136	
Total of credits of the curriculum							396	

Second year students will attend a compulsory field camp for seven days just during the June/July recess. The students will have to stay for another five (5) days on campus, after the camp. During this time, different mapping techniques will have to be achieved so that the learner can compile a geological/soil map of an area and write a geological report. This report will be submitted during the second semester. It will form part of GLGN221 and GDKN221. No student will be excused.

N.2.4.4.9 Curriculum N148P: Geology-Botany

 # The presenting of this curriculum is subjected to HEQC approval

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	GDKN211	16	X	GLGN311	32	H
DRKN111	8	X	GGFN211	16	X	KEUS311	8	X
FSKN111	8	X	GLGN211	16	H	PLKN312	24	H
GGFN111	8	H	PLKN212	16	H	WTNL318	8	X
GLGN111	8	H						
PLKN112	8	X						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	72	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	ENTR221	8	X	GLGN321	32	H
CHEN122	8	X	GDKN221	16	X	PLKN323	32	H
GGFN121	16	X	GLGN221	16	H			
GLGN121	16	H	PLKN222	16	H			
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	72		Tot 2nd sem	64	
Year level 1	124		Year level 2	136		Year level 3	136	
Total of credits of the curriculum							396	

Second year students will attend a compulsory field camp for seven days just during the June/July recess. The students will have to stay for another five (5) days on campus, after the camp. During this time, different mapping techniques will have to be achieved so that the learner can compile a geological/soil map of an area and write a geological report. This report will be submitted during the second semester. It will form part of GLGN221 and GDKN221. No student will be excused.

N.2.4.4.10 Curriculum N121P: Microbiology-Biochemistry

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	H	BCHN311	8	H
DRKN111	8	X	CHEN211	8	X	BCHN312	8	H
FLGX111	8	X	CHEN213	8	X	BCHN313	8	H
FSKN112	8	X	MKBN211	16	H	KEUS311	8	X
GLGN111	8	X	PLKN212	16	X	MKBN311	16	H
PLKN112	8	X				MKBN312	8	H
						WTNL316 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	BCHN221	8	H	BCHN321	8	H
CHEN122	8	H	BCHN222	16	H	BCHN322	24	H
DRKN123	16	X	ENTR221	8	X	MKBN321	16	H
GLGN121	16	X	MKBN221	16	H	MKBN322	8	H
PLKN124	16	X	MKBN222	8	H	MKBN323	8	H
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.11 Curriculum N122P: Microbiology-Chemistry

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	X	CHEN311	8	H
DRKN111	8	X	CHEN211	8	H	CHEN312	16	H
FLGX111	8	X	CHEN212	8	H	KEUS311	8	X
FSKN112	8	X	DRKN211	16	X	MKBN311	16	H
GLGN111	8	X	MKBN211	16	H	MKBN312	8	H
PLKN112	8	X				WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
DRKN123	16	X	CHEN223	8	H	MKBN321	16	H
GLGN121	16	X	ENTR221	8	X	MKBN322	8	H
PLKN124	16	X	MKBN221	16	H	MKBN323	8	H
AGLA121	12	X	MKBN222	8	H			
			WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.12 Curriculum N123P: Microbiology-Botany

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	BCHN213	16	X	KEUS311	8	X
DRKN111	8	X	CHEN211	8	X	MKBN311	16	H
FLGX111	8	X	CHEN213	8	X	MKBN312	8	H
GLGN111	8	X	MKBN211	16	H	PLKN312	24	H
STTK111	8	X	PLKN212	16	H	WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	ENTR221	8	X	MKBN321	16	H
CHEN122	8	X	MKBN221	16	H	MKBN322	8	H
DRKN123	16	X	MKBN222	8	H	MKBN323	8	H
GLGN121	16	X	PLKN222	24	H	PLKN323	32	H
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.13 Curriculum N124P: Botany-Biochemistry

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	BCHN213	16	H	BCHN311	8	H
DRKN111	8	X	CHEN211	8	X	BCHN312	8	H
FLGX111	8	X	CHEN213	8	X	BCHN313	8	H
FSKN112	8	X	MKBN211	16	X	KEUS311	8	X
GLGN111	8	X	PLKN212	16	H	PLKN312	24	H
PLKN112	8	H				WTNL316 or WTNL318	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	BCHN221	8	H	BCHN321	8	H
CHEN122	8	X	BCHN222	16	H	BCHN322	24	H
DRKN123	16	X	ENTR221	8	X	PLKN323	32	H
FLGX1121	16	X	PLKN222	24	H			
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.4.4.14 Curriculum N125P: Botany-Chemistry

This curriculum is compiled as follows[#]:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	X	CHEN311	8	H
DRKN111	8	X	CHEN211	8	H	CHEN312	16	H
FLGX111	8	X	CHEN212	8	H	KEUS311	8	X
FSKN112 or FSKN111	8	X	MKBN211	16	X	PLKN312	24	H
GLGN111	8	X	PLKN212	16	H	WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	CHEN221	8	H	CHEN321	16	H
CHEN122	8	H	CHEN222	8	H	CHEN322	16	H
FLGX1121 or (FSKN121 and FSKN123)	16	X	CHEN223	8	H	PLKN323	32	H
GLGN121	16	X	ENTR221	8	X			
PLKN124	16	H	PLKN222	24	H			
AGLA121	12	X	WTNL221	8				
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
						Total of credits of the curriculum	380	

[#] To qualify as a teacher FSKN111, 121 and 123 must be selected from this curriculum.

For your information

The following curricula are presented in the Faculty of Health Sciences and students wishing to take one of these curricula must consult the Calendar of the Faculty of Health Sciences and also enrol at that faculty..

Curriculum G341P: Biochemistry-Physiology

This curriculum is compiled as follows:

YEAR LEVEL 1		YEAR LEVEL 2		YEAR LEVEL 3	
First semester		First semester		First semester	
Code	Cr	Code	Cr	Code	Cr
FLGX111	8	FLGX211	8	FLGX311	8
CHEN111	8	FLGX212	8	FLGX312	8
FSKN112	8	BCHN213	16	FLGX313	8
DRKN111	8	CHEN211	8	BCHN311	8
PLKN112	8	CHEN213	8	BCHN312	8
ITRW111/ WISK113/ STTK111	8	MKBN211	16	BCHN313	8
				KEUS311	8
				WTNL318	8
Tot 1st sem	48	Tot 1st sem	64	Tot 1st sem	64
Second semester		Second semester		Second semester	
Code	KR	Code	KR	Code	KR
FLGX121	16	FLGX221	8	FLGX321	8
CHEN121	8	FLGX222	8	FLGX322	8
CHEN122	8	FLGX223	8	FLGX323	8
DRKN123	16	BCHN221	8	FLGX324	8
VOED151	8	BCHN222	16	BCHN321	8
FSKN122	8	ENTR221	8	BCHN322	24
AGLA121	12	WTNL221	8		
Tot 2nd sem	76	Tot 2nd sem	64	Tot 2nd sem	72
Year level 1	124	Year level 2	128	Year level 3	128
				Total of credits of the curriculum	380

Curriculum G342P: Chemistry-Physiology

This curriculum is compiled as follows:

YEAR LEVEL 1		YEAR LEVEL 2		YEAR LEVEL 3	
First semester		First semester		First semester	
Code	Cr	Code	Cr	Code	Cr
FLGX111	8	FLGX211	8	FLGX311	8
CHEN111	8	FLGX212	8	FLGX312	8
DRKN111	8	BCHN213	16	FLGX313	8
FSKN112	8	CHEN211	8	CHEN311	8
WISK111	8	CHEN212	8	CHEN312	16
STTK111	8	MKBN211	16	KEUS311	8
				WTNL318	8
Tot 1st sem	48	Tot 1st sem	64	Tot 1st sem	64
Second semester		Second semester		Second semester	
Code	Cr	Code	Cr	Code	Cr
FLGX121	16	FLGX221	8	FLGX321	8
CHEN121	8	FLGX222	8	FLGX322	8
CHEN122	8	FLGX223	8	FLGX323	8
STTK121	8	CHEN221	8	FLGX324	8
FSKN122	8	CHEN222	8	CHEN321	16
DRKN123	16	CHEN223	8	CHEN322	16
		ENTR221	8		
		WTNL221	8		
Tot 2nd sem	76	Tot 2nd sem	64	Tot 2nd sem	64
Year level 1	124	Year level 2	128	Year level 3	128
Total of credits of the curriculum					380

Curriculum G343P: Zoology-Physiology

This curriculum is compiled as follows:

YEAR LEVEL 1		YEAR LEVEL 2		YEAR LEVEL 3	
First semester		First semester		First semester	
Code	Cr	Code	Cr	Code	Cr
FLGX111	8	FLGX211	8	FLGX311	8
DRKN111	8	FLGX212	8	FLGX312	8
CHEN111	8	DRKN211	16	FLGX313	8
FSKN112	8	BCHN213	16	DRKN311	24
PLKN112	8	MKBN211	16	KEUS311*	8
ITRW111/ WISK113/ STTK111	8			WTNL318	8
Tot 1st sem	48	Tot 1st sem	64	Tot 1st sem	64
Second semester		Second semester		Second semester	
Code	Cr	Code	Cr	Code	Cr
FLGX121	16	FLGX221	8	FLGX321	8
DRKN123	16	FLGX222	8	FLGX322	8
CHEN121	8	FLGX223	8	FLGX323	8
CHEN122	8	DRKN221	24	FLGX324	8
PLKN124	16	ENTR221	8	DRKN321	16
AGLA121	12	WTNL221	8	DRKN322	16
Tot 2nd sem	76	Tot 2nd sem	64	Tot 2nd sem	64
Year level 1	124	Year level 2	128	Year level 3	128
Total of credits of the curriculum					380

Curriculum G344P: Microbiology-Physiology

This curriculum is compiled as follows:

YEAR LEVEL 1		YEAR LEVEL 2		YEAR LEVEL 3	
First semester		First semester		First semester	
Code	Cr	Code	Cr	Code	Cr
FLGX111	8	FLGX211	8	FLGX311	8
CHEN111	8	FLGX212	8	FLGX312	8
PLKN112	8	MKBN211	16	FLGX313	8
ITRW111	8	CHEN211	8	MKBN311	16
FSKN112	8	CHEN213	8	MKBN312	8
DRKN111	8	BCHN213	16	KEUS311*	8
				WTNL318	8
Tot 1st sem	48	Tot 1st sem	64	Tot 1st sem	64
Second semester		Second semester		Second semester	
Code	Cr	Code	Cr	Code	Cr
FLGX121	16	FLGX221	8	FLGX321	8
CHEN121	8	FLGX222	8	FLGX322	8
CHEN122	8	FLGX223	8	FLGX323	8
PLKN124	16	MKBN221	16	FLGX324	8
DRKN123	16	MKBN222	8	MKBN321	16
AGLA121	12	ENTR221	8	MKBN322	8
		WTNL221	8	MKBN323	8
Tot 2nd sem	76	Tot 2nd sem	64	Tot 2nd sem	64
Year level 1	124	Year level 2	128	Year level 3	128
Total of credits of the curriculum					380

N.2.4.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.2.5 PROGRAMME: TOURISM

The Faculty of Natural Sciences has approved a number of curricula that provide a good basic training in tourism. In compiling the curricula possible occupations and our country's need for human resources were also considered. These curricula also prepare the student for postgraduate studies (Master's in Environmental Sciences or Master's in Environmental Management). These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.5.1 Programme rules

N.2.5.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.5.1.2 Total credit value of curricula

Each curriculum in this programme is compiled from modules with a total credit value of at least 384. In the curricula set out below the 384 credits are evenly divided into three study years, viz. 128 per year.

N.2.5.1.3 Alternative possibilities

In every curriculum there is a number of *prescribed modules*: AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.2.5.2 Programme outcomes

On successful completion of this programme the student will be able to provide proof of his subject knowledge, skills and values with regard to the following exit level outcomes: continuous knowledge of the subject content of fundamental, core and/or alternative modules of subject combinations put together, application of these in practice and identification of the multi-disciplinary environmental and tourism field; identification, analysis and solution of environmental and tourism problems by using subject knowledge; verbal, electronic or written communication of information; original and creative thought and the realisation that problems cannot be solved in isolation; respect for fellow human beings, creation and authority; realisation of the necessity to secure well-developed learning skills and to remain at the forefront of the latest technology, experimental methods and management of human resources and tourism; mastering entrepreneurial skills to identify and develop opportunities in practice.

N.2.5.3 Articulation possibilities

a) On successful completion of this degree a student may be admitted to a Hons.B.Sc. in Tourism or a Master's in Environmental Sciences or a Master's in Environmental Management or registration for postgraduate studies at another university.

b) On completion of NQF level 5 in appropriate subjects at another university a student may be admitted to complete NQF level 6.

c) On completion of NQF level 5 at another tertiary institution in appropriate subjects the Dean may admit a student to NQF level 6.

d) The Dean will evaluate all assumed learning according to merit.

N.2.5.4 Curricula

All of the curricula in this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.4 also apply to these curricula**.

Curricula marked with an asterisk (*) grant admission to studies for the Post-graduate Education Certificate.

N.2.5.4.1 Curriculum N126P: Tourism-Botany with Geography modules

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ONTP212	16	H	GGFN312	8	H
DRKN111	8	X	GGFN211	16	H	KEUS311	8	X
GGFN111	8	H	ONTP211	16	H	ONTP311	16	H
GLGN111	8	X	PLKN212	16	H	PLKN312	24	H
ONTP111	8	H				WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	ENTR221	8	X	GGFN321	16	H
CHEN122	8	X	GGFN222	8	H	ONTP321	16	H
GGFN121	16	H	ONTP224	16	H	PLKN323	32	H
TMBP121	12	H	PLKN222	24	H			
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

N.2.5.4.2 Curriculum N127P: Tourism-Botany with Zoology modules*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ONTP212	16	H	DRTN311	8	H
DRKN111	8	H	DRKN211	16	H	KEUS311	8	X
GLGN111	8	X	ONTP211	16	H	ONTP311	16	H
ITRW111	8	X	PLKN212	16	H	PLKN312	24	H
ONTP111	8	H				WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRTN221	8	H	DRKN322	16	H
CHEN122	8	X	ENTR221	8	X	ONTP321	16	H
DRKN123	16	H	ONTP224	16	H	PLKN323	32	H
TMBP121	12	H	PLKN222	24	H			
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	72		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.5.4.3 Curriculum N128P: Tourism-Zoology with Botany modules*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ONTP212	16	H	DRKN311	24	H
DRKN111	8	H	DRKN211	16	H	KEUS311	8	X
GLGN111	8	X	ONTP211	16	H	ONTP311	16	H
ITRW111	8	X	PLKN212	16	H	WTNL318	8	X
ONTP111	8	H						
PLKN112	8	H						
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	56	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRKN221	24	H	DRKN321	16	H
CHEN122	8	X	ENTR221	8	X	DRKN322	16	H
DRKN123	16	H	ONTP224	16	H	ONTP321	16	H
TMBP121	12	H	PLTN222	8	H	PLTN323	24	H
PLKN124	16	H	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	72	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.5.4.4 Curriculum N129P: Tourism- Geography with Botany modules*

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ONTP212	16	H	GGFN313	16	H
DRKN111	8	X	GGFN211	16	H	GGFN312	8	H
GGFN111	8	H	ONTP211	16	H	KEUS311	8	X
MHBP111	8	X	PLKN212	16	H	ONTP311	16	H
ONTP111	8	H				WTNL318	8	X
PLKN112	8	H						
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
BSKP161	8	X	ENTR221	8	X	GGFN321	16	H
BSOP161	8	X	GGFN221	16	H	GGFN323	16	H
GGFN121	16	H	GGFN222	8	H	ONTP321	16	H
TMBP121	12	H	ONTP224	16	H	PLTN323	24	H
PLKN124	16	H	PLTN222	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	72		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.5.4.5 Curriculum N145P : Tourism- Geography with Zoology modules

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	X	ONTP212	16	H	DRTN311	8	H
DRKN111	8	H	DRKN211	16	H	GGFN313	16	H
GGFN111	8	H	GGFN211	16	H	GGFN312	8	H
GLGN111	8	X	ONTP211	16	H	KEUS311	8	X
ONTP111	8	H				ONTP311	16	H
PLKN112	8	X				WTNL318	8	X
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	X	DRTN221	8	H	DRKN322	16	H
CHEN122	8	X	ENTR221	8	X	GGFN321	16	H
DRKN123	16	H	GGFN221	16	H	GGFN323	16	H
GGFN121	16	H	GGFN222	8	H	ONTP321	16	H
TMBP121	12	H	ONTP224	16	H			
AGLA121	12	X	WTNL221	8				
Tot 2nd sem	72		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.5.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.2.6 PROGRAMME: CHEMICAL-BIOLOGICAL SCIENCES

The Faculty of Natural Sciences has approved a curriculum that provides a good basic training in chemical-biological sciences. In compiling this curriculum possible occupations and our country's need for human resources were also considered. This curriculum also prepares the student for postgraduate studies (Hons.B.Sc. and/or M.Sc.) in the various core subjects These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.6.1 Programme rules

N.2.6.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.6.1.2 Total credit value of curricula

The curricula in this programme are compiled from modules with a total credit value of at least 384. In the curricula set out below the 384 credits are evenly divided into three study years, viz. 128 per year.

N.2.6.1.3 Alternative possibilities

In every curriculum there is a number of *prescribed modules*: AGLA111, AGLA121 and ENTR221 and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.2.6.2 Programme outcomes

The student having completed this programme will have command of the following knowledge, skills and values:

N.2.6.2.1 Knowledge

a) Knowledge of fundamental chemical, physical and mathematical subject specific contents as indicated by the relevant subject combination.

b) Knowledge of scientific terminology and nomenclature.

c) Knowledge of the use of laboratory apparatus and techniques.

N.2.6.2.2 Skills

a) The ability to retrieve knowledge and information electronically and otherwise in preparation of lifelong learning.

b) Familiarity with different learning strategies and time management.

c) The ability to process, evaluate and report on scientific information.

d) The ability to recognise relationships between structures (reagents), driving forces and processes.

e) The ability to perform elementary and advanced problem solving.

f) Control of basic laboratory skills.

g) The ability to work in groups and where necessary to exercise leadership.

N.2.6.2.3 Values

a) The necessity to understand the environmental impact of scientific activities.

b) The necessity to cultivate a sense of responsibility for the fellow human being and environment in scientific investigations.

c) The necessity to be aware of scientific honesty and integrity.

N.2.6.3 Articulation possibilities

a) On successful completion of a curriculum the leaner who has performed adequately will have direct access to honours studies in one of the core subjects of the curriculum.

b) 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 concerned.

N.2.6.4 Curricula

All of the curricula for this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

N.2.6.4.1 Curriculum N130P: Chemistry-Biochemistry A

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	H	BCHN311	8	H
DRKN111	8	X	CHEN211	8	H	BCHN312	8	H
FLGX111	8	X	CHEN212	8	H	BCHN313	8	H
FSKN111	8	X	FLGX211	8	X	CHEN311	8	H
ITRW111	8	X	FLGX212	8	X	CHEN312	16	H
WISK111	8	X	MKBN211	16	X	KEUS311	8	X
						WTNL316	8	X
Tot 1st sem	48		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	BCHN221	8	H	BCHN321	8	H
CHEN122	8	H	BCHN222	16	H	BCHN322	24	H
DRKN123	16	X	CHEN221	8	H	CHEN321	16	H
FLGX121	16	X	CHEN222	8	H	CHEN322	16	H
FSKN121	8	X	CHEN223	8	H			
WISK121	8	X	ENTR221	8	X			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	124		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							380	

N.2.6.4.2 Curriculum N131P: Chemistry-Biochemistry B

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2010.

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN111	8	H	BCHN213	16	H	BCHN311	8	H
DRKN111	8	X	CHEN211	8	H	BCHN312	8	H
FSKN111	8	X	CHEN212	8	H	BCHN313	8	H
ITRW111	8	X	DRKN211	16	X	CHEN311	8	H
LEER111	8	X	WISK211	8	X	CHEN312	16	H
RINL111	8	X	WISK212	8	X	KEUS311	8	X
WISK112	8	X				WTNL316	8	X
WISK111	8	X						
Tot 1st sem	64		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
CHEN121	8	H	BCHN221	8	H	BCHN321	8	H
CHEN122	8	H	BCHN222	16	H	BCHN322	24	H
DRKN123	16	X	CHEN221	8	H	CHEN321	16	H
FSKN121	8	X	CHEN222	8	H	CHEN322	16	H
TGWS122	8	X	CHEN223	8	H			
WISK121	8	X	ENTR221	8	X			
WISK122	8	X	WTNL221	8	X			
Tot 2nd sem	64		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

N.2.6.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements for the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.2.7 PROGRAMME: COMPUTER, ECONOMIC AND MATHEMATICAL SCIENCES

The Faculty of Natural Sciences has approved two curricula that provide a good basic training in computer-mathematical-economic sciences. In compiling these curricula possible occupations and our country's need for human resources were also considered. These curricula also prepare the student for postgraduate studies (Hons.B.Sc. and/or M.Sc.) in the various core subjects. These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.7.1 Programme rules

N.2.7.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.7.1.2 Total credit value of curricula

The curricula in this programme are compiled from modules with a total credit value of at least 384. In the curricula set out below the 384 credits are evenly divided into three study years, viz. 128 per year.

N.2.7.1.3 Alternative possibilities

In every curriculum there is a number of *prescribed modules*, AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.2.7.2 Programme outcomes

Programme outcomes as discussed for the B.Sc. degree (programme chemical-physical-computer and mathematical sciences) in N.2.3.3 also apply to this qualification. Depending on the curriculum selection in this programme, the student will have the following skills in varying degrees:

a) The ability to formulate within reach of his knowledge problems from reality in such a way that they can be handled by means of mathematical methods and the ability not only to master and execute a variety of mathematical computation processes, but also to understand the abstract structural contexts in which they are justified.

b) The ability to structure mathematical arguments logically and use them coherently in view of effective subject communication for the benefit of the general community.

c) The ability to discuss with colleagues and clients who are not subject specialists the mathematical formulation, solution and interpretation of problems from reality in business applications and in low level technology development.

d) Knowledge and skills to use computer software for mathematical calculations, information retrieval and word processing.

e) Sound application skills in at least one modern relevant programming language.

f) Thorough basic knowledge and skills in the use of systems analysis and design for scientific systems and applications.

g) Sound application skills in disciplines of computer science and information systems that are frequently used in problem solving approaches.

h) Sound applications skills of modern database techniques and technologies.

i) The ability to utilise information sources and relevant facilities.

j) Knowledge and insight into the functioning of an economy.

k) Thorough understanding of the functioning of public finances and the role and functioning of the government in the South African economy.

l) The ability to understand and explain the transfer of funds between countries, fixing of exchange rates, exchange rate systems and the international monetary system.

m) Thorough knowledge and understanding of economic policy in South Africa.

n) Thorough insight into the impact of the asset and liability management of banks on the national economy.

o) Thorough knowledge of the South African futures market and insight into the functioning of derivative instruments.

p) The ability to explain the nature, aim and basic theory of accountancy and to practically implement basic accounting principles in forms of enterprises.

q) A thorough understanding of departmental accounts, manufacturing accounts, non-commercial enterprises, partnerships and close corporations and the ability to analyse and interpret financial statements.

r) Thorough knowledge of close corporations, conversion of enterprises, company financial statements, pre-incorporation income, debentures, cash flow and deferred taxes.

N.2.7.3 Articulation possibilities

a) On successful completion of the programme N132P (N133P) the leaner who has performed adequately will have direct access to honours studies in Computer Science (Mathematics) and Economics.

b) This programme also grants admission to studies for a postgraduate (secondary) education qualification.

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

c) With the basic and applied skills acquired by this qualification in the mathematical, computer and natural science disciplines the student will be equipped to continue further learning in one or two subject areas at other universities.

N.2.7.4 Curricula

All of the curricula in this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

Curricula marked with an asterisk (*) grant admission to studies for the Post-graduate Education Certificate.

N.2.7.4.1 Curriculum N132P: Computer Science-Economics

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKIP211	16	X	EKRP311 of EKNP311	16	H
ITRW111	8	H	ECON211	16	H	ITRW311	16	H
ACCS111*	16	X	ITRW212	16	H	ITRW312	8	H
WISK112	8	X	WISK211 or WISK213	8	X	KEUS311	8	X
WISK111	8	X	WISK212	8	X	STTK111	8	X
						WTNL318	8	X
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON121	16	H	EKNP221	16	H	EKRP321 or EKNP321	16	H
ITRW122	16	H	ENTR221	8	X	ITRW321	16	H
ACCS121*	16	X	ITRW222	16	H	ITRW322	16	H
WISK121	8	X	ITRW224	8	H	ITRW323	16	H
WISK122	8	X	WISK222	8	X			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

*It is recommended that students who have already passed grade 12 Accounting take ACCF111, 121 instead of ACCS111, 121. Students who have achieved a final mark of at least 65% in ACCS111 will be allowed to register for ACCF121.

N.2.7.4.2 Curriculum N133P: Mathematics-Economics

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKIP211	16	X	EKRP311 or EKNP311	16	H
ITRW111	8	X	ECON211	16	H	KEUS311	8	X
ACCS111*	16	X	ITRW212	16	X	STTK111	8	X
WISK112	8	X	WISK211 or WISK213	8	H	WISK311	16	H
WISK111	8	H	WISK212	8	H	WISK312	8	H
						WTNL318	8	X
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON121	12	H	EKNP221	16	H	EKRP321 or EKNP321	16	H
ITRW122	16	X	ENTR221	8	X	TGWS322	16	H
ACCS121*	16	X	ITRW222	16	X	WISK321	16	H
WISK121	8	H	WISK221	8	H	WISK322	16	H
WISK122	8	H	WISK222	8	H			
AGLA121	12	X	WTNL221	8	X			
Tot 2nd sem	76		Tot 2nd sem	64		Tot 2nd sem	64	
Year level 1	128		Year level 2	128		Year level 3	128	
Total of credits of the curriculum							384	

*It is strongly recommended that students who have already passed grade 12 Accounting take ACCF111, 121 instead of ACCS111, 121. Students who have achieved a final mark of at least 65% in ACCS111 will be allowed to register for ACCF121.

N.2.7.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.2.8 PROGRAMME: BUSINESS MATHEMATICS AND INFORMATICS

The Faculty of Natural Sciences has approved three curricula that provide a good basic training in quantitative risk management, data mining and financial mathematics. In compiling these curricula possible occupations and our country's need for human resources were also considered. Furthermore these curricula prepare the student for postgraduate studies (Hons.B.Sc. and/or M.Sc.) in quantitative risk management, data development and financial mathematics, These studies are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.8.1 Programme rules

N.2.8.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.8.1.2 Total credit value of the curricula

The curriculum in this programme is compiled from modules with a total credit value from 500 to 524. This is considerably heavier than the typical curriculum of 384 credits, which is ascribed to the fact that this qualification is directed at an occupation. In the curricula set out below the credits are divided into three years of study.

N.2.8.1.3 Alternative possibilities

In the curricula there is a number of *prescribed modules*: AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the four *alternative modules* indicated in the module list above.

N.2.8.2 Programme outcomes

Programme outcomes as discussed for the B.Sc. degree (Programme: Chemical-Physical-Computer and Mathematical Sciences) in N.2.3.3 also apply to this qualification. Apart from those the student will also have the following **specific** knowledge and skills.

N.2.8.2.1 Knowledge

On completion of the programme the student will have adequate knowledge of and insight into the following subjects:

a) The functioning of an economy, introductory micro- and macro-economics, determining the national income and the influence of different policy measures on it, national accountancy concepts and the macro-equilibrium equation, economic conjuncture and stabilisation, the transfer of funds between countries, exchange rate systems, balance of payment and international monetary system; monetary policy in South Africa.

b) The impact of the asset and liability management of banks on the national economy; risk, liquidity policy, lending policy, liability management and the apportionment of capital by banks, the South African futures market. Functioning of derivative instruments and their application to risk hedging.

c) The nature, aim and basic theory of accountancy. Financial statements, fixed assets and depreciation. Control, departmental and manufacturing accounts. Partnerships, close corporations and appropriate GAAP viewpoints.

d) Probability theory, sampling theory and statistical inference.

e) Theory and topology of real numbers and finite dimensional vector spaces, algebra and measurable spaces, integrals of measurable functions and monotone convergence, linear transformations between general vector spaces, complex functions, ordinary and partial linear differential equations, optimisation.

f) Basic computer literacy, object-directed programming language, artificial intelligence, data structures and algorithms and modern IT developments.

N.2.8.2.2 Skills

On completion of this programme the student will have the following skills:

a) The ability to identify and solve convergent and divergent quantitative risk management problems in a creative and active manner.

b) Sound knowledge of and insight into the financial markets and financial risk instruments and related problems, together with the ability to solve problems in interaction with other disciplines.

d) The ability to identify and develop quantitative financial risk, computer and data analysis techniques and/or approaches on an entrepreneurial basis in view of managing financial risks.

e) The ability to work efficiently as an individual or in a team in an organisation in order to address quantitative financial risk management problems.

f) The ability to organise and manage own activities in a responsible and efficient manner to attain desired aims.

g) The ability to handle questionnaires, meaningful data collecting methods, data presentation methods and exploratory data evaluation by using amongst others statistical computer software (e.g. Statistica, S-Plus and SAS).

h) The ability to prepare and present reports and presentations professionally.

i) Mathematical modelling of practical problems by using partial differential equations, combinatory mathematics, linear programmes and optimisation methods, together with computerised implementation where applicable.

j) Programming in a modern high level language, together with the ability to analyse and design computer systems and algorithms.

k) The ability to handle database management systems with ease.

N.2.8.3 Articulation possibilities

This programme grants admission to postgraduate studies in Hons.B.Sc. (BMI) programmes and may also grant admission to honours studies in economics, statistics or computer science. The honours B.Sc. (BMI) programmes are subject to the following requirements:

Honours curriculum	Graduate curriculum
N610P	N134P or N135P or N136P
N611P	N135P
N612P	N134P

N.2.8.4 Curricula

All of the curricula for this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

N.2.8.4.1 Curriculum N134P: Quantitative Risk Management (B)

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKRP211	16	X	BWIN313	24	H
ITRW111	8	X	ECON211	16	H	EKRP311	16	H
ACCS111* or ACCF111	16	H	ITRW211	8	X	KEUS311	8	X
STTK111	8	H	REKP211	16	H	REKP311	16	H
WISK112	8	X	STTK211	16	H	STTK311	24	H
WISK111	8	X	WISK211	8	X	WTNL318	8	X
			WISK212	8	X			
Tot 1st sem	60		Tot 1st sem	88		Tot 1st sem	96	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
BWIN123	8	H	EKRP221	16	X	BWIN321	8	H
ECON121	12	H	ENTR221	8	X	EKRP321	16	H
ITRW121	16	X	REKP221	16	H	REKP321	16	H
ACCS121* or ACCF121	16	H	STTK221	24	H	STTK321	24	H
STTK121	8	H	WISK221	8	H	STTK322	8	H
TGWS122	8	X	WISK222	8	H			
WISK121	8	X	WTNL221	8	X			
WISK122	8	X						
AGLA121	12	X						
Tot 2nd sem	96		Tot 2nd sem	88		Tot 2nd sem	72	
Year level 1	156		Year level 2	176		Year level 3	168	
					Total of credits of the curriculum		500	
Additional Stipulation: The Centre for BMI recommends that ENSW311 be taken as the elective module KEUS311 in the first semester of the third year.								

Students who have already passed grade 12 Accounting must take ACCF111,121. Students that have achieved final marks of at least 65% for ACCS111 **must** register for ACCF121 in the second semester. **A student that did not achieve at least 65% for ACCS111 at the end of the first semester must in consultation with the centre director switch to N135Por N136P.**

N.2.8.4.2 Curriculum N135P: Financial Mathematics (M)

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKRP211	16	X	BWIN313	24	H
ITRW111	8	X	ECON211	16	H	EKRP311	16	H
ACCS111* or ACCF111	16	X	ITRW211	8	X	KEUS311	8	X
STTK111	8	H	ITRW214	16	X	STTK311	24	H
WISK112	8	H	STTK211	16	H	WISK311	16	H
WISK111	8	H	WISK211	8	H	WTNL318	8	X
			WISK212	8	H			
Tot 1st sem	60		Tot 1st sem	88		Tot 1st sem	96	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
BWIN123	8	H	EKRP221	16	H	BWIN321	8	H
ECON121	12	H	ENTR221	8	X	EKRP321	16	H
ITRW121	16	X	ITRW224	8	X	STTK321	24	H
ACCS121* or ACCF121	16	X	STTK221	24	H	STTK322	8	H
STTK121	8	H	WISK221	8	H	TGWS322	16	H
TGWS122	8	X	WISK222	8	H	WISK321	16	H
WISK121	8	H	WTNL221	8	X			
WISK122	8	H						
AGLA121	12	X						
Tot 2nd sem	96		Tot 2nd sem	80		Tot 2nd sem	88	
Total Year level 1	156		Total Year level 2	168		Total Year level 3	184	
						Total of credits of the curriculum	508	
Additional Stipulation: The Centre for BMI recommends that ENSW311 be taken as the elective module KEUS311 in the first semester of the third year.								

*It is recommended that students who have already passed grade 12 Accounting take ACCF111, 121 instead of ACCS111, 121. Students who have achieved a final mark of at least 65% in ACCS111 will be allowed to register for ACCF121.

N.2.8.4.3 Curriculum N136P: Data Mining (I)

The curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKRP211	16	X	BWIN313	24	H
ITRW111	8	H	ECON211	16	H	EKRP311	16	H
ACCS111* of ACCF111	16	X	ITRW212	16	H	ITRW311	16	H
STTK111	8	H	ITRW214	16	H	KEUS311	8	X
WISK112	8	X	STTK211	16	H	STTK311	24	H
WISK111	8	X	WISK211	8	X	WTNL318	8	X
			WISK212	8	X			
Tot 1st sem	60		Tot 1st sem	96		Tot 1st sem	96	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
BWIN123	8	H	EKRP221	16	H	BWIN321	8	H
ECON121	16	H	ENTR221	8	X	EKRP321	16	H
ITRW122	16	H	ITRW222	16	H	ITRW321	16	H
ACCS121* or ACCF121	16	X	STTK221	24	H	STTK321	24	H
STTK121	8	H	WISK221	8	X	STTK322	8	H
TGWS122	8	X	WISK222	8	X	TGWS322	16	H
WISK121	8	X	WTNL221	8	X			
WISK122	8	X						
AGLA121	12	X						
Tot 2nd sem	96		Tot 2nd sem	88		Tot 2nd sem	88	
Total Year level 1	156		Total Year level 2	184		Total Year level 3	184	
						Total of credits of the curriculum	524	
Additional Stipulation: The Centre for BMI recommends that ENSW311 be taken as the elective module KEUS311 in the first semester of the third year.								

*It is recommended that students who have already passed grade 12 Accounting take ACCF111, 121 instead of ACCS111, 121. Students who have achieved a final mark of at least 65% in ACCS111 will be allowed to register for ACCF121.

N.2.8.5 Examinations

a) For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

b) The examination in module BWIN321 may only be taken once as a result of the project nature of the module.

N.2.9 PROGRAMME: ACTUARIAL SCIENCE

The Faculty of Natural Sciences has approved one curriculum that provides a good basic training in actuarial science. In compiling this curriculum possible occupations and our country's need for human resources were also considered. Furthermore this curriculum prepares the student for postgraduate studies in actuarial science, which are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.2.9.1 Programme rules

N.2.9.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.2.9.1.2 Total credit value of the curricula

The curriculum in this programme is compiled from modules with a total credit value of 508. This is considerably heavier than the typical curriculum of 380 credits, which may be ascribed to the fact that this is a qualification directed at an occupation. In the curricula set out below the credits are divided into three years of study.

N.2.9.1.3 Alternative possibilities

In the curricula there is a number of *prescribed modules*, AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the four *alternative modules* indicated in the above-mentioned module list.

N.2.9.2 Programme outcomes

Programme outcomes as discussed for the B.Sc. degree (Programme: Chemical-Physical-Computer and Mathematical Sciences) in N.2.3.3 also apply to this qualification. Apart from those the student will also have command of the following **specific** knowledge and skills.

N.2.9.2.1 Knowledge

On completion of the programme the student will have adequate knowledge of and insight into the following subjects:

a) The functioning of an economy, introductory micro- and macro-economics, determining the national income and the influence of different policy measures on it, national accountancy concepts and the macro-equilibrium equation, economic conjuncture and stabilisation, the transfer of funds between countries, exchange rate systems, balance of payment and international monetary system; monetary policy in South Africa.

b) The impact of the asset and liability management of banks on the national economy; risk, liquidity policy, lending policy, liability management and the apportionment of capital by banks, the South African futures market. Functioning of derivative instruments and their application to risk hedging.

c) The nature, aim and basic theory of accountancy. Financial statements, fixed assets and depreciation. Control, departmental and manufacturing

accounts. Partnerships, close corporations and appropriate GAAP viewpoints.

d) Close corporations, conversion of enterprises, company financial statements, pre-incorporation income, debentures, analysis and interpretation of financial statements, cash flow, deferred taxes, lease agreements in financial statements, earnings per share, adjustments for previous years, group financial statements.

e) Probability theory, sampling theory and statistical inference.

f) Theory and topology of real numbers and finite dimensional vector spaces, algebra and measurable spaces, integrals of measurable functions and monotone convergence, linear transformations between general vector spaces, ordinary and partial linear differential equations, optimisation.

g) Basic computer literacy, including the operation and components of a computer, storage of data, use of a spreadsheet and problem solving.

h) Object-based programming language, including the basic structure, data types, methods, classes, objects and problem solving.

N.2.9.2.2 Skills

On completion of this programme the student will be able to demonstrate that he/she has the following skills:

a) The ability to identify and solve convergent and divergent actuarial financial problems in a creative and pro-active manner.

b) Fundamental knowledge of and insight into the financial markets and financial instruments and relevant problems, together with the ability to solve problems in interaction with other disciplines.

l) The ability to identify and assess financial risk, computer and data analysis techniques and/or approximations on an entrepreneurial basis, in order to manage financial risks.

m) The ability to work effectively as an individual or in a team in an organisation and to address actuarial and financial problems.

n) The ability to identify and investigate training and occupational possibilities in actuarial science, as well as research possibilities.

o) The ability to master questionnaires and meaningful data collecting methods, handle data presentation methods and exploratory data evaluation by using amongst others statistical computer software (e.g. Statistica, S-Plus and SAS), together with standard executive inference methods at a broad level.

p) The ability to prepare and present professional written and oral reports.

q) Mathematical modelling of practical problems by using partial differential equations, combinatory mathematics, linear programmes and optimisation methods, together with computerised implementation where applicable.

r) Programming in a modern high level language, together with the ability to analyse and design computer systems and algorithms.

s) The ability to make calculations, analyse and solve problems with the aid of a spreadsheet and to design algorithms and handle problems in an object-based programming language.

N.2.9.3 Articulation possibilities

The programme grants admission to postgraduate studies in the Hons.B.Sc. (Actuarial Science) programme and may also grant admission to honours studies in Economics and Statistics. Students who passed the Hons.B.Sc. (Actuarial Science) may also apply for admission to the Master's Degree in Business Mathematics and Informatics (see N.4.9).

N.2.9.4 Curriculum

All of the curricula for this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

N.2.9.4.1 Curriculum N137P: Actuarial Science

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ECON111	12	H	EKRP211	16	X	BWIN313	24	H
ITRW111	8	X	ECON211	16	H	EKRP311	16	H
ACCF111* or ACCS111	16	X	ITRW211	8	X	KEUS311	8	X
STTK111	8	H	REKP211*	16	X	STTK311	24	H
WISK112	8	H	STTK211	16	H	WISK311	16	H
WISK111	8	H	WISK211	8	H	WTNL318	8	X
			WISK212	8	H			
Tot 1st sem	60		Tot 1st sem	88		Tot 1st sem	96	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
BWIN123	8	H	EKRP221	16	H	BWIN321	8	H
ECON121	12	H	ENTR221	8	X	BWIN322	16	H
ITRW121	16	X	REKP221*	16	X	BWIN324	24	H
ACCF121* or ACCS121	16	X	STTK221	24	H	STTK321	24	H
STTK121	8	H	WISK221	8	H	STTK322	8	H
TGWS122	8	X	WISK222	8	H			
WISK121	8	H	WTNL221	8	X			
WISK122	8	H						
AGLA121	12	X						
Tot 2nd sem	96		Tot 2nd sem	88		Tot 2nd sem	80	
Total year level 1	156		Total year level 2	176		Total year level 3	176	
						Total of credits of the curriculum	508	
Additional Stipulation: The Centre for BMI recommends that ENSW311 be taken as the elective module KEUS311 in the first semester of the third year.								

* Students who have already passed grade 12 Accounting must take ACCF111,121. Students that have achieved final marks of at least 65% for ACCS111 **must** register for ACCF121 in the second semester. **A student that did not achieve at least 65% for ACCS111 at the end of the first semester must in consultation with the centre director switch to N135P or N136P.**

N.2.9.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.3 RULES FOR THE DEGREE BACCALAUREUS SCIENTIAE IN INFORMATION TECHNOLOGY

This qualification may be taken in the programmes and curricula that are found in N.1.3.1 and are described in detail below. It may only be taken full-time. Students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the curriculum for which they are registered.

N.3.1 MINIMUM AND MAXIMUM DURATION OF STUDIES

The minimum duration for this degree is three years and the maximum duration for completing the degree is four years.

N.3.2 RECOGNITION OF PRIOR LEARNING

The requirements for this qualification regarding prior learning are described in N.1.8.

Students who did not pass Mathematics in the higher grade with at least 50%, but did achieve at least 40% in Mathematics HG, may take the refresher course in Mathematics, which is presented in January by the School of Computer, Statistical and Mathematical Sciences, after which the student might possibly on the basis of achievement in this course be admitted to the B.Sc. in IT.

N.3.3 PROGRAMME: INFORMATION TECHNOLOGY

This programme provides a good basic training in information technology. In compiling the curricula for this programme the Faculty also considered possible occupations and the need of our country for human resources. Furthermore this programme prepares the student for postgraduate studies (Hons.B.Sc. and/or M.Sc.) in computer science, which are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.3.3.1 Programme rules

N.3.3.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.3.3.1.2 Total credit value of programme

Each programme in this direction is compiled from modules with a total credit value of at least 384. In the programmes set out below the 380 credits are divided into three study years.

N.3.3.1.3 Selection possibilities

In each programme there are a number of *prescribed modules*, AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a programme, the student selects ONE of the six alternative *modules* indicated in the list of programme modules.

N.3.3.2 Programme outcomes

Programme outcomes as discussed for the B.Sc. degree (programme chemical-physical-computer and mathematical sciences) in N.2.3.3 also apply to this qualification. Apart from those the student will also have the following specific knowledge and skills, viz. he will have the ability to:

a) contribute in a professional manner and according to modern, acceptable methodologies to the design, development and delivery of computer systems in accordance with business needs and principles;

b) contribute meaningfully to the management of information and information sources on the basis of his knowledge and understanding of appropriate concepts, structures, models, theories, principles and research methods;

c) solve IT relevant problems in the context of approaches and techniques of other appropriate disciplines by means of a thorough, practice-directed knowledge of and insight into the field of information technology (IT);

d) realise the necessity to ensure continuing competency and to remain at the forefront of the latest technology and techniques, and as a lifelong student to stay involved with these by means of established and well-developed learning skills;

e) understand the process of entrepreneurship and to identify, create and make opportunities materialise in practice.

N.3.3.3 Articulation possibilities

The programme grants admission to honours studies in computer science.

N.3.3.4 Curricula

N.3.3.4.1 Curriculum N138P: Information Technology

This curriculum is compiled as follows:

YEAR LEVEL 1			YEAR LEVEL 2			YEAR LEVEL 3		
First semester			**First semester**			**First semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ITRW111	8	H	ITRW211	8	H	ITRW311	16	H
BMAN111	12	X	ITRW212	16	H	ITRW312	8	H
ACCS111 or ACCF111	16	X	ITRW213	16	H	ITRW313	8	H
STTK111	8	X	ITRW214	16	H	ITRW314	8	H
WISK113	8	X	WISK213	8	X	ITRW315	8	H
						KEUS311	8	X
						WTNL318	8	X
Tot 1st sem	52		Tot 1st sem	64		Tot 1st sem	64	
Second semester			**Second semester**			**Second semester**		
Code	**Cr**	**Type**	**Code**	**Cr**	**Type**	**Code**	**Cr**	**Type**
ITRW121	16	H	ENTR221	8	X	ITRW321	16	H
ITRW122	16	H	ITRW222	16	H	ITRW322	16	H
ACCS121 or ACCF121	16	X	ITRW225	16	H	ITRW323	16	H
STTK121	8	X	BMAN121	12	X	ITRW324	16	H
STTK123	8	X	WTNL221	8	X			
AGLA121	12	X						
Tot 2nd sem	76		Tot 2nd sem	60		Tot 2nd sem	64	
Total year level 1	128		Total year level 2	124		Total year level 3	128	
Total of credits of the curriculum							380	

Remark: ACCS111 and ACCS121 are taken by students who did not take Accounting in the grade 12 examinations, while ACCF111 and ACCFP121 are taken by students who did take Accounting in the grade 12 examinations.

N.3.3.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.4 RULES FOR THE DEGREE BACCALAUREUS SCIENTIAE (INDUSTRIAL SCIENCE)

This qualification may be taken in one of the programmes and curricula that are found in N.1.2.1 and are described in detail below. It may only be taken full-time.

Students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.4.1 MINIMUM AND MAXIMUM STUDY PERIOD

The minimum duration of studies for this degree is four years and the maximum duration for completing the degree is five years.

N.4.2 RECOGNITION OF PRIOR LEARNING

Recognition of prior learning as described in N.1.8 also applies here.

N.4.3 PROGRAMME: CHEMISTRY-CHEMICAL ENGINEERING

The Faculty of Natural Sciences has approved one curriculum that provides a good basic training in chemical sciences and technology. In compiling this curriculum possible occupations and our country's need for human resources were also considered. Furthermore this curriculum prepares the student for master's studies in chemistry and chemical engineering, which are recommended in view of registration with the South African Council for Natural Scientific Professions (SACNASP).

N.4.3.1 Programme rules

N.4.3.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.4.3.1.2 Total credit value of the programme

The curriculum in this programme is compiled from modules with a total credit value of at least 572. In the curriculum set out below it is also indicated in what way the credits are divided into the four study years of the curriculum.

N.4.3.1.3 Selection possibilities

In each programme there is a number of *prescribed modules*, AGLA111, AGLA121 and ENTR221, and the Philosophy of Science modules, WTNL221 and WTNL316-318. These modules are compulsory to all students. When a module KEUS311 is indicated in a programme, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.4.3.2 Programme outcomes

On successful completion of this degree the student will be able to provide proof of his subject knowledge, skills and values regarding the exit level outcomes following below.

N.4.3.2.1 Knowledge

a) Knowledge of fundamental, chemical, physical and mathematical subject specific content as indicated by a fixed directed programme.

b) Knowledge of scientific terminology and nomenclature.

c) Knowledge of the use of laboratory apparatus and techniques.

d) Knowledge of industrial processes and operational methods.

N.4.3.2.2 Skills

a) The ability to retrieve knowledge and information electronically and otherwise in preparation of lifelong learning.

b) Familiarity with different learning strategies and management of time.

c) The ability to process, evaluate and report on scientific information.

d) The ability to recognise relationships between structures (reagents), driving forces and processes.

e) The ability to perform elementary and advanced problem solving.

f) Control of basic laboratory skills.

g) The ability to work in groups and where necessary to exercise leadership.

N.4.3.2.3 Values, conduct and attitudes

a) The necessity to understand scientific actions.

b) The necessity to be aware of scientific honesty and integrity.

N.4.3.3 Articulation possibilities

a) On successful completion of the Baccalaureus Scientiae (Industrial Science) the student will have direct admission to the master's degree in Chemistry and Chemical Engineering.

b) Credits will be awarded for modules of other faculties or other universities, provided such modules contribute to the outcomes and total credit requirements of the curriculum concerned.

c) The basic and applied skills in the mathematical and natural science disciplines the student has acquired by this qualification equips him to continue further learning in several specialist areas at other institutions.

d) Students with credits from other tertiary institution at levels 5a, 5b and 6 will be evaluated by the Dean for possible admission to further studies in the B.Sc.(Ind.Sc.) programme.

N.4.3.4 Curriculum

All of the curricula in this programme are compiled from modules in the list of modules in N.1.5.

NB: **The provisions of rule N.2.3.5 also apply to these curricula**.

The core subjects of each curricula are indicated by superscripts "1" and "2".

Curricula marked with an asterisk (*) grant admission to studies for the Post-graduate Education Certificate.

N.4.3.4.1 Curriculum N139P: Chemistry-Chemical Engineering*

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**			**YEAR LEVEL 4**		
First semester			**First semester**			**First semester**			**First semester**		
Code	**Cr**	**T**	**Code**	**Cr**	**T**	**Code**	**Cr**	**T**	**Code**	**Cr**	**T**
CHEN111	8	H	BCHI211	8	X	CEMI311	16	H	BCHI411	16	X
FSKN111	8	X	CEMI212	16	H	CEMI313	16	H	CEMI411	16	H
ITRW111	8	X	CHEN211	8	H	CHEN311	8	H	CHEN611 or CHEN613	16	H
STTK111	8	X	CHEN212	8	H	CHEN312	16	H	CHEN612	16	H
WISK112	8	X	TGWS211	8	X	KEUS311	8	X	CHEN671[#]	48	H
WISK111	8	X	TGWS212	8	X	TGWS312	8	X			
			WISK211	8	X	WTNL317	8	X			
			WISK212	8	X						
Tot 1st sem	48		Tot 1st sem	72		Tot 1st sem	80		Tot 1st sem	112[#]	
Second semester			**Second semester**			**Second semester**			**Second semester**		
Code	**Cr**	**T**	**Code**	**Cr**	**T**	**Code**	**Cr**	**T**	**Code**	**Cr**	**T**
CHEN121	8	H	CEMI222	16	H	CEMI223	16	H	CEMI321	16	H
CHEN122	8	H	CHEN221	8	H	CEMI322	16	H	CEMI323	16	H
FSKN121	8	X	CHEN222	8	H	CHEN321	16	H	KEUS62*	16	H
FSKN123	8	X	CHEN223	8	H	CHEN322	16	H			
TGWS121	8	X	ENTR221	8	X						
TGWS122	8	X	TGWS222	8	X						
WISK121	8	X	WISK221	8	X						
WISK122	8	X	WTNL221	8	X						
AGLA121	12	X									
Tot 2nd sem	76		Tot 2nd sem	72		Tot 2nd sem	64		Tot 2nd sem	48[#]	
Total year level 1	124		Total year level 3	144		Total year level 3	144		Total year level 4	160	
									Total of credits of the curriculum	572	

[#] The module CHEN671 is a year module, which means the credits of this module are divided into two semesters.

* Choose TWO of the following in consultation with the School Director:

Elective Modules (KEUS62*) for N139P		
CHEN621	Homogeneous catalysis	8
CHEN622	Carbon Chemistry	8
CHEN623	Membrane science and technology	8
CHEN624	Molecular modelling	8
CHEN625	Reactions under non classic conditions	8
CHEN626	Femto Chemistry	8
CHEM621	Polymer Chemistry	8
CHEM622	Advanced structural clarification	8
CHEM623	Environmental Chemistry	8
CHEM624	Techniques for organic synthesis	8
CHEM625	Platinum Group Metal Chemistry	8

N.4.3.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.5 RULES FOR THE DEGREE BACCALAUREUS ARTIUM ET SCIENTIAE (PLANNING)

This qualification may be taken full-time only.

Students who have registered for the first time up to 2006 may obtain this qualification by completing curriculum N140P or N141P set out in detail below. **Curricula N140P and N141P will be phased out from 2007 to 2011. Students who have not completed N140P or N141P at that time will have to switch to N146P.**

Students who register for the program for the first time from 2007, register fir curriculum N146P.During their studies students may only with the consent of the school director concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.5.1 MINIMUM AND MAXIMUM STUDY PERIOD

The minimum duration of the studies for this degree is four years and the maximum duration for completing the degree is four years.

N.5.2 RECOGNITION OF PRIOR LEARNING

a) Recognition of prior learning as described in N.1.8 also applies here.

b) **Students are only admitted to the B.Art. et Scien.(Plan.) if they have been selected for admission.**

N.5.3 PROGRAMME: URBAN AND REGIONAL PLANNING

The Faculty of Natural Sciences has approved curricula N140P, N141P and N146P, which provide a good basic training in urban and regional planning. In compiling these curricula possible occupations and our country's need for human resources were also considered. These curricula also conform to the requirements of the South African Council for Town and Regional Planners and prepare the student for admission to studies of the degree M.Art. et Scien.(Plan.)

N.5.3.1 Programme rules

N.5.3.1.1 Changing a programme or curriculum

During their studies students may only with the consent of the school directors concerned change from one programme or curriculum to another or change the programme or curriculum for which they are registered.

N.5.3.1.2 Total credit value of curricula

Curricula N140P and N141P in this programme are compiled from modules with a total credit value of at least 572 for N140P, 548 for N141P and 580 for N146P. In the curriculum matrices set out below it is indicated in what way the credits are divided into the four study years of the curricula.

N.5.3.1.3 Selection possibilities

In each curriculum there is a number of *prescribed modules*, AGLA111, AGLA121 and ENTR221, and the Philosophy of Science module WTNL221. This module is compulsory to all students. When a module KEUS311 is indicated in a curriculum, the student selects ONE of the six *alternative modules* indicated in the list of programme modules.

N.5.3.1.4 Conducting the research project (mini-dissertation)

Students do the practical work for SBEL471 full-time during the first and second semester under the guidance of the personnel of the subject group. The following conditions have to be complied with:

a) An exposition of the research project on an acceptable topic in the subject area of urban and regional planning is to be presented for consideration to the school director before the end of February.

b) On the recommendation of the subject group the school director assigns a study leader to the student from the midst of the personnel in the subject group. The student has the right to request that the studies be conducted under the guidance of a specific member of the personnel. If necessary, the school director may on the recommendations of the subject group appoint an assistant or fellow study leader from other subject groups and/or the private or public sector.

c) Students present a monthly progress report on the research project to the study leader appointed. The progress report concerns the work that has been completed during the previous month, as well as the work that will be undertaken during the following month.

d) As part of the research project the student prepares a framework for an article for publication on the topic of the research project under the guidance of the study leader (assistant study leader, if applicable). This framework will also be considered for evaluation.

e) SBEL471 consists of the following components: completing the research project and submitting a framework for an article on the **research** topic.

N.5.3.2 Programme outcomes

N.5.3.2.1 General outcomes

f) At the end of the programme the student ought to have a broad interdisciplinary knowledge and skills and be equipped with scientific, technical and communicative skills and an awareness of the social and environmental context in which he/she will be working.

g) On completion of the programme the student ought to be qualified to function effectively in all planning fields in central, provincial, district and local government areas, and in the private sector.

h) He/she ought to have developed a fundamental view of life and the world based on principles of respect for fellow human beings, creation and authority.

i) He/she ought to have the ability to communicate knowledge creatively and effectively.

N.5.3.2.2 Special and critical exit outcome levels

On successful completion of this qualification the student ought to have the subject knowledge, skills and values with regard to the following exit level outcomes: knowledge of the fundamental content of urban and regional planning and other subject specific contents that have been presented in the programme; creative, critical and independent project planning and execution, including aspects like data collection, computerised processing, evaluation, reporting and making recommendations that conform to scientific and professional standards; the application of basic planning knowledge and techniques in identifying and solving planning problems; knowledge and skills in bringing about sustainable development in urban and rural environments; the

ability to function as a member of a multi-disciplinary team and where necessary to exercise and assume leadership; the ability to apply effective and responsible self-management; the ability to apply integrated planning; scientific and comprehensible communication of knowledge, which means the student must have command of oral, writing, reasoning and computer skills; respect for fellow human beings, creation and authority; the ability to act as an entrepreneur by utilising knowledge and skills in planning consultations and development; familiarity with the following values: integrity, responsibility, trustworthiness, precision, thoroughness and punctuality; an awareness as a responsible citizen of the importance to take part in the life of the local, national and international community; an awareness of the importance of cultural and ethnic sensitivity of social contexts and the possibilities and limitations of the community and environment; the ability to create an own frame of thought with specific reference to Christian and other views of life and the world.

N.5.3.3 Articulation possibilities.

Relevant graduate subjects already completed will be recognised. Successful completion of the degree grants admission to the M.Art. et Scien.(Plan.), M.Sc. (Geography) and the Master of Environmental Management degrees.

N.5.3.4 Curricula

All the curricula in this programme are compiled from modules from the module list in N.1.5.

NB: The stipulations N.2.3.4 are also applicable to these curricula.

N.5.3.4.1 Curriculum N140P : With Geography and Environmental Studies

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2011. Students who have not completed this curriculum at that time, WILL HAVE TO switch to curriculum N146P.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**			**YEAR LEVEL 4**		
First semester			**First semester**			**First semester**			**First semester**		
Code	**Cr**		**Code**	**Cr**		**Code**	**Cr**		**Code**	**Cr**	
ECON111	12	H	EKNP211	16	H	EKNP311	16	H	SBEL471#	72#	H
GGFN111	8	X	GGFN211	16	X	KEUS311	8	X	SBRL411	8	H
LEER111	8	X	SBRL211	16	H	SBEL311	16	H	SBRL412	8	H
RINL111	8	X	SBSL211	16	H	SBRL311	16	H	SBSL411	16	H
SBEL111	16	H				SBSL311	16	H			
SOSL111	8	X									
STTK111	8	X									
WISK113	8	X									
Tot 1st sem	72		Tot 1st sem	64			80		Tot 1st sem	68#	
Second semester			**Second semester**			**Second semester**			**Second semester**		
Code	**Cr**		**Code**	**Cr**		**Code**	**Cr**		**Code**	**Cr**	
ECON121	12	X	EKNP221	16	X	GGFN321	16	H	ENTR221	8	X
GGFN121	16	H	GGFN221	16	H	GGFN323	16	H	SBEL421	16	H
SBEL121	16	H	GGFN222	8	H	SBEL321	16	H	SBEL471#	72#	H
SOSL121	8	X	PVRR221	8	X	SBRL321	16	H			
STTK124	8	X	SBRL221	16	H	SBSL321	16	H			
WISK123	8	X	SBSL221	16	H						
WTNL221	8	X									
Tot 2nd sem	72		Tot 2nd sem	80		Tot 2nd sem	80		Tot 2nd sem	60#	
Total Year level 1	144		Total Year level 2	160		Total Year level 3	160		Total Year level 4	128	
									Total of credits of the curriculum	576	

The research project module, SBEL471, is a year module and therefore it is indicated in both semesters, but only half of the credits of the module indicated in N140P above are added to the credit total of each semester. See faculty rule N.3.6.1 below on submitting the planning project and taking the examinations in this module.

N.5.3.4.2 Curriculum N141P: With Economics

NB: New students cannot register for this curriculum in 2009. This curriculum will only be presented up to 2011. Students who have not completed this curriculum at that time, WILL HAVE TO switch to curriculum N146P.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**			**YEAR LEVEL 4**		
First semester			**First semester**			**First semester**			**First semester**		
Code	**Cr**		**Code**	**Cr**		**Code**	**Cr**		**Code**	**Cr**	
ECON111	12	H	EKNP211	16	H	EKNP311	16	H	SBEL471[#]	72[#]	H
GGFN111	8	X	GGFN211	16	X	KEUS311	8	X	SBRL411	8	H
LEER111	8	X	SBRL211	16	H	SBEL311	16	H	SBRL412	8	H
RINL111	8	X	SBSL211	16	H	SBRL311	16	H	SBSL411	16	H
SBEL111	16	H				SBSL311	16	H			
SOSL111	8	X									
STTK111	8	X									
WISK113	8	X									
Tot 1st sem	72		Tot 1st sem	64			72		Tot 1st sem	68[#]	
Second semester			**Second semester**			**Second semester**			**Second semester**		
Code	**Cr**		**Code**	**Cr**		**Code**	**Cr**		**Code**	**Cr**	
ECON121	12	H	EKNP221	16	H	EKNP321	16	H	ENTR221	8	X
GGFN121	16	X	GGFN221	16	X	SBEL321	16	H	SBEL421	16	H
SBEL121	16	H	GGFN222	8	X	SBRL321	16	H	SBEL471[#]	72[#]	H
SOSL121	8	X	PVRR221	8	X	SBSL321	16	H			
STTK124	8	X	SBRL221	16	H						
WISK123	8	X	SBSL221	16	H						
WTNL221	8	X									
Tot 2nd sem	72		Tot 2nd sem	80		Tot 2nd sem	64		Tot 2nd sem	60[#]	
Total Year level 1	144		Total Year level 2	146		Total Year level 3	136		Total Year level 4	128	
									Total of credits of the curriculum	552	

[#] The research project module, SBEL471, is a year module and therefore it is indicated in both semesters, but only half of the credits of the module indicated in N141P above are added to the credit total of each semester. See faculty rule N.5.3.6.1 below on submission and taking the examinations in this module.

N.5.3.4.3 Curriculum N146P: With Economics and Geography and Environmental Sciences

NB. New students may register for this curriculum from 2009.

This curriculum is compiled as follows:

YEAR LEVEL 1			**YEAR LEVEL 2**			**YEAR LEVEL 3**			**YEAR LEVEL 4**		
First semester			**First semester**			**First semester**			**First semester**		
Code	**Kr**	**T**	**Code**	**Kr**	**T**	**Code**	**Kr**	**T**	**Code**	**Kr**	**T**
ECON111	8	X	ECON211	16	X	GGFN313	16	H	SBEL471[#]	72[#]	H
GGFN111	8	H	GGFN211	16	H	GGFN312	8	H	SBRL431	8	H
SBEL111	16	H	SBRL211	16	H	KEUS311	8	X	SBRL441	8	H
SOSL111	8	X	SBSL212	16	H	SBEL311	16	H	SBSL411	16	H
STTK111	8	X	SOSL 211	8	X	SBRL311	16	H	SBSL412	16	H
WISK113	8	X	SOSL 212	8	X	SBSL311	16	H	SBVD411	8	X
						EKNP311	16	H			
Tot 1e sem	56		Tot 1e sem	80			96		Tot 1e sem	72[#]	
Second semester			**Second semester**			**Second semester**			**Second semester**		
Code	**Kr**	**T**	**Code**	**Kr**	**T**	**Code**	**Kr**	**T**	**Code**	**Kr**	**T**
ECON121	12	H	GGFN222	8	H	GGFN321	16	H	ENTR221	8	X
GGFN121	16	H	PVRR221	8	H	GGFN323	16	H	SBEL421	16	H
SBEL121	16	H	SBRL251	8	H	SBEL321	16	H	SBEL471[#]	72[#]	H
SOSL121	8	X	SBRL261	8	H	SBRL351	8	H	SBPR421	8	H
STTK124	8	X	SBSL221	16	H	SBRL361	8	H			
AGLA121	12	X	WTNL 221	8	X	SBSL321	16	H			
Tot 2e sem	76		Tot 2e sem	56		Tot 2e sem	80		Tot 2e sem	80	
Total Year level 1	132		Total Year level 2	136		Total Year level 3	176		Total Year level 4	152	
									Total for degree	604	

[#] The research project module, SBEL471, is a year module and therefore it is indicated in both semesters. In the first semester 16 of the credits of the module are added to the credit total of the semester and 56 credits to the total of the second semester. See faculty rule N.5.3.6.1 below on submission and taking the examinations in this module.

N.5.3.5 Examinations

For examination admission requirements, calculation of the participation mark, module mark, pass requirements of the curriculum, repetition of examinations in modules, etc. the student is referred to N.1.12.

N.5.3.5.1 Submission and examination of research project (SBEL471)

i) A date on which the research report must be submitted for examination is set by the subject group.

iii) ii) The examination of the research project comprises the evaluation of the submitted research report and an oral examination on its content

After the examination the final marks will only be official when the correct number of research reports, which must be edited finally and bound according to prescriptions, is submitted to the school director. This submission must take place before the final date for the submission of marks for the second examination opportunity. The framework for the article on the research project topic must be submitted for evaluation simultaneously with the research project.

N.5.3.5.2 Practical examination (SBPR421)

i) A date on which the practical examination takes place is set by the subject group.

ii) The examination may comprise written and/or oral components and may include one or more parts of the methodologies and practices of urban and regional planning have been treated during the course of the programme.

N.6 THE CENTRE FOR ENVIRONMENTAL MANAGEMENT

The Centre for Environmental Management of the Faculty of Natural Sciences annually presents a number of courses in environmental management and related areas. Particulars of these courses are published in a separate booklet, “Environmental Management Courses 2009/10”. This booklet is deemed to be an integral part of this Calendar.

N.7 GRADUATE MODULE OUTCOMES

The duration of the examination paper, viz. 2 hours or 3 hours, is indicated at each module. The modules, of which the outcomes are described below, are all presented at the Potchefstroom campus and the outcomes described apply only to the Potchefstroom campus.

BUSINESS MATHEMATICS

BWIN123 BMI PROJECT: FINANCIAL MATHEMATICS

2 hours

At the end of this module the student will have acquired knowledge and insight into the calculation of interests, time value of money, nominal and effective interest rates and annuities and loans. The concepts are presented in the form of a self-created project. In this module the student acquires skills to handle vaguely defined problems and to integrate concepts from the financial-economic world that can be quantified with the aid of mathematical models and solved by means of computer spreadsheet-based implementation. Specific attention is given to playing off simulation versus the analytical, as well as to discrete versus stochastic modelling of such problems.

BWIN313 FINANCIAL MATHEMATICS CT1

3 hours

At the end of this module students will have knowledge and insight into the concepts fundamental to actuarial philosophy and actuarial scientific methods, as well as generalised cash-flow models, interests and cash flow, theory of interest and compound interest functions, non-annual interest payments, discounted cash flow techniques, capital redemption insurance, annuities and stochastic interest rate models. Students will also have knowledge and insight into the concepts and notions fundamental to regression theory, fixed-interest-bearing securities, term structure of interest rates, options and futures contracts, as well as the functioning thereof. Students will have skills necessary to describe and implement actuarial scientific methods and philosophy in several investment problems

BWIN321 BMI PROJECT: CAPITAL MARKETS MODELLING AND ANALYSIS

2 hours

The module elaborates on the principles laid down in BWN123 at a more advanced level. Teamwork plays a greater role, and more is expected from students in terms of self-study and research. The focus here concerns the use and development of more advanced systems to support decision-making. Modelling and analysis of the performance of securities at the equity market will be used as the framework of training. On successful completion of the module the student will be able to manage independently his own portfolio at the stock exchange and to work effectively in a team, with the focus on the integration of knowledge from different disciplines in the financial risk management environment.

BWIN322: FINANCE AND FINANCIAL REPORTING CT2

3 hours

The aim of this module is to provide a basic understanding of financial management including a knowledge and understanding of the instruments used by companies to raise finance and manage financial risk. In order to increase the wealth of a company, investment opportunities have to be identified and evaluated. Funds have to be raised in order to fund these wealth-creating opportunities. This module is concerned with the acquisition and application of funds as well as the decision to pay out dividends to shareholders.

BWIN324 STATISTICAL METHODS CT6

3 hours

At the end of this module students will have knowledge and insight into the concepts and notions fundamental to loss distributions, reinsurance, total claims from insurance policies, ruin probability, Bayes statistics and Bayes estimators, credibility theory, time series analysis, run-off triangles, no claims discount schemes and generalised linear models. Risk theory has different applications to different practical situations. This module presents to the student an opportunity to obtain a good background in risk theory and to accumulate practical skills in order to function better in the private sector. A practical project is conducted and the inference procedure and basic statistical techniques are used. A written report is submitted to develop the scientific communication skills of the student.

BUSINESS ETHICS

Consult the Calendar of the Faculty of Economic and Management Sciences.

INDUSTRIAL AND PERSONNEL PSYCHOLOGY

Consult the Calendar of the Faculty of Economic and Management Sciences.

BSKP161 DIVERSITY IN WORK CONTEXT

MHBP111 INTRODUCTION TO HUMAN RESOURCE MANAGEMENT

INDUSTRIAL PSYCHOLOGY

Consult the Calendar of the Faculty of Economic and Management Sciences.

BSOP161 SOCIAL CHANGE

BSOP211 OCCUPATIONAL SOCIOLOGY

BUSINESS ACCOUNTANCY

Consult the Calendar of the Faculty of Economic and Management Sciences.

BRKP321 DECISION-MAKING AND FINANCIAL MANAGEMENT

BIOCHEMISTRY

BCHI211 – INTRODUCTORY BIOCHEMISTRY FOR ENGINEERS

2 hours

The relationship and scope of biochemistry and biotechnology with regard to other disciplines. Cellular biology: structure and properties of pro- and eucharіotic cells, subcellular components; chemical composition of cells. Structure and function of biomolecules: carbohydrates, proteins, nucleic acids and lipids; hierarchy in cellular organisation. Metabolism and bio-energetics: provision of carbon and energy needs; oxidation reduction reaction and mechanisms of ATP generation. Introductory Enzymology: biological catalysts; simple enzyme kinetics; regulation of enzyme activity; applied Enzymology.

BCHN213 INTRODUCTORY BIOCHEMISTRY

3 hours

At the end of this module the student will have an overview of the scope and range of biochemistry, as well as the structural and functional organisation of organisms at a molecular level. The student will also have a fundamental knowledge of the primary and higher order structure of nucleic acids and the processes involved in the flow of genetic information in the biosphere (e.g. DNA and RNA synthesis), translational and post translation modifications. The student will have adequate knowledge, insight and skills to be able to: describe the role of proteins in the structure and function of the cell; discuss the physical-chemical properties of amino acids, peptides and proteins; identify and describe the most important elements in the primary, secondary, tertiary and quaternary structure of proteins; discuss the thermodynamic stability of proteins as a function of stabilising the 3-D-structure by internal, non-covalent bonds and to discuss comprehensively the most important structure-function relationships of selected proteins (e.g. myoglobin, haemoglobin, enzymes, antibodies).

BCHN221 ENZYMOLOGY A

2 hours

At the end of this module the student will have a sound knowledge and insight into the classification system of enzymes and the role of enzymes as biocatalysts, the general structural and functional properties of enzymes, the principles of enzyme catalysis and the meaning of the basic kinetic parameters, a practical approach in determining the kinetic parameters, enzyme inhibition and the distinction between the types of mechanisms. The student will also have knowledge of the role of cofactors and coenzymes and the regulation of enzyme activities, as well as their role in metabolic regulation.

BCHN222 METABOLISM A

3 hours

At the end of this module the student will have acquired basic knowledge and insight into the structure of carbohydrates, lipids, amino acids and nucleotides involved in metabolism, and the processes involved in the catabolism of these molecules, as well as the biorearrangement of these molecules to vitally important compounds. The student will also have a basic knowledge of the interdependency of the molecules and the contribution of each of them to the normal functioning of the cell.

BCHN311 ENZYMOLOGY B

2 hours

At the end of the module the student will be acquainted with the nomenclature of enzymes, the concepts of catalysis and kinetics of single and multisubstrate enzyme catalysed reactions, enzyme inhibition, different enzymatic mechanisms and the meaning of and methods to determine enzyme-kinetic parameters. The student will be familiar with experimental approaches to enzyme kinetics, data processing and interpretation, as well as the characteristics of allosteric enzymes, sigmoidal behaviour of enzymes and its importance in metabolic regulation; the practical handling and purification of enzymes and industrial applications of enzymes in the chemical industry, medicine and biotechnology.

BCHN312 METABOLISM B

2 hours

At the end of this module the student will have acquired knowledge and insight into the metabolic pathways involved in the catabolism and anabolism of different biomolecules, experimental approaches, results and conclusions that lead to the clarification of reactions,

and intra- and interregulation of metabolic pathways. The student will also have knowledge of the role of biomolecules in congenital and other selective diseases.

BCHN313 MOLECULAR BIOLOGY

2 hours

At the end of this module the student will have knowledge of the basic principles of recombinant DNA technology, viz. the generation and characterisation of cloned genes, applications to medical, agricultural and industrial areas. The student will also have knowledge of the complexity of the eukaryotic genome structure and the regulation of gene expression. Knowledge of the molecular characterisation of genetic defects, cancer and AIDS will be acquired, as well as of the molecular basis and ethical issues of gene therapy and the genetic manipulation of organisms.

BCHN321 ANALYTICAL BIOCHEMISTRY

2 hours

At the end of this module the student will have acquired basic knowledge and insight into the application of analytical techniques in the diagnosis of biochemical abnormalities. The student ought to be familiar with the design of molecular-biological strategies in view of the characterisation of genetic defects, high-permeating genometics, its application in diagnosis, application of enzyme kinetics in diagnosis, application of problem-directed approaches and data processing at the level of research reports.

BCHN322 INDEPENDENT PROJECT

3 hours

At the end of this module the student will have completed independent studies regarding selected clinical-biochemical issues by making use of known information systems, presenting specific approaches to problem solving, implementing a wide range of analytical techniques in the selection, standardisation and validation of relevant methods, data collecting, processing and presentation of scientific data in the form of reports, articles and scientific talks.

BCHI422 BIOTECHNOLOGY

3 hours

At the end of the module the student will have knowledge of the basic principles of energy regeneration by organisms and of the flow of genetic information in the biosphere. The student will have knowledge of the principles of genetic manipulation of organisms and in what way this knowledge can be applied in the production of special compounds. Metabolism and bio-energetics: provision of carbohydrate and energy needs. Oxidation-reduction reaction and mechanism of ATP generation. The student will also have knowledge of biological reactors and the meaning and utilisation of mixed microbe populations and biofilms.

CHEMISTRY

CHEN111 CHEMICAL PRINCIPLES

2 hours

At the end of this module the student will have acquired basic knowledge and insight to handle scientific methods, to write and name chemical formulae and to balance reaction equations; to use stoichiometric and other calculations in determining an unknown quantity; to explain tendencies and relationships according to the Periodic Table (main groups) and to name important properties of substances; to classify substances, to write reaction equations and to

give explanations for phenomena observed, to handle laboratory equipment and to take safety measures.

CHEN121 INTRODUCTORY ORGANIC CHEMISTRY

2 hours

At the end of this module the student will have acquired basic knowledge and insight to classify and name organic compounds; to be familiar with the physical properties and chemical reactions of the following types of compounds: unsaturated hydrocarbons, alkyl halides, alcohols, carbonyl compounds, carboxylic acids and their derivatives and a few aromatic compounds; to describe the mechanism of selected organic reactions; to know important compounds and a few of their reactions.

CHEN122 INTRODUCTORY INORGANIC CHEMISTRY

2 hours

At the end of this module the student will have acquired basic knowledge and insight to represent the principles underlying solutions, chemical equilibrium, acids and bases, formation of precipitates and electron transfer and to perform appropriate calculations; and to discuss chemical processes in practice and in nature.

CHEN211 ANALYTICAL METHODS I

2 hours

At the end of this module the student will have acquired knowledge and insight to describe analysis as a process (sampling, sample preparation, separation, quantifying, evaluating) to evaluate analytical data, to make analytical calculations, to describe volumetric methods (acid-base, complexiometric), atomic spectrometric methods (background, atomic absorption and atomic emission spectroscopy, inductively coupled plasma), electrochemical methods (potentiometry, coulometry, conductometry and separation methods (extraction, column and thin-layer chromatography) and to be familiar with general laboratory techniques; to be able to use chemical analytical techniques generally found in research and quality control laboratories and to learn “classic” analytical methods on his/her own; to perform chemical analyses in a responsible way and to evaluate analytical results.

CHEN212 PHYSICAL CHEMISTRY II

2 hours

The thermodynamic and kinetic methods of approach in studying chemical and/or biological processes are presented at an introductory level in this module. On completion of this module the student (1) will have command of the conceptual background, theoretical knowledge and operating competency to determine and interpret thermodynamic quantities; (2) will be familiar with basic kinetic concepts and have the ability to calculate kinetic quantities from which he/she will also be able to make mechanistic deductions.

CHEN213 ORGANIC CHEMISTRY II FOR PHARMACY/BIOLOGICAL SCIENCES

2 hours

At the end of this module the student will have a basic knowledge and insight into the nomenclature and chemical properties of polyfunctional compounds of alkylenes, alcohols, carbonyls, carboxylic acids, amides and amines as well as five- and six-membered heterocyclic compounds. The student will also be familiar with the basic principles of aromaticity, know the chemistry of diazotic compounds and be able to explain the reaction mechanisms of electrophiles and aromatic substitution reactions. The student will be able to predict synthetic routes/pathways for aromatic compounds because of his/her knowledge of permanent effects and his/her ability to apply these in order to explain orientation and

reactivity. The student will be able to synthesise certain polyfunctional and aromatic compounds, as he/she has mastered the necessary laboratory techniques and skills.

CHEN 221 ANALYTICAL METHODS II

2 hours

At the end of this module the student will have acquired knowledge and insight to be able to evaluate analytical data, to describe molecular spectrometric techniques (ultraviolet, infrared, proton magnetic resonance, mass spectrometry) and surface characterising methods (microscopy), separation methods (gas, fluid and superfluid chromatography, electrophoresis), thermal methods (differential thermal analysis, differential scanning calorimetry, thermogravimetry) and the relevant sampling preparation techniques; to derive the structures and properties of chemical substances from experimental measurements, to utilise analytical techniques that are generally used in the characterisation of chemical compounds and to execute chemical analyses in a justifiable way and evaluate analytical results.

CHEN222 INORGANIC CHEMISTRY II

2 hours

With this module the student acquires basic knowledge and insight to describe the atomic structure of the s- and p-group elements and the bonding theories applicable to these elements; to learn and understand the chemical reactions of the more important s- and p-group elements and to be able to apply the tendencies in the periodic table; to acquire laboratory skills in a variety of synthesis techniques for the s- and p- group compounds and to act responsibly in a laboratory.

CHEN223 ORGANIC CHEMISTRY II

2 hours

At the end of the module the student will be familiar with the basic principles of aromaticity, have a knowledge of the chemistry of the most important aromatic compounds, as well as the ability to explain the reaction mechanisms of electrophilic and nucleophilic aromatic substitution reactions. The student will have the ability to predict synthesis routes for aromatic compounds on the basis of his/her knowledge and ability to apply permanent and time-dependent electronic effects in order to explain orientation and reactivity. The student will be able to synthesise certain aromatic compounds, as he/she has mastered the necessary laboratory techniques and skills.

CHEN311 ANALYTICAL METHODS III

2 hours

At the end of this module the student will have acquired knowledge and insight to describe more advanced applications of UV, IR, NMR and MS, further techniques of thermal analysis (DMA, TMA and other specialised techniques), chromatographic separation methods, capillary electrophoresis and electrochromatography, electrochemistry, radiochemistry, basic measurements with analytical instruments, and relevant sample preparation techniques; to derive the structures and properties of chemical substances from experimental measurements, to utilise analytical techniques that are used for characterising chemical compounds; to carry out chemical analyses in a justifiable way and to evaluate analytical results; and to understand the role of the chemical analyst in the well-being of the community and environment.

CHEN312 PHYSICAL CHEMISTRY III

3 hours

On completion of this module the student will have acquired the operational knowledge and theoretical, yet practice-directed insight of the three main chemical theories for non-ideal (real)

process types to: a) determine and interpret thermodynamic and electrochemical quantities; b) determine and mechanistically explain reaction-kinetic and electrode-kinetic parameters and c) explain quantum-chemically the origin of molecular spectra and calculate molecular and spectroscopic quantities from these spectra; and to utilise these three process approaches in a variety of applications based on surface and interface chemistry

CHEN321 INORGANIC CHEMISTRY III

3 hours

With this module the student acquires basic knowledge and insight into the principles and applications of co-ordination compounds; become familiar with the use of transition elements in industry and their importance in selected biological systems; learn to know representative reactions and properties of the d- and f-group elements and to develop the ability to predict their properties and reactions; learn to plan, carry out and present systematically the results of a practical project on the synthesis of transition metal complexes.

CHEN322 ORGANIC CHEMISTRY III

3 hours

At the end of this module the student will have the knowledge and insight to predict stereochemical implications of the most important reaction types. Knowledge is acquired of the chemical properties of polyfunctional compounds containing carbonyl, as well as of five- and six-membered heterocyclic compounds. The student will be familiar with the most general rearrangement reactions found in organic chemistry and will be able to solve elementary synthesis problems. Laboratory skills and synthesis techniques in the laboratory are mastered.

CHEN611 ADVANCED ORGANIC CHEMISTRY

3 hours

At the end of this module the student will have knowledge and insight to predict structure and reactivity relationships. Knowledge is acquired of factors that influence reactivity and substitution reactions. The student will be familiar with the role carbonium ions and carbaions play in reactions and will be able to predict reaction parameters that influence the formation of these intermediates. Students will have a fundamental knowledge of the basic reaction types and the most important rearrangement reactions.

CHEN612 ADVANCED PHYSICAL CHEMISTRY

3 hours

On completion of this module the student will have the operational knowledge and theoretical insight that enable him/her on the basis of the three main chemical theories a) to calculate and explain statistical thermodynamic quantities from the viewpoint of quantum chemical processes and b) determine the reaction-kinetic parameters of a variety of complex process types and interpret and explain them mechanistically-mathematically.

CHEN613 ADVANCED INORGANIC CHEMISTRY

3 hours

With this module the student acquires knowledge of modern theories used to describe the chemical bond in more complex inorganic molecules. These theories are used to explain the spectroscopic properties of molecules and to explain mechanisms of reactions of metal complexes with regard to ligand substitution, electron transfer and structural changes and to use them in synthesising new molecules. Advanced practical techniques like the synthesis of water and oxygen-sensitive complexes are acquired.

CHEMICAL ENGINEERING

See the Calendar of the Faculty of Engineering.

CEMI212 PROCESS PRINCIPLES I
CEMI222 CHEMICAL THERMODYNAMICS I
CEMI223 PROCESS PRINCIPLES II
CEMI311 TRANSPORT PHENOMENA I
CEMI313 CHEMICAL THERMODYNAMICS I
CEMI321 TRANSPORT PHENOMENA II
CEMI322 SEPARATION PROCESSES I
CEMI323 REACTOR THEORY I
CEMI411 SEPARATION PROCESSES II

ZOOLOGY

DRKN111 LOWER INVERTEBRATA

2 hours

On successful completion of this module the student will have the knowledge and insight to be able to identify specimens of lower invertebrate animals and place them in the classification frameworks of phyla, classes, orders, etc.; to comfortably retrieve existing/additional knowledge regarding lower invertebrates from documented sources; to show relationships between lower invertebrate groups; to communicate in a general or specific context on aspects of form and functions of lower invertebrate groups; to illustrate the economic importance of animals as sources of food, as parasites of human beings, animals and plants, or as biological or mechanical carriers/hosts of pathogens.

DRKN123 HIGHER INVERTEBRATA AND CHORDATA

3 hours

On successful completion of this module the student will have the knowledge and insight to identify specimens of higher invertebrate and chordate animals and to classify them in into phyla, classes, orders, etc.; to retrieve additional knowledge regarding higher invertebrates and chordates from documented sources; to communicate on aspects of the form and function of the different taxa of higher invertebrate groups and chordates; to show possible phylogenetic relationships between the different invertebrate and vertebrate taxa; to explain the ecological, economic and evolutionary importance of the different higher invertebrate and chordate groups; to show the progression of every taxon as opposed to more underclass taxons as regards morphological, physiological and ecological adaptability; to illustrate the economic importance of these animal groups as sources of food, parasites of human beings, animals and plants, or as carriers/hosts of pathogens.

DRKN211 DEVELOPMENTAL BIOLOGY

3 hours

On successful completion of this module the student will have the knowledge and insight to explain meaningfully, and where applicable, compare with each other selected cytogenetic and embryonic subjects among which the structure and function of DNA and RNA, protein synthesis, the cause and effect of mutations, the structure of the gene and chromosome, cell cycle and division processes, hereditary patterns, the principles of gene cloning experiments, early embryogenesis of four chordate animals, the fertilisation process, hormonal control and other processes; to explain the evolution theory and its history, as well as the modern view of the theory, and to understand its verification; to develop microscope skills and group work activities during practical work.

DRKN221 COMPARATIVE ANIMAL PHYSIOLOGY

3 hours

On completion of this module the student will have the knowledge and insight to relate the physico-chemical properties of the environment, as regards gas exchange, to specialised breathing organs of different animals; to explain the effect of environmental variables, like temperature, great heights, etc., on the binding and transport of oxygen and carbon dioxide in the blood of different animals; to explain the effect of environmental variables, like oxygen, food, temperature, etc. on the metabolic rate of animals; to explain the effect of different environments (fresh water, sea water, deserts, etc.) on osmotic regulation and excretion in different animals; to investigate, in groups, certain physiological processes experimentally and report on these processes.

DRKN311 ECOLOGY

3 hours

On successful completion of this module the student will have the knowledge and insight to be able to discuss ecology in all its consequences and relate it to other zoological and subject disciplines; to identify, characterise and formulate possible solutions regarding fundamental and applied ecological problems; to explain and model organisms and their interactions with each other and the abiotic environment; to apply basic biometrical and experimental methods; to discuss and put into context the ecological impact of human activities.

DRKN321 PARASITOLOGY

3 hours

On successful completion of this module the student will have the knowledge and insight, 1) as regards animal parasitology, to apply the basic definitions and epidemiological concepts,

identify and classify parasites, understand their impact on human health and know how to control them; and 2) regarding plant physiology, to understand and apply the socio-economic and research aspects of integrated pest control systems, sampling techniques, harvest loss assessments, application of chemical and microbial insecticides, host plant resistance, predator-prey interaction and models and biological control, as well as to apply the taxonomy, biology and economics of selected nematode, mite and insect groups.

DRKN322 COMMUNITY AND BEHAVIOURAL ECOLOGY

3 hours

On successful completion of this module the student will be able to discuss and explain community and behavioural ecology on the basis of the nature and characteristics of communities, types of ecosystems and factors influencing them, the principles and development of behaviour, communication, motivation and decision-making, as well as learning and learning behaviour. Practical work includes aspects of sensory ecology, as well as a field project that has to be designed and carried out by the students themselves. A project report and feedback is expected.

DRTN221 COMPARATIVE ANIMAL PHYSIOLOGY: TOURISM

2 hours

On completion of this module the student will have the knowledge and insight to relate the physico-chemical properties of the environment, as applicable to gas exchange, to the specialised breathing organs of different animals; to explain the effect of environmental variables like temperature, great heights, etc, on the binding and transport of oxygen and carbon dioxide in the blood of different animals; and to explain the effect of environmental variables like oxygen, food, temperature, etc. on the metabolic rate of animals.

DRTN311 ECOLOGY: TOURISM

2 hours

On successful completion of this module the student will have the knowledge and insight to relate ecology to other zoological and subject disciplines; to be able to identify, characterise and formulate possible solutions to fundamental and applied ecological problems; to explain and model organisms and their interactions with each other and the abiotic environment; to apply basic biometrical and experimental methods; and to discuss and put into context the ecological impact of human activities.

ECONOMICS, RISK MANAGENT AND INTERNATIONAL TRADE

See the Calendar of the Faculty of Economic and Management Sciences.

EKRP211 INTRODUCTION TO RISK MANAGEMENT

ECON111 INTRODUCTION TO ECONOMY

ECON121 BASIC MACRO- AND MICRO-ECONOMICS

ECON211 **MACRO-ECONOMICS**

ECON221 **MICRO ECONOMICS**

EKNP311 **DEVELOPMENT, REGIONAL AND LABOUR ECONOMICS**

EKNP321 **ECONOMIC ANALYSIS**

EKRP221 **INVESTMENT MANAGEMENT**

EKRP311 **BANK RISK MANAGEMENT**

EKRP321 **FINANCIAL MARKETS**

FINANCIAL ACCOUNTANCY

See the Calendar of the Faculty of Economic and Management Sciences.

ACCF111 **FINANCIAL ACCOUNTING: BASIC CONCEPTS, ACCOUNTING CYCLE, ACCOUNTING SYSTEMS AND ELEMENTARY FINANCIAL REPORTING**

ACCF121 **FINANCIAL ACCOUNTING: SPECIAL ACCOUNTS, PARTNERSHIPS AND CLOSE CORPORATIONS**

REKP211 **FINANCIAL REPORTING**

REKP221 **SPECIAL TOPICS AND ELEMENTARY GROUP STATEMENTS**

REKP311 **GENERALLY ACCEPTED ACCOUNTING PRACTICE**

REKP321 **GROUP STATEMENTS**

FINANCIAL ACCOUNTANCY (SPECIAL)

See the Calendar of the Faculty of Economic and Management Sciences.

ACCS111 **FINANCIAL ACCOUNTING: SPECIAL ACCOUNTS, PARTNERSHIPS AND CLOSE CORPORATIONS**

ACCS121 **ACCOUNTING: INTRODUCTORY CORPORATE ACCOUNTING**

PHYSIOLOGY

See the Calendar of the Faculty of Health Sciences.

FLGX111 **INTRODUCTORY PHYSIOLOGY**

FLGX121 **MUSCULAR PHYSIOLOGY AND DIGESTION**

FLGX211 **ENDOCRINOLOGY**

FLGX212 **METABOLISM**

PHYSICS

FSKN111 **MECHANICS**

2 hours

At the end of this module students will have a formal mathematical knowledge of the fundamental concepts of physics, such as: kinematics in one and two dimensions; Newton's laws of motion; gravitation, work, energy, power, linear momentum, systems of particles, collisions, rotational motion, moments of inertia, statics and waves. In the practica the students will have developed skills in measuring, processing and reporting natural science processes that are selected to be wider than only the area of physics.

FSKN112 PHYSICS FOR BIOLOGY I

2 hours

This module is a service course for students who do not want to take Physics at a second of third level. At the end of this module the student will have learnt in what way physics acts in natural science phenomena that are mainly selected from the biological sciences. This is learnt from the following topics: kinematics, Newton's laws of motion, moments, work, energy and power, with applications to the human body, fluid mechanics, pressure, surface tension, diffusion, viscosity, with applications to the flow of blood. In the practica skills are acquired in measuring, processing and reporting natural science processes.

FSKN121 ELECTRICITY AND MAGNETISM I

2 hours

At the end of this module students will have a formal, mathematical knowledge of electromagnetism. It is acquired by means of differential and integral calculus. The topics consist of electrostatics, direct currents, magnetostatics, electromagnetic induction and alternating currents. In the practica further skills are acquired in measuring, processing and reporting of natural science processes.

FSKN122 PHYSICS FOR BIOLOGY II

2 hours

This module follows FSKN112 and is a service course for students who do not want to take Physics at level two or further. At the end of this module the student will have learnt in what way physics acts in a further group of natural science phenomena. The topics of this module are: theory of heat and thermodynamics, electrostatics, electric potential, electric currents and electromagnetic waves, with applications to apparatus that is used in biological sciences. In the practica further skills are acquired in measuring, processing and reporting natural science processes.

FSKN123 MODERN PHYSICS

2 hours

At the end of this module students will have been introduced to optics and topics from atomic and nuclear physics, such as introductory quantum theory, quantum theory of radiation, atomic spectra, X-rays, de Broglie waves and radioactivity. In the accompanying practica students acquire experience in measuring, processing and reporting natural science processes.

FSKN211 ELECTRICITY AND MAGNETISM II

2 hours

At the end of this module students will have been comprehensively introduced to the experimental laws of electrostatics and magnetostatics in vacuum and matter, as well as electrodynamics. Students learn to apply the laws to a variety of problems by calculating electrostatic potentials and fields and magnetostatic fields. In the practica (only for B.Sc. students) new knowledge is applied to measure these phenomena, investigate their conformity to scientific laws and to analyse and present results and reports with the aid of computer methods.

FSKN212 WAVES, FLUID DYNAMICS AND HEAT THEORY

2 hours

At the end of this module students will have a formal, mathematical knowledge of the following topics: elasticity, simple harmonic motion, waves, hydrostatics, hydrodynamics and heat theory. The mathematical treatment is fully based on differential and integral calculations. In the accompanying practica skills are acquired in handling experimental measurement errors, data analysis and mathematical modelling. These skills are developed with emphasis on computerised techniques.

FSKN221 SPECIAL RELATIVITY

2 hours

At the end of this module students will have a good insight into the meaning and the historical development of special relativity as they have observed what the nature and consequences of the Michelson-Morley experiment are, why and how the Lorentz-Einstein transformations were introduced and how Einstein interpreted these in terms of his two postulates of special relativity. Hereafter students are introduced to the concepts of length contraction, time dilatation, four-vectors and relativistic energy. In the accompanying practica students learn how to use this knowledge by investigating and reporting on relativistic phenomena.

FSKN222 INTRODUCTORY QUANTUM PHYSICS

2 hours

At the end of this module students will have been introduced to the extension of classic physics for the first time, as energy quantisation for a number of phenomena has been treated with reference to the Planck quantisation postulate. The phenomena include blackbody radiation, photoelectric effect, the Compton effect and X-rays. Hereupon students see how Bohr used the quantisation principle to develop the first effective model for the hydrogen atom. In the practica a few quantum mechanical phenomena are investigated. Specialised software for data presentation is used to present a computerised report on these phenomena.

FSKN223 OPTICS

2 hours

At the end of this module students will formally have mastered the principles of wave and quantum optics mathematically for the first time, as they study the topics wave theory, interference, diffraction and polarisation of light, as well as laser physics. In the accompanying practica a number of concepts and phenomena from geometric optics are described and measured, and certain laws regarding these phenomena are investigated. In the accompanying practica a number of concepts and phenomena from geometric optics are described and measured, and certain laws regarding geometric optics are investigated. Amongst others these investigations are carried out by means of the telescope at Nooitgedacht. Graphic modelling and presentation are used to present a computerised report on these investigations.

FSKN311 ELECTROMAGNETISM

2 hours

In this module, following directly on FSKN211, the Maxwell equations are derived for vacuum and for matter. At the end the students will have learnt a number of solutions to these equations in vacuum, non-conductors and conductors, including wave guides and optical fibres. In the practica (only for B.Sc. students) introductory electronics is studied with reference to the following topics: semiconductors, rectifiers, transistors, common emitter amplifiers, the transistor as switch and negative feedback.

FSKN312 WAVE MECHANICS

2 hours

At the end of this module students will been introduced to wave mechanics as a replacement of Newton mechanics for the first time. This is done by treating de Broglie waves, electron diffraction, the Heisenberg uncertainty principle, the Schrödinger equation with solutions for infinite and finite deep potential wells, simple harmonic potentials and the hydrogen atom. In the practica quantum mechanical phenomena are studied and computerised and oral reports are presented.

FSKN313 ASTROPHYSICS

2 hours

At the end of this course the students will have been introduced to distances, positions, motion, brightness, temperature, mass and colours of stars, and their meaning. Further topics are the sun and the heliosphere as prototypes, magnetic fields of stars, pulsating stars and explosion of stars. In the practica skills are acquired by means of photometric and spectral measurements with the optical telescope at Nooitgedacht.

FSKN321 THERMODYNAMICS

3 hours

After the introductory course on theory of heat in FSKN211 students receive formal education in the following topics of thermodynamics: the zeroth, first and second laws of thermodynamics, including the kinetic gas theory; the concepts entropy, TdS-equations, Helmholtz and Gibbs functions, potential functions, equilibrium and phase transitions, transport phenomena and statistical thermodynamics. In the practica precise measurements are made on variable stars and students gain experience in applying their thermodynamic knowledge to astrophysical problems.

FSKN322 NUCLEAR PHYSICS AND ELEMENTARY PARTICLES

3 hours

This course follows on FSKN312 and at the end of it students will have learnt how to apply their knowledge of wave mechanics to electrons, nuclear structures, nuclear reactions, nuclear power, the four fundamental laws and to elementary particles. An assignment on a selected topic in modern physics is required. In the practica a few projects on the contents of the course with emphasis on astrophysics are carried out, with great emphasis on correctly written and oral presentation of project reports.

GEOGRAPHY AND ENVIRONMENTAL STUDIES

GGFN111 INTRODUCTION TO ENVIRONMENTAL ASPECTS I

2 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: different approaches to geographic regions, geomorphology (endogenetic and exogenetic land-forming forces and processes, pedology (physical-chemical properties of soil), demography of South Africa and the world, as well as an introduction to cartography and spatial literacy.

GGFN121 INTRODUCTION TO ENVIRONMENTAL ASPECTS II

3 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: climatology (the atmosphere), basic economic-geographic concepts (population distribution and its impact on economic development, classification of economic activities and spatial interaction), settlement geography (world urbanisation tendencies, as well as inter- and intra-urban models, structures and systems), statistical processing, diagrammatic presentations and spatial interpretation.

GGFN211 ECONOMIC GEOGRAPHY, GEOGRAPHIC STATISTICS AND APPLIED CLIMATOLOGY

3 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: economic-geographic theories and activities (diffusion, primary, secondary, tertiary and quaternary activities), applied climatology (impact of climate on agriculture and housing, climatic changes and the South African climate) and computer-assisted statistical computations.

GGFN221 PHYSICAL GEOGRAPHY

3 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: interpretation of aerial photos (principles of image analysis, explanation and interpretation), basic geographical techniques (e.g. measurement of slope and canal profiles), engineering-geological aspects of environmental management (slope stability, subsidence and expansion and contraction of soils) and basic hydrography (basic water issues, the hydrological cycle, the Water Act (1998), monitoring, calculation of the mean annual run-off and introduction to water quality).

GGFN222 ANTHROPOGENIC ENVIRONMENTAL ISSUES

2 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: urban-geographical concepts, problems and management (the urban concept, intra-urban structure, commercial structure, industrial structure, residential structure, social problems and physical, morphological and functioning problems).

GGFN312 INTRODUCTORY GEOGRAPHIC INFORMATION SYSTEMS

2 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: introductory cartography and geographic information systems (definition and uses of GIS), basic georeference and CAD drawing techniques.

GGFN313 ADVANCED GEOGRAPHICAL INFORMATION SYSTEMS

3 hours

At the end of this module students have to demonstrate knowledge and insight into the following topics: GIS applications (database design and implementation, naming of CAD elements, connecting of database and GIS drawing data and critical questioning with the aid of GIS).

GGFN321 DEVELOPMENT AND URBANISATION IN AFRICA AND THE SOUTH AFRICAN CITY

3 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: spatially uneven development and urbanisation and underdevelopment in Africa, challenges for reconstruction (e.g. sustainable development, development of women in Africa, participation in rural development), urbanisation tendencies in Africa (historical, contemporary and future perspectives), the South African city, transformation of the South African city (colonial to post-apartheid), urban problems (e.g. housing, provision of services, social pathologies, urban management) and sustainable urban development.

GGFN323 ENVIRONMENTAL GEOGRAPHY

3 hours

At the end of this module students must demonstrate knowledge and insight into the following topics: environmental geography and the concept of region (the human being and sustainability, scientific principles and concepts of environmental geography, population problems, resources and sustainable development, environmental quality and pollution, maintaining biodiversity and sustainable cities, as well as the environment and community aspects).

GEOLOGY

GLGN 111 EVIRONMENTAL GEOLOGY

2 hours

At the end of this module the student will have knowledge and insight to: describe the formation processes of the earth; to describe and classify the most common rock forming minerals and rocks; explain by means of the theory of plate tectonics specific features of the earth's crust and geological processes; describe different deformation processes of the earth's crust; discuss the causes of vulcanism and earthquakes and the consequences thereof for human activities; describe how the earth's internal structure can be explained from magnetic, seismic en gravitational measurements; describe the basic geological surface processes that work by means of water, wind and ice/glaciers; make use of the interaction between the earth's atmospheric, hydrosferic en lithospheric systems to explain the phenomena of ground water, sand-dunes en landscape-forms.

GLGN121 SOUTH-AFRICAN GEOLOGY

3 hours

The student ought to be able to identify common rock-forming minerals and metal ores, as well as the most common rocks; apply the basic principles of stratigraphy; interpret the rock record as presented on geological maps with regard to relative ages and the geological history of the area; communicate the primary division of the most important South-African stratigraphic units, their spatial distribution and general lithology.

GLGN211 MINERALOGY AND IGNOEUS PETROLOGY
3 hours

At completion of this module, learners should have the knowledge and understanding to:
1) describe, identify and classify different minerals in unknown rock samples utilizing physical identification techniques, polarizing microscopy and X-ray diffractometry; that includes: the basic principles of crystallography, crystal structures and crystal chemistry; the documenting and communicating of the systematic description of important ore and rock-forming mineral groups; the calculation of mineral formulas and graphic presentations of the variation tendencies in mineral compositions;
2) classify igneous rocks by characterizing its mineralogy and chemical compositions; to apply basic phase diagrams; to illustrate the rock forming processes in silicate melts and fluid-rich magma systems by describing the melting behaviour of formations, as well as the crystallisation behaviour of the melts under different pressure-temperature conditions; to identify processes that control the changes in magma composition during cooling; to utilize the behaviour of isotopes and trace elements in magmatic processes; to present chemical analyses in a graph and to interpret the tendencies in compositional changes; to communicate and document a systematic outline of the most important igneous rock associations.
Learners should be able to demonstrate their skills by using polarised microscopy: describing the texture of igneous rocks, providing identification of the composite minerals and classification of a spectrum of igneous rock types. Examples of South African occurrences should be given throughout.

GLGN221 SEDIMENTOLOGY, STRUCTURAL GEOLOGY AND NEOTECTONICS
3 hours

At completion of this module, learners should have knowledge and understanding of the following:
1) basic principles of sedimentology: weathering of rocks, transportation, deposition and diagenesis of sediment; physical qualities, composition and classification of sedimentary rocks; the association between sedimentary processes, structures, tectonic and depositional environments within the geosystem; sedimentary facies, basin analysis and sequence stratigraphy;
2) the general principles of deformation in brittle and ductile rocks, the description of structures which develop as a result by means of direct and indirect observation; and
3) the geographical distribution, stratigraphy, general lithology and typical depositional environments of Cenozoic depositions and associated soils in Southern Africa; geomorphological associations with these depositions. Learners need to demonstrate their skills by means of particle size analyses of sediments and by statistically processing and interpreting data; identifying and describing sedimentary rocks from hand samples; solving three dimensional structural problems using borehole information, geological maps and stereographical projection techniques; and interpreting outcrop patterns on geological maps.
Learners will engage in field trips where they will develop skills to make filed observations regarding soil utilisation, potential pollution and supply possible solutions to poor soil management and pollution. References to South African examples have to be provided through out.
Learners will attend a compulsory field camp for seven days just during the June/July recess. During this time, different mapping techniques will have to be achieved so that the learner can compile a geological/soil map of an area and write a geological report.

GLGN311 METAMORPHIC PETROLOGY EN GEOCHEMISTRY
3 hours

At completion of this module, learners should have acquired a well rounded knowledge base and understanding to be able to:
Describe and communicate metamorphic principles and concepts; distinguish between agents that control metamorphism and metamorphic products found in different tectonic environments; using metamorphic equilibrium reactions and thermodynamics together with chemographical representations and phase diagrams; distinguish between progressive and retrogressive metamorphism as observed in pelitic, basic and siliceous rocks.
Learners should exhibit skills in using polarizing microscopy to classify different metamorphic rock types by describing the texture and identifying minerals. Examples South African occurrences should be used throughout.
Learners should have acquired a well rounded knowledge base and insight to be able to: in general, describe and communicate the basic geochemical principles and the distribution and movement of chemical elements within the geosystem; to demonstrate how low temperature geochemistry can be used in solving geochemical problems of a complex nature; configure simple modelling of chemical behaviour of elements and heavy metals, and to put this in context with a variety of environmental conditions and apply it during problem solving.
Learners should demonstrate competence in different sampling techniques, geochemical analyses, (X-ray fluorescence spectrometry, ICP-MS, atomic absorption spectrophotometry), data processing and interpretation of results by completing a project where human impact on the environment is analysed, quantified and characterised using scientific methods to illustrate how ethical correct, value driven investigations should be conducted.

GLGN321 HYDROGEOLOGY
3 hours

At completion of this module, learners should have acquired a well rounded knowledge base and understanding to be able to:
1) investigate, document and communicate the occurrence, distribution, movement and geological interaction of water on the Earth's surface and underground regarding its physical and chemical hydrogeology, groundwater quality and contaminants, groundwater pollution, remedying and conservation of groundwater sources; managing water sources (groundwater, rivers and wetlands); field and laboratory methods to establish hydrology and water quality parameters; and
2) to investigate soils and rock formations with regards to its slope stability, subsidence, development of prominent joints and bedding, shearing deformation, and permeability of rock formations, depth of weathering, the swelling and shrinkage of soils. Learners have to be able to interpret these results regarding the erection of artificial structures, construction materials and waste sites.
They have to understand that geophysical measurements are the application of the results of contrasting differences in the physical attributes of rock formations, and that measurable geological information can be collected by means of remote sensing. Learners should be able to apply this information with the means of geophysical methods (seismic, gravity, magnetic, electric, electromagnetic and radiometric) in the understanding of structures in the substrata and learners should be aware of the restrictions in applying geophysics.
Learners have to complete a project where the human impact on the environment is analysed, quantified and characterised using scientific methods to illustrate how ethical, value driven investigations should be conducted.

SOIL SCIENCE

GDKN211 ADVANCED SOIL SCIENCE

Learners should, at completion of this module, have a thorough knowledge and understanding of:
Soil chemical principles and relations within the plant nutrition system; colloid chemistry, cation exchange, sorption, and precipitation reactions; the fundamental principles of soil physics, advanced soil and water relations in agriculture and the environmental management milieu, basic principles of soil mechanics, building-blocks of soil mineralogy; general secondary minerals (clay minerals and oxides) and its origin in terms of primary rock forming minerals; the interpretation of soil chemical analysis; practical execution of lab simulations and leaching columns for the simulation of cation exchange, precipitation reactions, and leaching phenomena; laboratory modelling of soil physical reactions and the relationships with specific reference to soil chemistry and mineralogy; the observation and application of soil mechanical measurements.

GDKN221 SOIL DEGRADATION AND REHABILITATION
3 hours

Learners should, at completion of this module, have a thorough knowledge and understanding of:
The identification and description of the origin and extent of soil pollution; the effect of soil degradation on chemical, physical and mechanical aspects of soil; the principles and application of remote sensing; the prescription of remedial measures to counter or prevent degradation; the development of sustainable soil consumer's management systems; the execution of environmental risk analysis on soil consumption; the execution of practical field work and soil mapping techniques; the practical description and identification of the implications of soil chemical and physical attributes which were upset by anthropogenic influences; the application of soil chemical and physical principles to prescribe remedial measures.
Learners will attend a compulsory camp for seven days during the June/July recess. During this time, learners need to master different characterization techniques in order to draw up a soil map of the area and to write a pedological report.

ALTERNATIVE MODULES

AFNV311 AFRIKAANS FOR THE PROFESSIONS

1,5 hours

On completion of this module the student ought to be able to: demonstrate the competency to express himself grammatically correct and effectively in writing and orally in Afrikaans; and to write and revise texts in the appropriate register and genre in the light of the nature and needs of the targeted audience and the requirements of good communication (such as style, layout, meaning and coherence).

Note: The target groups of this module are mother tongue speakers of Afrikaans.

BYBI311 INTERPRETATION OF THE BIBLE FOR LIFE AND SCIENCE

2 hours

The student should be able to: by using appropriate resources, interpret the Bible validly and verifiably; apply this ability; create a frame of thought and justify this frame of thought concerning relevant current problems, the practice of science as well as lifestyle. Specific

outcomes are that each successful candidate should be able to: formulate and apply fundamental points of view with regard to understanding the Bible; formulate a valid standpoint based on the Bible on relevant scientific and life-issues; use at least the following resources in understanding the Bible: *The Study Bible, Life Application Bible* and Libronix, a Logos computer programme.

EKNP312 PERSONAL MANAGEMENT OF FINANCES

2 hours

The student must have the ability: to understand and interpret correctly general terms used in economics; to predict the movement of inflation rates, interest rates, exchange rates, tax and labour climate on the basis of certain crucial indicators in the economy; to act on the basis of these predictions in a pro-active way in handling specific situations for the benefit of his/her work environment. The student will have the ability to manage his/her personal finances correctly, which includes handling and managing cheque accounts, credit cards, debit cards, mortgages on property, hire-purchases, investments in amongst others shares, short and long term insurance policies and budgets for personal households; to have the ability to participate in discussions of the economy and its influence on the individual and work environment.

ENSW311: ENGLISH FOR THE PROFESSIONS

1,5 hours

At the end of this module the student should be able to: communicate accurately and fluently in English, use English grammatical structures correctly, write English accurately and appropriately, use the appropriate conventions and register of English in a variety of professions.

Please note: This module has as its target group second language speakers of English.

MICROBIOLOGY

MKBN211 INTRODUCTORY MICROBIOLOGY

3 hours

On completion of this module the student must be able to: define and discuss terms and concepts relevant to Microbiology; explain the scope and value of Microbiology as a science; observe, discuss and compare fundamental aspects of microscopy and the different techniques to observe micro-organisms; describe and compare procaryotic- and eucaryotic cell structure and –functions; discuss nutritional requirements and –types, as well as absorption of nutrients by micro-organisms; explain the growth and reproduction of micro-organisms and the influence of abiotic factors thereon; describe and apply the physical and chemical control of micro-organisms; provide an overview on different cultivation processes; discuss and quantify the theoretical principles of microbial growth- and mortality kinetics; use microscopy to study micro-organisms and apply aseptical techniques for the cultivation of micro-organisms; comply with the Microbiology laboratory safety regulations and the handling of biological hazardous waste products.

MKBN221 INTRODUCTORY MICROBIAL ECOLOGY

3 hours

On completion of this module the student must be able to: explain and apply the basic principles of microbial ecology; observe and describe the interactions among microbial populations, and those of micro-organisms with plants and animals in terrestrial and aquatic environments; describe and quantify the influence of abiotic factors and environmental

extremes on micro-organisms; give an overview of air, water and soil microbiology; discuss the role of microbial communities in ecosystems and the biogeochemical cycling of nutrients in water and soil; discuss the role of water in spreading diseases; describe the use of microbial metabolism in different biological processes for the treatment of waste water; explain the microbial degradation of plant material; discuss the contribution of microbial diversity in soil; be able to explain the role of soil micro-organisms in human health.

MKBN222 INTRODUCTORY MICROBIAL GENETICS

2 hours

On completion of this module the student must be able to: discuss the structure, organisation and replication of nucleic acid of micro-organisms; explain the genetic code; discuss the processes and regulatory mechanisms of the central dogma; explain enzyme and gene regulation in bacteria; describe recombination and the transfer of genetic material by conjugation, transformation and transduction; understand the general principles of microbial genetics.

MKBN311 MICROBIAL PHYSIOLOGY

3 hours

On completion of this module the student must be able to: explain the general principles of microbial metabolism; discuss the principles of energy generation and participation in cellular metabolism; describe the integration and control of metabolic processes; describe and quantify the metabolic pathways involved in the assimilation of mineral compounds and the dissimilation of organic carbon compounds with the aid of enzymes.

MKBN312 ADVANCED MICROBIAL GENETICS AND RECOMBINANT DNA TECHNOLOGY

2 hours

On completion of this module the student must be able to: explain the implications of natural and artificial recombination processes; discuss general properties and uses of extra-chromosomal genetic elements; explain the incidence, distribution and implications of transposons and other mobile elements; discuss the principles and applications of microbial gene manipulation; explain the selection, characterisation and expression of recombinant DNA; describe techniques that are used in the characterisation of DNA and demonstrate practical skills; discuss the application of recombinant DNA technology in biotechnology; understand the implications of DNA technology research and discuss the ethical aspects.

MKBN321 MICROBIAL DIVERSITY

3 hours

On completion of this module the student must be able to: describe the development and most important principles of microbial taxonomy; give an overview of the current classification systems accepted by most microbiologists; make a summary of the main characteristics associated with the main groups of the Archaea; discuss the taxonomy and distinctive characteristics, morphology, procreation, physiology and ecology of the representative species of the Deinococci and Nonproteobacteria Gram Negatives The High G + C Gram Positive Bacteria; explain the diversity and characteristics, as well as the ecological and economic impact of selected fungi; discuss and compare general characteristics of selected viruses, die science of virology and the methodology used to study viruses; explain the characteristics, classification and life cycle of bateriophages; discuss the characteristics of viruses that infect eukaryriots.

MKBN322 INDUSTRIAL MICROBIOLOGY

2 hours

On completion of this module the student must have the ability to: explain the role and function of each of the microbial groups in different industrial processes; discuss the role of micro-organisms in food contamination and preservation; explain the application of microbial metabolism in industrial processes for the production of fermented and metabolic products; describe the role of micro-organisms in treating harmful waste products, bioremediation of disturbed environments and ecological control of pests.

MKBN323 IMMUNOLOGY AND EPIDEMIOLOGY

2 hours

On completion of the module the student must have the ability to: describe the different components of the human immune system and explain the function of each in the defence of the body against infection; discuss the role of immunisation and vaccines in the control of infective diseases; describe the different types of immunity deficiencies in humans; circumscribe terms and concepts regarding epidemiological outbreaks of infective diseases; explain routes of transmission, as well as measures used to inhibit outbreaks of epidemics; understand the danger of bioterrorism.

Remark: The above-mentioned microbiology modules are all interactive modules and therefore access tot the Internet is a prerequisite for taking these modules.

BUSINESS MANAGEMENT

See the Calendar of the Faculty of Economic and Management Sciences.

ONBP111 INTRODUCTION TO BUSINESS MANAGEMENT

ONBP122 INTRODUCTION TO MARKETING MANAGEMENT

BOTANY

PLKN112 PLANT STRUCTURE – CYTOLOGY, MORPHOLOGY AND ANATOMY

2 hours

On successful completion of this module the students must have a fundamental knowledge of and insight into the structure and function of prokariotic and eukariotic cells; the structure and function of primary and secondary cells and tissues; the structure and function of normal and modified plant organs; the life cycle of flowering plants and the relationship between the sections of a flower and the different kinds of fruit and seed that are produced; must understand the importance of plants for the existence of life on earth, and have the ability to apply theoretical principles of the relation between plants and life on earth in practice; must have acquired skills in preparing plant material for macro- and microscopic research; and in the use of a composite light microscope and in making scientifically acceptable drawings to illustrate macro- and microscopic structures.

PLKN124 BIODIVERSITY AND ENVIRONMENTAL BOTANY

3 hours

On successful completion of this module the students must have a fundamental knowledge of and insight into pre- and post Darwinian classification systems with a clear understanding of the most important evolutionary mechanisms that may lead to speciation; the classification, morphology, procreation and biological importance or cyanobacteria and algae; the evolution of early eucariotics; the challenges that a terrestrial environment present to the survival of

organisms; and the specific structural and procreation adaptations of a selected number of species from the mosses, seedless vascular plants and seed plants (gymnosperms and flowering plants); have a fundamental knowledge of the biotic composition of aquatic and terrestrial ecosystems; the ecological interactions between living organisms among each other and between abiotic and biotic components; the most important human influences on ecosystems, i.e. influences that lead to environmental problems like water pollution, degradation of agricultural soil and increasing urbanisation in a South African context; have acquired skills in using a composite light microscope and in making scientifically acceptable drawings to illustrate macro- and microscopic structures.

PLKN 212 PLANT-WATER RELATIONS: STRUCTURE AND FUNCTION (ANATOMY AND ECOPHYSIOLOGY)

3 hours

Morphology and anatomy of xerophytes: Plant tissue types – Structure, function and anatomical adaptations to different environments with special reference to xerophytes. *Plant water relations:* Diffusion and osmosis, vapour pressure and water potential, components of water potential, the membrane, measuring the components of water potential, the dilemma of transpiration vs. gas exchange, the mechanism of the stomata, upward movement of sap in plants. *Nutrition:* Anatomical structure: Transport tissue (xylem and phloem) vegetative organs (roots, stems and leaves); mineral nutrition: chelating agents, symptoms of deficiency, functions of elements; absorption of nutrient elements: absorption area, ion transport, membrane types, properties of ion absorption, general mechanisms. *Phloem transport:* organic compounds, pressure flow mechanism, control mechanisms. *Soil and root interactions*: composition of soil micro flora, bacteria, actinomycetes, fungi, the root sphere, role of selected organisms endomycorrhizae and ectomycorrhizae, nitrogen-fixing bacteria, plant pathogens. Practical work.

PLKN222 FLORA OF SOUTH AFRICA (PLANT SYSTEMATICS AND PHYTOGEOGRAPHY)

3 hours

By completing this unit students must have the knowledge and competencies underpinning plant phytogeography and be able to applied it to the Flora of South Africa; to explain the diagnostic characteristics of the most common plant families in South Africa and be able to identify them with the aid of identification keys and to apply higher level classification; to discuss the significance of biodiversity studies and to give an overview of plant systematics as a science; to explain the general principles and methods in plant systematics with reference to specific sources of systematics; to evaluate the theories on the origin and maintenance of plant diversity; to explain the basic principles of plant nomenclature.

PLKN312 PLANT PHYSIOLOGY: ENERGY CONVERSION AND METABOLISM

3 hours

On completion of the module the student must have the ability to: describe the unique nature and interaction of the biospheric and biochemical processes of plants, including photosynthesis, respiratory metabolism, assimilation of mineral compounds and molecular-biological processes; explain basic molecular biology and its practical implications; critically evaluate the experimental data of phytochemical analyses and metabolic processes.

PLKN323 PLANT ECOLOGY

3 hours

On completion of the module the student must have the ability to: apply basic ecological principles; discuss ecological interactions and examples thereof; understand and apply basic principles of Vegetation Dynamics and Landscape Ecology; discuss resource management and –use and the impact of aspects such as pollution, ecosystem management, degradation, restoration, rehabilitation and urbanisation based on specific case studies; integrate knowledge on the impact of human and changing environmental conditions on ecosystems; master different data sampling techniques and apply multivariate data analysis on environmental data; classify and compare water environments; understand physical, chemical and biological environmental variables in an aquatic environment and understand their interrelations; present adaptations of algae to aquatic environments; understand seasonal growth- and succession patterns of algae populations in both nutrient limited and nutrient enriched environments, to grasp the unique water situation in South Africa as well as to explain the related problems associated with waterpurification processes.

PLTN222 FLORA OF SOUTH AFRICA (PLANT SYSTEMATICS AND PHYTOGEOGRAPHY): TOURISM

2 hours

By completing this unit students must have the knowledge and competencies underpinning plant phytogeography and be able to applied it to the Flora of South Africa; to explain the diagnostic characteristics of the most common plant families in South Africa and be able to identify them with the aid of identification keys and to apply higher level classification; to discuss the significance of biodiversity studies and to give an overview of plant systematics as a science; to explain the general principles and methods in plant systematics.

PLTN323 PLANT ECOLOGY: TOURISM

2 hours

On completion of the module the student must have the ability to: apply basic ecological principles; discuss ecological interactions and examples thereof; understand and apply basic principles of Vegetation Dynamics and Landscape Ecology; discuss resource management and –use and the impact of aspects such as pollution, ecosystem management, degradation, restoration, rehabilitation and urbanisation based on specific case studies, also in the tourism industry; integrate knowledge on the impact of human and changing environmental conditions on ecosystems; master different data sampling techniques and apply multivariate data analysis on environmental data; explain the water situation in South Africa and the importance of the use of inland water as a limited resource; discuss physical, chemical and biological environmental variables and understand their mutual relationships; integrate knowledge of water organisms with seasonal- and successional patterns; discuss the human impact on water quality and the use of inland water, also within the tourism industry.

PRIVATE LAW

See the Calendar of the Faculty of Law.

PVRR221 PRIVATE LAW

COMPUTER SCIENCE AND INFORMATION SYSTEMS

ITRW111 INTRODUCTION TO PROGRAMMING

2 hours

At the end of this module the student will have acquired basic knowledge and insight into the way a computer works, its different components and data storing and manipulation. The student will also have acquired knowledge of the utilisation and use of spreadsheets. The module serves as an introduction to programming. The student will have knowledge of spreadsheets, which includes tables, computations, transfer of data between different applications and application environments, functions and graphs to process and present data. On completion of the module the student will provide proof that he/she has the ability to apply the knowledge and insight he/she has acquired to problem solving with the aid of the computer.

ITRW121 GRAPHICAL INTERFACE PROGRAMMING I

3 hours

On successful completion of this module the student will have knowledge and skills in the graphical interface environment to develop computerised applications in a visual object-based computer language. Aspects like graphical interface design, event-driven programming with user-friendly interfaces, as well as procedural and object-based programming fundamentals will have been established as basis. The theory must be practically applied to given problems.

ITRW122 PROGRAMMING I

3 hours

At the end of this module the student will have acquired knowledge and insight into the basic structure, data types, methods, classes and objects of an object-based programming language. Further the student will also be able to programme, debug, test and perform specific computer applications. He/she will be able to develop an algorithm for a problem defined in order to solve the problem, as well as code, debug, test and implement the algorithm with the aid of the computer. The student will be able to use the general characteristics of a programming language to develop applications that are well structured, user-friendly and readable.

ITRW211 GRAPHICAL USER INTERFACE PROGRAMMING II

2 hours

On successful completion of this module the student will have knowledge and skills to develop in a visual, object-based programming language and, within the graphical interface environment, computerised applications that will interact with other computer applications. The student will have gained insight into client servers, web and distributed applications. The theory must be practically applied to given problems.

ITRW212 PROGRAMMING II

3 hours

At the end of this module the student will have acquired basic knowledge and insight into object-directed programming (also for the Web) and problem solving, which include: debugging, testing and carrying out applications, file management, exception handling, inheritance, interfaces and polymorphism and Boolean Algebra. On completion of the course the student will provide proof that he/she has the ability to apply the knowledge and insight that he/she has acquired to problem solving with the aid of a computer.

ITRW213 SYSTEMS ANALYSIS I

3 hours

On successful completion of this module the student will be able to demonstrate: knowledge of the functions of the systems analyst and other role players in planning and analysing a system; knowledge of the early phases and activities in the life cycle of systems development and the ability to utilise these phases and activities; knowledge of several modelling techniques and the ability to apply them; the ability to think creatively and with a positive attitude to problem solving when planning and analysing a computerised system.

ITRW214 DECISION SUPPORT SYSTEMS I

3 hours

At the end of this module the student ought to have acquired basic knowledge and insight into: decision-making, construction of decision-making systems, formulating simple linear models (break-even analysis, linear programming) and their solution with the aid of spreadsheets; carrying out sensitivity analysis and solving specific problems (transportation and assignment problems and networks). The above techniques will be used in modelling and solving simple operational problems.

ITRW222 DATA STRUCTURES AND ALGORITHMS

3 hours

On completion of this module the student will be able to compile and manipulate data structures, vectors, matrices, switched lists, stacks and queues. Object-orientated methods, for example inheritance and polymorphism, will be used to create abstract data types for the above-mentioned data structures. The student will be able to analyse the complexity (run time and memory usage) of algorithms and be familiar with several data management problems and their solution and analysis. The student will be able to practically apply object theory and data structures.

ITRW224 SYSTEMS DEVELOPMENT (FOR SCIENTIFIC APPLICATIONS)

2 hours

On successful completion of this module the student will be able to demonstrate knowledge of and insight into: the functions of all of the role players in developing a system; the phases of the life cycle of systems development and their utilisation in given practical assignments; several modelling techniques for systems development and design and their application in practical assignments.

ITRW225 SYSTEMS ANALYSIS AND -DESIGN II

3 hours

On successful completion of this module the student will have knowledge of and insight into the functions and role players during the development of systems; know and be able to use the later phases in the development of the life cycle of systems development; know and be able to apply several modelling techniques of systems design; be able to think and act creatively when a computerised system is designed and developed. All of the knowledge will be practically applied when working in a group on a project. Relevant systems documentation will be compiled and it will also be presented in an oral systems presentation.

ITRW311 DATABASES I

3 hours

At the end of this module the student ought to have basic knowledge and insight into: the difference between file systems and databases; the relational database model versus

hierarchical and object-orientated database models; entity relationship modelling; normalising of database models; database design; transaction management; management of simultaneous use; and SQL and Oracle PL/SQL. On completion of the module the student will be able to demonstrate that he/she has the ability to apply the acquired knowledge and insight to problem solving in his/her subject area and fields of application.

ITRW312 ARTIFICIAL INTELLIGENCE

2 hours

At the end of this module the student will have been introduced to basic concepts in the field of artificial intelligence. The student has to be aware of important issues in the subject, as well as its historical foundations. Furthermore the student must understand the basic techniques used in the field and have the ability to apply them to practical problems. The practical implementation of the techniques learnt takes place by writing programmes in an artificial intelligence language.

ITRW313 EXPERT SYSTEMS

2 hours

On completion of this module the student will have the ability to demonstrate that he/she has adequate knowledge with regard to knowledge-based programming techniques in designing and developing expert systems. Students will be able to use different strategies with regard to the presentation of knowledge and inference techniques and also to demonstrate that they have adequate knowledge and insight with regard to the phases of expert systems analysis and design, as well as regarding aids and methodologies. As a result of the acquired knowledge students will have the ability to think and act creatively and with a positive attitude to problem solving in designing and developing an expert system.

ITRW314 DECISION SUPPORT SYSTEMS II

2 hours

On completion of this module the student will be able to provide proof of his ability to apply the knowledge and insight he/she has acquired with regard the formulation of simple problems with stochastic elements (e.g. inventory models), introductory decision-making theory, sensitivity analysis and prediction, to problem solving in his subject area and applications fields. The student will therefore be able to model, solve and implement simple operating problems containing stochastic elements within the frame of decision support.

ITRW315 COMMUNICATION SKILLS

2 hours

At the end of this module the student will have acquired basic knowledge and insight into the most important communication skills, including oral presentation and writing skills. Students will also be aware of the importance of interpersonal relationships, conflict management and other appropriate behavioural characteristics and will be able to present talks confidently and write reports structured correctly.

ITRW321 DATABASES II

3 hours

At the end of this module the student ought to have a basic knowledge and insight into distributed database management systems; object-orientated databases; client/server systems; data warehouses; databases and Internet; database management (theory as well as practical applications with Oracle). On completion of the module the student will be able to provide proof that he/she has the ability to apply the knowledge and insight acquired to problem solving in the subject area and its application fields.

ITRW322 NETWORK PROGRAMMING AND INTERNET

3 hours

At the end of the module the student will have the ability to provide proof that he/she is familiar with the operation of the OSI, TCP/IP and IEEE (local area network) protocols, as well as topics independent of protocol, such as congestion control and routing. The student will further have mastered OSI, TCP/IP and IEEE (local area network) protocols by low-level implementation of the IEEE protocols in a high-level programming language. The student will have knowledge of the Internet, its operation, services and characteristics and have the ability to carry out practical assignments and the accompanying implementation on the Internet.

ITRW323 OPERATING SYSTEMS

3 hours

On successful completion of the module the student has to provide proof that he/she has adequate knowledge of and insight into the principles according to which operating systems work. This comprises process control in a multi-programming environment, concurrent processes, input and output handling, management of memory, the file system and operating systems security, and implementing these aspects in a number of operating systems (for example, UNIX and DOS/Windows). The student will also develop practical skills in installing operating systems and concurrent programming where interprocess communication, synchronisation and mutual exclusion problems have to be solved.

ITRW324 IT TRENDS

3 hours

At the end of this module the student will have the ability to prove that he/she is familiar with the rapid changes taking place in the field of IT and related disciplines. He/she will have knowledge of the development(s) that is/are important in a specific time phase and relate them to the rest of the programme taken up to now. An effort will be made to involve people of the industry with planning and possibly with presenting the contents, with the purpose that students may establish contact with practice and experience practically in what way modern IT developments are integrated and implemented in an enterprise to ensure a sustainable competitive edge.

SOCIOLOGY

See the Calendar of the Faculty of Arts.

SOSL111 SOUTH AFRICA: COMPILATION AND FUNCTIONING

SOSL121 THE DYNAMICS OF DEVELOPMENT: INTRODUCTION A

SOCIAL ANTHROPOLOGY

See the Calendar of the Faculty of Arts.

SANL211 INRODUCTION TO SOCIAL ANTHROPOLOGY

URBAN AND REGIONAL PLANNING

SBEL111 HISTORICAL DEVELOPMENT OF CITIES AND PLANNING THOUGHT

3 hours

At the end of the module the student must have the ability: to identify, describe and compare

the prehistory, origin and development of cities in the world; to evaluate historical eras in terms of the problems and lessons gained by them; to describe the origin and development of planning as a profession; to define planning; to describe the dualistic nature and aim of planning; to identify types of planning; and to describe the development of planning thought.

SBEL121 GARDEN CITIES AND NEIGHBOURHOOD THEORY

3 hours

At the end of the module the student must have he ability: to describe, evaluate and compare the origin and development of different neighbourhood theories; to identify practical manifestations of the different theories in contemporary times; to describe the principles of creating neighbourhoods; and to evaluate neighbourhood layout.

SBSL211 LAND USE MANAGEMENT AND RESIDENTIAL DEVELOPMENT

3 hours

At the end of the module the student must have the ability: to set out the characteristics and requirements of the large variety of residential types for which the planner has to provide; to demonstrate a thorough understanding of the requirements and processes that have to be followed in order to create successful residential development; to understand the aim and implementation of zoning and land use management as planning instruments.

SBSL221 URBAN DESIGN

3 hours

At the end of the module the student must have the ability: to describe the concepts *design* and *urban design*; to describe the designing process; to identify poorly functioning and inappropriately designed urban spaces; to describe the reasons for the development of poorly and inappropriately designed urban spaces; to describe urban design theories; to identify and describe elements of good urban design; to compile guidelines for urban design; and to compare several approaches to urban design with each other.

SBSL311 TRANSPORT PLANNING

3 hours

On completion of this module the student must have adequate knowledge and insight with regard to: the historical development of urban transport; urban vehicles and their utilisation; the transport planning process; trip generation and trip distribution; network planning and traffic allocations; modal distribution; economic evaluation of traffic proposals; the urban traffic problem; the balance between the form of the city and urban traffic; network components of the urban transport system; the pedestrian system; the traffic control system; and transport planning for developing communities.

SBSL321 INDUSTRIAL AND BUSINESS PLANNING

3 hours

At the end of the module the student must have the ability: to identify the different types of industrial areas, plan the layout and describe the planning needs of each type; to classify business centres hierarchically; to describe the composition and functioning of a central business area; to describe the requirements of a successful central activities centre; to demarcate central business areas; to describe land use patterns, land values, density, action patterns, movement and dynamics of business centres; to describe and identify aspects of a successful pedestrian-friendly activity centre; to identify factors that influence entrepreneurs in location of various businesses; to describe the operation of the informal business sector and prescribe appropriate planning measures; to describe the origin of the concept *shopping centre*; to compare the types of shopping centres with each other; to describe the

requirements of successful shopping centres; to describe the site requirements and characteristics of successful office functions, including residential offices and residential businesses.

SBEL311 ENGINEERING FOR PLANNERS I

3 hours

On completion of this module the student ought to have adequate knowledge and insight into: the interface between urban and regional planning and engineering; the composition of the management team and the interaction among members; service levels of different services; applicable legislation; the public participation process; and factors influencing the location of services like water supply, sewerage and electricity supply.

SBEL321 ENGINEERING FOR PLANNERS II

3 hours

On completion of this module the student must have adequate knowledge and insight with regard to: flood water management in urban areas; geometric design standards for streets; structural design of streets; design standards and maintenance of approach roads; planning in view of road users like cyclists and pedestrians; and the combination of all the different services in planning.

SBEL421 INTEGRATED PLANNING MANAGEMENT

3 hours

At the end of the module the student must have mastered planning strategies based on a sound planning theory, have the ability to determine planning priorities and compile business plans for planning projects, including the performance management of planning projects. The student is taught communication, financial, personnel and administrative management principles as applicable to planning. At the end of the module students must practically apply the management skills they have developed.

SBEL471 PLANNING PROJECT

At the end of this module the student must be able to prove that he/she has the following skills: die ability to apply subject specific planning knowledge (planning theory) and skills (knowledge of practice) empirically on the basis of a previously accepted planning subject/project; the ability to plan and describe the theoretical and empirical research related to the planning project independently and/or in a group, collect data and information, process these on the computer, analyse and represent the results in order that these may be contained in a planning project in an ordered and logical manner according to expert planning practices; to make recommendations on the basis of appropriate theoretical planning knowledge and empirical research of problems that might emerge in the research; to compile on the ground of the research contained in the planning project a conceptual research article on the topic in view of possible publication in a subject journal.

SBSL411 HOUSING POLICY AND SETTLEMENT ISSUES

3 hours

At the end of this module the student must be able to explain the role of international and national planning policy, and specifically housing policy, in socio-economic development. Students must understand and take a critical line towards the existing housing situation in South Africa and the present housing provision programme of the government. The student must also demonstrate an understanding of basic planning approaches, and have the knowledge to evaluate different planning approaches.

SBRL211 URBAN SETTLEMENT IN URBAN SYSTEMS

3 hours

At the end of the module the student ought to have the knowledge and insight: to distinguish the constituent subdivisions of the city and to understand the forces determining urban morphology. He/she ought to know what the factors are that play a role in the settling of cities and towns in different circumstances and identify the shaping elements that determine urban morphology. For this reason he/she ought to be able to point out and explain the similarities and differences of urban systems in different parts of the world. Further urban settlement is scrutinised as a nodal point in its service area. In the second part of the module the region is investigated and at the end of the module the student will have to explain what the reasons are for a region coming into existence.

SBRL221 LOCATION OF INDUSTRIES, REGIONAL PLANS AND FORMATION OF METROPOLITAN STRUCTURES

3 hours

While urban settlement is scrutinised in its service area in course unit SBRL 211, this module comprises a synoptic overview of regional planning. At the end of the module the student ought to be completely familiar with the factors that play a role in establishing different types of businesses in different circumstances in the geographical space. He/she ought to have the ability to demonstrate the utilisation of the region as planning instrument and also thoroughly understand the phenomenon of the formation of a metropolis.

SBRL311 REGIONAL ECONOMICS

3 hours

In this learning unit the emphasis falls on two topics: As South Africa shows development characteristics of a First World and Third World, a general outcome of the first part of the leaning unit is to understand what factors play a role in the development of cities and regions in different developmental circumstances. The student has to understand the development history of Third World countries and the balanced-imbalanced approach to regional development. He/she has to explain the advantages and disadvantages of “top-down” and “bottom-up” development approaches and substantiate the appropriate choice in different circumstances.

SBRL321 REGIONAL THEORY AND REGIONAL EVALUATION TECHNIQUES

3 hours

As an outcome the student ought to have the ability at the end of this learning unit to distinguish between regions that are essentially different; know what variables have an influence on regions; identify concrete and abstract elements of the region, be informed on the dynamic characteristics of the region and in what way theories trying to explain these dynamics tie in with them. They ought to have the ability to distinguish between different regional systems in different parts of the world. He/she has to understand when to apply certain statistical procedures and know what the general application possibilities of specific analytical procedures are in specific circumstances.

SBRL411 DEMOGRAPHIC ASPECTS OF PLANNING

2 hours

General outcomes of this learning unit are that the student ought to know what factors have an influence on population migration. He/she must take note of the different population migratory tendencies in developed and developing countries. He/she must understand the different

forms of development transition and explain the connection between demographic and mobility transition. He/she must have a good understanding of differences between the development processes of cities in different parts of the world, the relationship between migration processes in First World and Third World countries and have the ability to explain the influence of globalisation on human settlement patterns.

SBRL412 APPLICATION OF REGIONAL PLANNING IN SA

2 hours

The student ought to understand the different approaches with regard to regional planning and development. The current development approach in South Africa at the moment is critically evaluated according to theoretical models already discussed, also with regard to international practice. Because of the dynamic nature of this subject area and the relevancy of its application in SA the contents of this module will be adapted every year to keep up with developments.

STATISTICS AND OPERATIONAL RESEARCH

STTK111 DESCRIPTIVE STATISTICS

2 hours

This module presents to the student the opportunity to build up a good general background regarding basic statistical principles and methods, as well as basic practical skills, in order to manage simple data-handling and data-presentation methods and to make sense out of data. The course is a daytime course presented at a non-mathematical level with the aid of computer software and a study guide. The student will understand the basic fundamental concepts of statistics such as compiling simple questionnaires and handling data gathered from them, including summarising the data with graphic presentations, simple calculations regarding location, scattering and correlation, as well as the interpretation of such summaries together with simple probability calculations. Basic methods regarding experimental design will be mastered and applied to simple experiments, as well as basic regression methods, such as the fitting of straight lines through data points and applying elementary fitting criteria involving residual inspection.

STTT111 DESCRIPTIVE STATISTICS

STTT111 Descriptive Statistics = STTK111 Descriptive Statistics.

STTK121 INTRODUCTORY STATISTICAL INFERENCE I

2 hours

Successful completion of this module will enable the student to understand fundamental statistical concepts covering a wide area of practical statistics as well as the theory of probability. The student will be able to perform simple probability calculations regarding the normal and student t-distribution and to apply the central limit theorem to make elementary calculations surrounding point estimation, as well as interval estimation, such as determining confidence intervals for population averages and proportions. The student will also be able to test hypotheses regarding location in certain cases.

STTK122 STATISTICS FOR MANAGERIAL SCIENCES

2 hours

After successful completion of the module the student will have a synoptic appreciation of selected statistical topics, have the ability to perform elementary calculations regarding the normal distribution, point and interval estimation and will be able to determine sample sizes for

simple practical applications. The student will be able to perform hypothesis testing for hypotheses regarding location for one- as well as two-sample cases, apply basic regression methods, apply time series analysis procedures and interpret index numbers.

STTK123 INTRODUCTORY STATISTICAL INFERENCE II

2 hours

After completion of this module the student will be able to understand more basic statistical disciplines to enable the handling and solving of a wider range of elementary problems. Special emphasis is placed on subjects involved in practical research, such as multiple regression, factor analysis, variance analysis, auditing of conditions, categorical data analysis and distribution-free methods. The student will also be able to plan research projects more effectively and apply appropriate inference methods, as well as having the ability to evaluate computer printouts of statistical analyses in a responsible and meaningful way.

STTK124 PRACTICAL STATISTICS

2 hours

After completion of this module the student will be able to understand more basic statistical disciplines to enable the handling and solving of a wider range of elementary problems. Special emphasis is placed on subjects involved in practical research, such as multiple regression, factor analysis, variance analysis, auditing of conditions, categorical data analysis and distribution-free methods. The student will also be able to plan research projects more effectively and apply appropriate inference methods, as well as to evaluate computer printouts of statistical analyses in a responsible and meaningful way.

STTK211 PROBABILITY THEORY

3 hours

After completion of this module the student will have fundamental knowledge and understanding of the most relevant elements of probability theory, such as probability measures, stochastic variables, distribution theory, and fundamental probability theorems, such as the law of total probability, Bayes' theorem, the law of large numbers and the central limit theorem. The student will be able to solve non-specialised problems, such as probability calculations regarding stochastic variables, as well as calculations regarding measures of centrality, scattering and kurtosis over a wide class of distributions.

STTK221 INTRODUCTORY SAMPLING THEORY AND TECHNIQUES

3 hours

After successful completion of the module the student will have fundamental knowledge and understanding of the most relevant sampling methods used in practice, such as random, systematic, cluster and stratified sampling methods. For these types of sampling, methods of performing inference regarding location, variance and related topics are studied. Fundamental theorems surrounding estimation problems, such as the Blackwell-Rao theorem and fundamental concepts like sufficient and complete statistics, the Cramer-Rao lower bound, various methods to determine estimators, such as the method of moments and the method of maximum likelihood, are studied and applied.

STTK311 STATISTICAL INFERENCE

3 hours

After completion of the module the student will have deeper knowledge and understanding of statistical inference methods and techniques, such as hypothesis testing methods for a wide variety of hypotheses, data presentation methods based on fundamental concepts such as the distribution function and relevant functions, measures of location and scattering, two-sample

theory, categorical data analysis and Bayesian inference. The student will apply SAS, Statistica and especially SPLUS statistical computer packages for analyses. Documentation of inference and drawing sensible conclusions from analyses will receive special attention.

STTK321 LINEAR MODELS

3 hours

After completion of this module the student will have mastered both the matrix and co-ordinate-free (vector space) approach to statistical modelling theory. Modelling disciplines, such as multiple regression, variance analysis and generalised linear modelling, as well as fitting measures, diagnostics and remedial methods are studied. SAS, Statistica and SPLUS modelling software are utilised in problem solving.

STTK322 STATISTICS PROJECT

2 hours

After completion of this module the student will be able to embark independently on a statistics project, collect and expertly process data and apply the correct techniques necessary to perform appropriate statistical inference in a responsible and meaningful manner. Modern statistics software, educational and corporate aids will be handled and applied fluently to deliver both professionally written and oral scientific reports.

APPLIED MATHEMATICS

TGWS121 STATICS

2 hours

At the end of this module the student will have acquired knowledge and insight into Newton's laws of motion and the concepts of force, vector product, moment, couple, rotational analogue of the second law of Newton and friction. The student will have skills to reduce a system of forces on a rigid body to a single force and apply these skills to solve statics problems, including problems presenting frictional phenomena, as well as the analysis of the rotation of planar bodies.

TGWS122 MATHEMATICAL MODELLING

2 hours

At the end of this module the student will have acquired knowledge and insight into the least squares method, dimensional analysis and growth models. He will have acquired skills to model phenomena mathematically by means of concepts of proportionality in practice. In determining the constants he will have the ability to handle the data graphically and according to the method of least squares. The student will be able to model simple growth phenomena, solve the models and to reduce them to dimensionless form.

TGWS211 DYNAMICS

2 hours

The student will have acquired knowledge and insight into the theory of the structure, solution and evaluation of mathematical models in connection with the dynamics of particles, systems of particles and fixed bodies in a plane. These topics are treated with regard to fixed or moving origins and the student acquires skills in handling problems regarding these topics.

TGWS212 DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS

2 hours

The student will have acquired knowledge and insight into first order ordinary differential equations, the Laplace transform and the methods of Euler, Heun and Runge-Kutta for the numerical solution of a single or a system of differential equations. The student will be skilled in solving some of the first order ordinary differential equations by separation of variables and reduction to exact differential equations and he/she will be able to use them in modelling real phenomena; will be able to solve linear differential equations with constant coefficients by means of the Laplace transform; and will have the ability to solve any type of ordinary initial value problem numerically with the aid of a computer. The student will have learnt how to use the software MATLAB in solving differential equations.

TGWS221 DYNAMICS II

2 hours

The student will have acquired knowledge and insight into the theory of flexible cables, internal forces and distortion of simple beams and the motion of satellites and planets. The student will have skills to determine strains in beams and cables under stress, and to determine the orbits and positions of satellites.

TGWS222 NUMERICAL ANALYSIS

2 hours

The student will have acquired knowledge and insight into the theory of the basic numerical methods of common mathematical problems. Amongst these methods are the solution of non-

linear equations, the determination of interpolation polynomials and the numerical determination of specific integrals. The student will have acquired skills to apply a variety of computer techniques to every type of problem. The student will have gained skills in solving non-linear equations by means of iterative techniques, determination of interpolation polynomials of Lagrange and Newton, numerical determination of certain integrals with the trapezium method, the Simpson rule, Romberg integration and Gauss quadrature and also in implementing these techniques on the computer.

TGWS311 PARTIAL DIFFERENTIAL EQUATIONS

3 hours

At the end of this module the student will have acquired knowledge and insight to identify, analyse and solve real problems of which the mathematical models lead to partial differential equations. The student will have acquired skills in solving partial differential equations analytically. Physical problems discussed are amongst others the wave equation, heat equation, potential equation and the electric charge problem. As means to mastering these skills the student will also acquire skills regarding the Fourier series, orthogonal functions (Legendre and Bessel functions), power series techniques (amongst which the Frobenius method) and the Sturm-Liouville problem.

TGWS312 PARTIAL DIFFERENTIAL EQUATIONS (NUMERICAL)

2 hours

The student will have acquired knowledge and insight into the accuracy of discretisations of ordinary and partial linear differential equations, will have become familiar with special characteristics of tridiagonal matrix calculation problems that result in ill-conditionedness and sparse systems of linear equations, convergence characteristics of iterative methods for systems linear equations and the stability characteristics of numerical methods, and in the implementation of iterative methods on the computer with MATLAB.

The student will have acquired skills by means of finite difference methods in the numerical solution of two-point boundary value problems, the heat equation, the potential equation and the wave equation and in the implementation of these on the computer.

TGWS321 DYNAMICS III

3 hours

The student will have acquired knowledge and insight into the kinematics of a rigid body in space, the Lagrange formulation of dynamics and the basis of the calculus of variation. The student will have gained skills in solving problems regarding the description of movement and constraints. He/she will be able to model any problem with regard to the three-dimensional movement of a rigid body and to solve basic problems regarding stationary curves for functionals formed by integrals.

TGWS322 OPTIMISATION

3 hours

At the end of this module the student will have acquired the ability to apply a variety of mathematical optimisation techniques and to implement them with the aid of a computer; to have an appreciation of the mathematical basis of these techniques and to be able to indicate how the techniques flow forth from the mathematical basis. The student will have acquired skills in applying these techniques to unconstrained and constrained problems, including one-dimensional search methods, multidimensional techniques and linear programming, as well as compiling custom-made MATLAB functions and implementing these functions as optimisation aids.

TOURISM MANAGEMENT

See the Calendar of the Faculty of Economic and Management Sciences.

ONTP111 INTRODUCTION TO TOURISM
ONTP121 GAMEFARM AND HOSPITALITY MANAGEMENT
ONTP211 APPLIED TOURISM MANAGEMENT
ONTP221 ENTREPRENEURIAL TOURISM
ONTP311 ECOTOURISM: PRINCIPLES AND GUIDELINES
ONTP321 TOURISM MARKETING

PRESCRIBED MODULES

ENTR221 ENTREPRENEURSHIP

2 hours

MATHEMATICS

WISK111 ANALYSIS I

2 hours

At the end of this module the student will have consolidated his/her knowledge of techniques from school mathematics by completely mastering the rules of differentiation. The student will know the properties of various mathematical functions, limits and continuity of functions and will also have mastered the proofs of a representative selection thereof. The student will have developed a competency to solve problems involving the properties of differentiation, integration and a synthesis of both.

WISK112 CO-ORDINATE GEOMETRY IN 2 OR 3 DIMENSIONS

PK 1,5 hours

At the end of this module the student will have mastered the following main topics: solution possibilities of systems of linear equations; matrix computations and their application in the context of linear systems; vector algebra of geometric vectors and vector algebra of co-ordinate presentations of vectors, including dot product (or inner product) and crossproduct (or vector product); algebraic equations of conical sections in a plane, as well as straight lines, planes and quadratic surfaces in three-dimensional space. The student will have mastered the following computational techniques in this module: a systematic technique of solving systems linear equations; the basic computations of matrix algebra. The student will also have acquired the ability to manipulate three-dimensional vectors algebraically and to interpret the results; to describe lines, planes and other regular figures in two and three dimensions algebraically; to interpret the contents of certain equations in two or three variables geometrically.

WISK113 MATHEMATICAL TECHNIQUES

2 hours

At the end of this module the student will have mastered the following topics at an introductory level: the function concept as demonstrated by examples including the exponential and logarithmic functions; a solution method for systems of linear equations; matrix algebra; linear programming problems in more than two variables; analysis of the tempo at which functions change. The student will have acquired skills to identify these concepts in practical situations, to formulate them in mathematical symbols and then to find new information in the above-

mentioned situations by applying appropriate properties and applicable differentiation or linear algebraic techniques.

WISK121 ANALYSIS II

2 hours

At the end of this module the student will have the ability to extend the concept of a limit to the limits of sequences; know definite integrals as limits of sums of area sections and to use them in area calculations. He/she will know and have the ability to prove the basic theorems of integral and differential calculus; to approximate functions by means of the Taylor series; to use the techniques of differentiation and integration in calculating the maxima and minima of functions in practical and theoretical situations and also in calculating the lengths of curves, as well as the surface areas and volumes of solids of revolution.

WISK122 INTRODUCTORY ALGEBRA

2 hours

At the end of this module the student will have adequate knowledge of the typical properties of the real number system; the complex number system; the connection between first degree factors and roots of polynomials; the algebraic motivation for the existence of rational functions as well as forms for their factorisation into partial fractions; introductory combinatory concepts; the binomial theorem for natural exponents and the extension of the theorem to binomial series; mathematical induction and other basic techniques of proof. The student will have the ability to use the Euclidean algorithm and operations with complex numbers in different forms, synthetic division of polynomials and techniques for factorising rational functions into partial fractions. The student will also have the ability to analyse and compile basic structures of proof.

WISK123 = WISK113

WISK211 ANALYSIS III

2 hours

At the end of this module the student will have acquired knowledge and insight into all of the aspects of differential calculus of multivariable functions, including Taylor's theorem, directional derivatives and the gradient function; the theory of multiple integrals, parameterisation of curves and the introductory theory of line integrals. The student will have acquired skills in the computation of partial derivatives, directional derivatives and gradients; in applying double and triple integrals, as well as the calculation of their values; in applying line integrals and the computation of such integrals by means of parameterisation of curves.

WISK212 LINEAR ALGEBRA I

2 hours

At the end of this module the student will have acquired knowledge and insight into the solvability of systems of linear equations; criteria for the existence of inverses of matrices; subspaces of n-dimensional real vector spaces, as well as ordinary and orthogonal bases of such spaces; the basic properties of determinants; matrix eigenvalues and eigenvectors and diagonalisation of matrices. The student will have skills in: solutions of systems of linear equations in the context of vector spaces; matrix computations; determining bases for vector spaces; carrying out the Gram-Schmidt orthogonalisation process; determining eigenvalues and eigenvectors; basic diagonalisation processes; carrying out these matrix calculations with the aid of MATLAB and in interpreting the results.

WISK213 DISCRETE MATHEMATICS

2 hours

At the end of this module the student will have knowledge of the principles of elementary mathematical logic and reasoning. The student will have the ability to perform basic operations with sets; apply the pigeonhole principle and analyse combinatory graphs with regard to characteristic properties. He/she also will have the ability to determine whether graphs with certain given properties do indeed exist. The student will have acquired knowledge of Ramsey's theorem and its applications to the colouring of graphs and he/she will have skills regarding the characterisation of trees and networks.

WISK221 ANALYSIS IV

2 hours

At the end of this module the student will already have acquired sufficient knowledge of and insight into the calculus of multivariable functions to embark confidently on further studies in related areas. The student will know convergence tests for series, as well as the basic theory of general first order and also linear n-th order differential equations. The student will demonstrate the ability to carry out applications-directed computations of line and surface integrals, apply convergence tests for series and solve general first order as well as n-th order linear differential equations.

WISK222 LINEAR ALGEBRA II

2 hours

At the end of this module the student will have acquired knowledge and insight into the theory of general vector spaces and bases; inner products; vector norms; the Hessenberg matrix as a reduction form and its role in determining eigenvalues; the characteristic polynomial of a matrix and the Cayley-Hamilton theorem. The student will have acquired knowledge and insight into matrix and vector norms and stepwise orthogonal transformations on a matrix; will have learnt to carry out Householder transformations and QR-factorisation and to determine eigenvalues. The student will have obtained skills in determining general as well as orthogonal bases; in applying the Gram-Schmidt process; in calculating determinants and in orthogonal diagonalisation of symmetric matrices. The student will have learnt to carry out these computational techniques with MATLAB and to interpret the results.

WISK311 REAL ANALYSIS I

3 hours

At the end of this module the student will have acquired knowledge and insight into: the theory of real numbers; the topology of finite dimensional vector spaces; the compactness and connectedness of sets; continuous and uniformly continuous functions; continuous images of compact and connected sets; implicit functions and the implicit function theorem in three dimensions; convergence of sequences and Cauchy sequences; convergence and uniform convergence of sequences of functions; improper integrals; differentiation of vector functions of several variables; differentiability; directional derivatives; theorem of Taylor; general implicit function theorem. The student will have skills in solving analytical problems, testing functions for continuity and uniform continuity; testing improper integrals and infinite series for convergence; Riemann and abstract integration, sigma algebras and measurable spaces; general measurable and Borel measurable spaces; measures in measurable spaces; integrals of measurable functions; the monotone convergence theorem; Fatou lemma and Lebesque convergence theorem; the relationship between Riemann and Lebesque integrals; the characterisation of Riemann integrable functions in terms of continuity. The student will be skilled in techniques in solving analysis problems, testing functions of continuity, solving of problems from integration theory and in applying abstract mathematical theorems and concepts in areas such as probability theory.

WISK312 LINEAR ALGEBRA III

2 hours

At the end of this module the student will have acquired knowledge and insight into: the theory of linear transformations between general vector spaces and how they are connected to other vector space and matrix algebra concepts, such as eigenvalues and eigenvectors of a matrix and diagonalisation of matrices; direct sum decompositions and complement of a subspace; vector quotient spaces (factor spaces). The student will have acquired skills in: interpreting vector space and matrix concepts in terms of linear transformations; applying eigenvalues and eigenvectors to obtain the appropriate bases; determining complementary subspaces; geometric interpretation and algebraic manipulation of lines and planes in quotient spaces.

WISK321 REAL ANALYSIS II

3 hours

Differentiation of vector functions of multivariables; differentiability; directional derivatives; Taylor theorem; general implicit function theorem; improper integrals; Radom-Nikodum and Fubini theorems. The student will be skilled in testing the convergence of improper integrals and infinite series; the calculation of maxima and minima of functions of multivariables and the application of abstract theorems from measure and integration theory in areas such as probability theory, functional analysis and financial mathematics.

WISK322 ALGEBRAIC STRUCTURES

3 hours

At the end of this module the student will have a general knowledge of algebraic structures such as groups, rings and fields. The student will be able to prove the fundamental theorems of the theory and will be able to apply these concepts with the help of logical, axiomatic reasoning to amongst others the integers modulo *n*, the cycle representation of permutations, computations with polynomials with integer coefficients (modulo *n*), factor rings formed from polynomial rings, as well as to carry out error-correcting coding and decoding.

PHILOSOPHY OF SCIENCE

WTNL221 PHILOSOPHY OF SCIENCE I

2 hours

On successful completion of module A students must demonstrate that they know and have the ability to explain the history, origin, nature and purpose of science; understand the relationship between norms and science; understand the influence of science and technology on the spiritual, cultural and material well-being of man and his environment; understand and discuss the coherence of science, its limitations and significance in the context of Christian and other value systems.

WTNL316 PHILOSOPHY OF SCIENCE II

2 hours

On successful completion of the module the student must demonstrate that he/she: can identify and critically react to the basic issues in the contemporary discussion about science, technology and society; can identify and critically react according to a value-based orientation to the most important ethical issues in the subject areas of a programme; can adopt a well-argued viewpoint on the concept of sustainable development, including the socio-economic implications thereof. In all cases the statement of the viewpoint made by the student must flow forth from a self-chosen but acknowledged frame of reference in the relevant area.

WTNL316 = WTNL317 = WTNL318 = WTNL318