

Sc.8 SYLLABI

Sc.8.1. SYLLABI FOR BSC, BSC(AGRIC), BINSTAGRAR AND BCONS.SC.

List of codes:

Fac Dept:		The Faculty in which the timetable for the particular module is determined and the department that offers the module.
NAS BCM	=	Faculty of Natural and Agricultural Sciences Department of Biochemistry
NAS BOT	=	Faculty of Natural and Agricultural Sciences Department of Botany
NAS CMY	=	Faculty of Natural and Agricultural Sciences Department of Chemistry
NAS FLG	=	Faculty of Natural and Agricultural Sciences Department of Physiology
NAS FSK	=	Faculty of Natural and Agricultural Sciences Department of Physics
NAS GGY	=	Faculty of Natural and Agricultural Sciences Department of Geography, Geoinformatics and Meteorology
NAS GLY	=	Faculty of Natural and Agricultural Sciences Department of Geology
NAS GTS	=	Faculty of Natural and Agricultural Sciences Department of Genetics
NAS LEK	=	Faculty of Natural and Agricultural Sciences Department of Agricultural Economics, Extension and Rural Development
NAS MBY	=	Faculty of Natural and Agricultural Sciences Department of Microbiology and Plant Pathology
NAS PGW	=	Faculty of Natural and Agricultural Sciences Department of Plant Production and Soil Sciences
NAS SCI	=	Faculty of Natural and Agricultural Sciences Gold Fields Computer Centre for Education
NAS VBR	=	Faculty of Natural and Agricultural Sciences Department of Consumer Science
NAS VDW	=	Faculty of Natural and Agricultural Sciences Department of Food Science
NAS VKU	=	Faculty of Natural and Agricultural Sciences Department of Animal and Wildlife Sciences
NAS VWT	=	Faculty of Natural and Agricultural Sciences Department of Insurance and Actuarial Sciences
NAS WST	=	Faculty of Natural and Agricultural Sciences Department of Statistics
NAS WTW	=	Faculty of Natural and Agricultural Sciences Department of Mathematics and Applied Mathematics
NAS ZEN	=	Faculty of Natural and Agricultural Sciences Department of Zoology and Entomology
EB BDO	=	Faculty of Economic and Management Sciences Department of Human Resource Management
EB BEM	=	Faculty of Economic and Management Sciences Department of Marketing and Communications Management
EB EKN	=	Faculty of Economic and Management Sciences Department of Economics
EB FRK	=	Faculty of Economic and Management Sciences Department of Accounting and Financial Management
EB INF	=	Faculty of Economic and Management Sciences Department of Informatics
EB OBS	=	Faculty of Economic and Management Sciences Department of

Nat and Agric Sciences 2005

EB TBE	=	Business Management Faculty of Economic and Management Sciences Department of Tourism Management
GW EOT	=	Faculty of Humanities Unit for the Development of Language Skills
GW FLG	=	Faculty of Humanities Department of Physiology
GW K GK	=	Faculty of Humanities Department of Visual Arts
GW MTL	=	Faculty of Humanities Department of Ancient Languages
GW SLK	=	Faculty of Humanities Department of Psychology
GW SOC	=	Faculty of Humanities Department of Sociology
GW VKK	=	Faculty of Humanities Department of Visual Arts
ING CIR	=	Faculty of Engineering, Built Environment and Information Technology Department of Chemical Engineering
ING COS	=	Faculty of Engineering, Built Environment and Information Technology Department of Computer Science
ING SWK	=	Faculty of Engineering, Built Environment and Information Technology Department of Civil and Biosystems Engineering
MED ANA	=	Faculty of Health Sciences Department of Anatomy
MED FAR	=	Faculty of Health Sciences Department of Pharmacology
OPV OPV	=	Faculty of Education Faculty of Education
RGL RGL	=	Faculty of Law Faculty of Law
VET PAS	=	Faculty of Veterinary Science Department of Genetics

Language: Medium of instruction of the module

English: Medium of instruction is English.

Afrikaans: Medium of instruction is Afrikaans.

Double: Separate classes for Afrikaans and English.

Bilingual: Both Afrikaans and English are used in the class.

lpw/ppw: lectures per week/ practicals per week (e.g.: 3+1 = 3 lectures and 1 practical per week)

Quarter: The quarter in which the specific module is presented.

J1 = the whole year (year module: extends over two semesters)

S1 = the first semester (K1 + K2)

S2 = the second semester (K3 + K4)

K1 = first quarter

K2 = second quarter

K3 = third quarter

K4 = fourth quarter

Credits: Credit value of a module.

: This symbol implies a module must be taken either before or concurrent with the module for which it is a prerequisite.

TDH: Approval from the head of department is required to register for the module.

Par 1.2: Refers to the requirements for specific modules that appear at the beginning of this publication.

Module	Title				
Fac_Dept	Old code	Language	lpw/ppw	Term	Credits
ABR351	LABOUR_LAW_351				
RGL_RGL	n a	Bilingual	3 + 0	K1	10
Basic principles of the employment contract. Collective Labour Law.					
ABR352	LABOUR_LAW_352				
RGL_RGL	n a	Bilingual	3 + 0	K2	10
Statutory conditions of employment. Individual labour disputes. Collective labour disputes. Settlement procedures. Social security provisions.					
AGC161	INTRODUCTORY_AGRICULTURE_161				
NAS_PGW	AGC152	English	2 + 0.5	S2	8
Basic properties of soils and principles involved in plant nutrition and plant health. The most important agronomic, horticultural, pasture and fodder crops in South Africa and their cultivation. General principles of animal breeding, animal reproduction and extensive animal production systems. Nutrient requirements of ruminants and monogastric animals. Post-harvest technology of food production and food processing.					
AGR313	PRIMARY_FOOD_CROPS_313				
NAS_PGW	AGR351.352	Bilingual	2 + 0.5	S1	14
Botanical characteristics, classification, growth requirements, production practices and utilization of vegetables in the field and in a controlled environment. Visits to fresh produce markets, seed and chemical companies and growers. Prerequisites: [HSC252] and [PPK251]					
AGR361	INDUSTRIAL_CROPS_361				
NAS_PGW	AGR323	Bilingual	2 + 0.5	S2	14
Botanical characteristics, classification, growth requirements, production practices and utilization of crops rich in oil and protein, fibre crops, tobacco, sugarcane and diverse crops. Visits to research institutions and producers. Prerequisites: [HSC252] and [PPK251]					
AGR450	PROD.SYST.1: GRAIN_CROPS_450				
NAS_PGW	AGR481	English	2 + 0.5	S1	12
Integration of agronomic, pedological, botanical, economic and management considerations in crop production systems with a view to sustainable maximum economic yield. Case studies of specific crops.					
AGR460	PROD.SYST.11: VEGETABLE_CR.460				
NAS_PGW	AGR482	English	2 + 0.5	S2	12
Integration of agronomic, pedological, botanical, economic and management considerations in crop production systems with a view to sustainable maximum economic yield. Case studies of specific vegetable crops.					
AGV410	AGRARIAN_EXTENSION_410				
NAS_LEK	n a	Bilingual	2 + 0	S1	20
The objective, philosophy and ethics of extension. Technology and agricultural production. Distribution and diffusion of technology. Group dynamics, the functioning and handling of groups. Leadership, leadership functions and types. Extension organisation.					
AGV412	GROUP_DYNA.LEADSH.&COM.FAC.412				
NAS_LEK	n a	English	3 + 0	S1	20
Community - concept and meaning; the community and change; hindrances to change. The use of small groups in the community; group dynamics; group and community goals. The paradigm shift from directing to facilitating; group techniques; participative techniques. Leadership development in communities. Case studies.					

AGV413	COMMUNICATION_413				
NAS_LEK	n a	English	2 + 0	J1	20
Nature and importance of development communication; the process and models of communication; critical elements and factors in communication; symbol systems and non-verbal communication. Credibility, messages and message treatment; audience and audience identification; channels and methods of communication. Effective listening and feedback. Practical training in communication: Effective speaking; visual aids in communication; managing conflict; report writing.					
AGV415	PRINC.&APPRO.OF_DEVEL.&EXT_415				
NAS_LEK	n a	English	2 + 0	J1	20
The role, importance and nature of extension and development; ethics in development and extension. International approaches to development and extension; paradigm shifts within extension and development. The Third World: concept, characteristics and change. The subsistence farmer, rural poverty and the deprivation trap. Development practice and theories. Participation; appropriate technology; role players and responsibilities in development.					
AGV421	COMMUNICATION_421				
NAS_LEK	n a	Bilingual	2 + 0	S2	20
Communication: Definition and clarification of concepts. Theory and elements of communication. Verbal and non-verbal communication. Determinants of interpersonal communication. Abating factors impeding communication. Nature, classification and efficiency of communication channels.					
AGV426	PROGRAMME_ & PROJECT_PLAN.426				
NAS_LEK	n a	English	2 + 0	J1	20
Nature, purpose and principles of a programmed and purposeful approach. Institutional framework for community participation, ownership and empowerment; linking with complementary and support services. Participative need appraisal, problem identification and delimitation; PRA methods and techniques; problem conceptualisation and development of survey instrument; situation surveys and analyses; formulation of objectives; identification and scheduling of methods and activities; work plan or calendar construction, budgeting.					
AGV428	EVAL.OF_DEVEL.&DEVEL.PROJS.428				
NAS_LEK	n a	English	3 + 0	J1	20
Reasons and purposes of evaluation; expectations from evaluations; role players and motives in evaluation. Criteria and indicators of development, development projects and development organisations. Methods of evaluation; formulation of objectives and scale construction for evaluation; developing and coding the measuring instrument. Sampling and sampling techniques; data analysis and interpretation; evaluation report.					
AGV429	BEHAVIOUR_CHANGE_&INTERVEN.429				
NAS_LEK	n a	English	2 + 0	J1	20
Characteristics of human behaviour; basic concepts: perception, defence mechanism, decision making and problem solving, learning, innovativeness and adoption behaviour; diffusion of innovations: elements and phases of diffusion, opinion leaders and contact farmers, methodological implications for extension. Psychological, cultural and social barriers to change. Behaviour change or modification: comparison of different approaches and strategies. A practical model: Background principles and theories, identifying "forces" or behaviour determinants; designing effective extension messages for development programmes.					
AGV481	EXTENS,PHIL,_ORGAN_ & MNGEM_481				
NAS_LEK	n a	English	4 + 0	S1	20
The history of agricultural extension; phases of development, extension in other countries; nature, philosophy and objectives of extension; ethics in extension; models of organisations; personnel management; administration; seminar.					

AGV482	LEADERSHIP&_GROUP_DYNAMICICS_482				
NAS_LEK	n a	English	4 + 0	S1	20
The group as channel and instrument in extension; definitions and characteristics; group formation; theories of group functioning; internal and external group dynamics; group techniques and evaluation; rural groups and their application; definitions and theories of leadership; types, kinds and functions of leadership; the extension officer as professional leader; opinion leadership; training of leaders; seminar.					
AGV485	COMMUNITY_EXTENS&_DEVELOPM_485				
NAS_LEK	n a	English	3 + 1	S1	20
The relation between rural sociology, community development and extension; physical and social structures of communities; cultural and value systems; social stratification; development as change; process and ethical norms; principles and functions of community development; development obstructions; method and models.					
AGV487	EXTENSION_PRORAMMING_487				
NAS_LEK	n a	English	2 + 1	J1	20
Definitions, concepts and models; philosophy principles and assumptions, motives and tenets; institutional linkages with and participation of communities; reconnaissance surveys, problem identification and delineation; problem conceptualisation, questionnaire construction, planning and analysis of surveys, formulation of objectives, identification of activities and activity planning, development of work calendar and planning of evaluation.					
AGV488	EVALUATION_OF_EXTENSION_488				
NAS_LEK	n a	English	2 + 0	J1	20
Meaning, extent and place of evaluation in extension; characteristics of a science (extension science); extension science; the process of research and evaluation; problem identification; theory and hypothesis; objectives; literature research and sources of information; sampling; methods and collection of data; criteria of efficiency; quality of measuring instruments; construction of scales; interviewing; statistical methods; research reporting; computer programming; practical exercises.					
AGV489	ACCEPTANCE_&_DIFFUSION_489				
NAS_LEK	n a	English	4 + 0	J1	20
The nature and purpose of extension; definitions; psychological foundations and dynamics of human behaviour; theories and models of decision-making and change in conduct; the field theory, theory and practice; characteristics and acceptance of innovations, factors determining behaviour, categories of acceptance. Diffusion: clarification of concepts; deficiencies of empirical research; seminar.					
AHG300	ANIMAL_HANDLING_300				
GTS_VET_PAS	n a	English	1 + 1	J1	12
Animal contact sessions are compulsory and include hands-on sessions for domestic and farm animals. Students are expected to acquire the skills necessary to handle animals, and know how and why a range of basic animal management are carried out. Prerequisite: [Only students selected for BSc(Veterinary Biology)III]					
ANA121	INTR.:_HUMAN_ANAT.&_EMBRIOL121				
MED_ANA	n a	Bilingual	1 + 1	S2	4
Terminology, musculo-skeletal system, nervous system, surface anatomy, cardiovascular system, respiratory system, urogenital system, gastro-intestinal system, endocrine system, introductory osteology and joints, introductory embryology. Prerequisite: [MLB111 GS]					
ANA122	HUMAN_OSTEOLOGY_122				
MED_ANA	n a	Bilingual	1 + 1	S2	4
Introduction to osteology, bone function and classification, humerus, radius, ulna, femur, tibia, fibula, clavicle, scapula, ribs, sternum, vertebrae, pelvis, hand and foot bones, sesamoid bones, skull, mandible, joints.					

ANA126	BASIC_HUMAN_HISTOLOGY_126				
MED_ANA	n a	Bilingual	1 + 1	S2	4
General introduction to cells and tissue, terminology, the cell and cytoplasm, organelles and inclusions, surface and glandular epithelium, general connective tissue, specialised connective tissue, namely cartilage, bone, blood and haemopoietic tissue, muscle and nervous tissue. Prerequisites: [CMY117 GS] and [MLB111]					
ANA214	HUMAN_CELL_&_DEVELOPM.BIOL.214				
MED_ANA	n a	Bilingual	2 + 1	S1	12
Functional review of the cell and cell content. Normal and abnormal cell function in relation to structure. Control of the human cell, heredity and the human genome. Cell communication, growth and development, adhesion and division. Aspects of cellular research. Techniques on how to study cells. Medical cell and molecular biology application. Prerequisites: [ANA121] and [ANA126]					
ANA215	PALEO-ANTHROPOLOGY_215				
MED_ANA	n a	Bilingual	2 + 1	S1	10
Introduction to paleoanthropology, focussing on hominid fossil record, principles of evolution, principles of heredity, human variation, introduction to primatology, hominide taxonomy, time-frames and dating methods, fossilation and tafonomy, trends in hominide evolution, hominide areas. Australopithecus, Homo habilis, Homo erectus, Homo sapiens neanderthalensis, the origin of anatomically modern human beings, DNA studies, paleo-environments, hominide diets, introduction to the development of culture, South African populations.					
ANA217	HUMAN_ANATOMY_217				
MED_ANA	n a	Bilingual	2 + 1	S1	16
Regional approach to human anatomy. Cadaver dissection of the upper and lower limbs, back, thorax, abdomen, pelvis, perineum and genital area. Anatomical techniques. Prerequisites: [ANA121] and [ANA122]					
ANA226	HUMAN_HISTOLOGY_226				
MED_ANA	n a	Bilingual	1 + 1	S2	10
General introduction to organ structure. Terminology. The eye, ear, skin, circulatory system, nervous system, lymphoid system, gastrointestinal tract, gastrointestinal tract glands, respiratory system, urinary system, andrological and female reproductive systems, endocrine system. Prerequisite: [ANA126]					
ANA227	HUMAN_ANATOMY_227				
MED_ANA	n a	Bilingual	0 + 0	S2	16
Regional approach to human anatomy. Cadaver dissection of the head, neck as well as neuro-anatomy. Anatomical techniques. Prerequisite: [ANA217 GS]					
ANA315	FORENSIC_ANTHROPOLOGY_315				
MED_ANA	n a	Bilingual	2 + 1	S1	16
Introduction to forensic anthropology, detection of graves, excavation of graves, human vs. animal bone, forensic entomology, osteometry, cranial and post-cranial measurements, non-metric features of the skeleton, age determination, sex determination, race determination, ante-mortem stature, dental analysis, osteopathology, factors of individualisation, measurements, of the face, introduction of face mapping and skull-photo superimposition, legal aspects. Prerequisites: [ANA122] and [ANA215]					

ANA316	HISTOLOGY_TECHNIQUES_316				
MED_ANA	n a	Bilingual	2 + 2	S1	16
General introduction to light and electron microscopic techniques: fixation, processing, imbedding, staining. Principles of different staining techniques for LM and EM: routine stains, proteins, carbohydrates, amino acids, metachromasia, immunocytochemistry, lectin stains, specialised stains. Principles of the operation of LM and EM: general LM, fluorescent microscopy, differential contrast microscopy, dark field microscopy, phase contrast microscopy, transmission and scanning electron microscopy. Prerequisite: [ANA226]					
ANA324	HUMAN_CELL_&_DEVEL.BIOLOGY_324				
MED_ANA	n a	Bilingual	2 + 1	S2	14
Practical aspects of cell biology. Cell, tissue, organ, and organism culture. The biology of the culture environment. Cellular basic of morphogenesis, cleavage patterns and gastrulation. The early vertebrate development; neurulation, ecto-, meso- and endoderm derivatives. Cell destiny and embryonic axis including malformations. Development of the Tetrapod limb and cell death. Cell interactions at a distance through hormones and metamorphosis. Prerequisites: [ANA214] and [ANA226]					
ANA327	COMPARATIVE_ANATOMY_327				
MED_ANA	n a	Bilingual	1 + 1	S2	14
Introduction to comparative anatomy. Introduction to comparative osteology. Comparative anatomy of the appendicular skeleton. Comparative anatomy of the axial skeleton. Prerequisites: [ANA121] and [ANA122] and [ANA217] and [ANA227]					
ANA328	APPL.RESEARCH_TECHNIQUES_328				
MED_ANA	n a	Bilingual	0 + 1	S2	8
Introduction to research. Development of research project. Research skills. Completion of research project. Prerequisites: [ANA315] and [ANA316]					
APS461	CROP_PHYSIOLOGY_461				
NAS_PGW	PPK411	English	2 + 0.5	S2	14
Physiology of growth, yield, and quality; effect of environmental factors upon plant carbon budget, source – sink relationships, stress physiology, growth analysis and modelling. Growth manipulation. Prerequisites: [GKD250] and [GKD260] and [HSC252] and [PGW350]					
APZ325	LIVESTOCK_BREEDING_325				
NAS_VKU	n a	English	2 + 0	S2	10
Introduction to applied animal breeding and genetics: Genetic defects in farm and companion animals (single gene and multifactor characteristics). Phenotypic expression of genes in qualitative and quantitative inheritance. Principles of breeding and selecting farm and companion animals, breeding systems, application and interpretation of breeding values and animal recording schemes. Prerequisite: [GTS261]					
APZ400	SEMINAR_400				
NAS_VKU	n a	English	1 + 0	J1	8
Literature studies and seminars on the management of Animal Production Systems. Prerequisites: [APZ311] and [APZ312] and [APZ313] and [APZ321] and [APZ324] and [APZ325] and [TDH]					
APZ412	LIVESTOCK_ECOLOGY_412				
NAS_VKU	n a	English	3 + 1	S1	16
Interaction between livestock and the environment: specific adaptation mechanisms and management of resources to optimise biological efficiency. Selected literature study and discussion classes. Prerequisite: [APZ324] or [TDH]					

APZ422	LIVESTOCK_MANAGEMENT_422				
NAS_VKU	n a	English	3 + 1	S2	16
Functional drive in beef and dairy cattle, sheep and goats. Management programmes and intensive, extensive production systems. Seminars, discussions and literature studies on animal nutrition, breeding, production, planning and management systems and marketing.					
Prerequisites: [APZ324] and [APZ325] and [or [TDH]					
APZ423	LIVESTOCK_MANAGEMENT_423				
NAS_VKU	n a	English	3 + 1	S2	16
Functional management of pigs, poultry and aquaculture. Management programmes and production systems, seminars, discussions and literature studies on animal nutrition, breeding, production, planning and management systems and marketing.					
Prerequisites: [APZ324] and [APZ325] and [or [TDH]					
ARD480	AGRIC.&_RURAL_DEVELOP.STUD.480				
NAS_LEK	n a	English	2 + 0	J1	40
Overview of the concepts and theories of rural development; the role of agriculture in rural development. Rural livelihood systems: household farming systems; decisions and the operation of farming systems; Non-farm enterprises and SMMEs in the rural economy; household food security.					
Rural institutions: Definitions and role of institutions; land tenure; rural financial markets; local institutional development; human capital, knowledge systems. Methodologies for Rural Development: The farming systems approach; participatory techniques; Assessment of land use patterns (zoning techniques); Typology techniques; technology transfer and decisionmaking support; communication for rural development; planning rural development at local level.					
ARD482	RESOURCES_AND_DEVELOPMENT_482				
NAS_LEK	n a	English	3 + 0	S1	20
Review of the most important physical-biological agricultural resources - soil, water, climate, topography, plant species, animal species; differences in characteristics, quality and vulnerability; the concept of optimum land use; resource conservation; general ecological principles; examples of problems caused by mismatching of physical-biological resources and land use during development planning; principles of sensible technology transfer.					
ASS420	ASSESSMENT_420				
OPV_OPV	n a	Bilingual	+	S1	12
Contact Department for more information.					
BCM251	INTRO._TO_PROT._&_ENZYMES_251				
NAS_BCM	BCM216	Bilingual	2 + 0.5	S1	12
Structural and ionic properties of amino acids. Peptides, the peptide bond, primary, secondary, tertiary and quaternary structure of proteins. Interactions that stabilize protein structure, denaturation and renaturation of proteins. Introduction to methods for the purification of proteins, amino acid composition, and sequence determinations.					
Introduction to enzyme kinetics and enzyme inhibition. Allosteric enzymes, regulation of enzyme activity, active centres and mechanisms of enzyme catalysis. Examples of industrial applications of enzymes.					
Prerequisites: [CMY117 GS] and [CMY127 GS] and [MLB111 GS]					
BCM252	CARBOHYDRATE_METABOLISM_252				
NAS_BCM	BCM217	Bilingual	2 + 0.5	S1	12
Biochemistry of carbohydrates. Thermodynamics and bioenergetics. Glycolysis, citric acid cycle and electron transport. Glycogen metabolism, pentose-phosphate pathway, gluconeogenesis and photosynthesis.					
Prerequisites: [CMY117 GS] and [CMY127 GS] and [MLB111 GS]					

BCM261	LIPID_ & NITROGEN_METABOLIS.261				
NAS_BCM	BCM226	Bilingual	2 + 0.5	S2	12
Biochemistry of lipids, membrane structure, anabolism and catabolism of lipids. Nitrogen metabolism, amino acid biosynthesis and catabolism. Biosynthesis of neurotransmitters, pigments, hormones and nucleotides from amino acids. Catabolism of purines and pyrimidines. Therapeutic agents directed against nucleotide metabolism. Examples of inborn errors of metabolism of nitrogen containing compounds. The urea cycle, nitrogen excretion. Prerequisites: [CMY117 GS] and [CMY127 GS] and [MLB111 GS]					
BCM262	BIOCHEMISTRY_IN_PERSPECT_262				
NAS_BCM	BCM227	Bilingual	2 + 0.5	S2	12
Integration of metabolic pathways; biochemistry and nutrition; hormones and second messengers; hormonal control in metabolism; a case study in connectivity among metabolic pathways, nutrition, regulation and the immune system. Prerequisites: [CMY117 GS] and [CMY127 GS] and [MLB111 GS]					
BCM271	BIOCHEMISTRY_PRACTICAL_271				
NAS_BCM	BCM228	English	0 + 1	J1	12
(Note: for students majoring in Biochemistry only) Basic biochemical separation methods, experimental design, biochemical calculations. Prerequisites: [BCM251 #] and [BCM252 #] and [BCM261 #] and [BCM262 #] and [CMY283 #] and [CMY284 #]					
BCM351	BIOCHEMISTRY_OF_PROTEINS_351				
NAS_BCM	BCM312	Bilingual	2 + 1	K1	9
Biochemistry of amino acids, peptides and proteins. Chemical modification of amino acids. Primary, secondary, tertiary and quaternary structure, protein folding, sequence motifs and domains, supersecondary and supramolecular structure, self assembly. Practical: Subcellular fractionation (CBE) and purification of proteins. HPLC of proteins (CBE). Dipeptide sequencing and electrophoresis of proteins. Prerequisite: [BCM251]					
BCM352	PROTEOME_ANALYSIS_352				
NAS_BCM	BCM312	Bilingual	2 + 1	K2	9
Analysis of amino acid composition and sequence of proteins. Isolation and characterization of proteins. Introduction to proteomics. Sequence-based characterisation of proteins, scoring matrices and algorithms. Basic techniques for three-dimensional modelling and characterization. Practical: Introduction to bioinformatics in protein structure-function relation investigations. Prerequisites: [BCM251] and [BCM351 GS]					
BCM354	BIOCHEM_OF_NUCLEIC_ACIDS_354				
NAS_BCM	BCM411	Bilingual	1 + 0.5	S1	9
Biochemistry of nucleic acids, nucleotides and nitrogen bases. Chemical modification of nucleotides and nucleic acids. Primary, secondary and tertiary structure of nucleic acids and sequence-induced conformational types. Sequence-based analysis and comparison, characterisation of functional regions and genome analysis. Hybridization of nucleic acid strands, thermodynamics and kinetics of the process. Reversible interactions between small ligands (dyes and antibiotics) and nucleic acids. Interaction between nucleic acids and nucleic acids binding proteins. Enzymology of gene manipulation. Principles of the Polymerase Chain Reaction (PCR). Nucleotide sequence determination of nucleic acids. Chemical synthesis and use of oligonucleotides. Note. The practical is shared with the departments of Microbiology and Genetics. Prerequisites: [BCM251] and [BCM252] and [BCM261] and [BCM262]					

BCM355	IMMUNOBIOLOGY_355				
NAS_BCM	BCM423	Bilingual	1 + 0.5	S1	9
<p>Adaptive and innate immunity. Complement. Organs and cells of the immune response. Cell killing; Phagocytosis, apoptosis and necrosis. Anatomy and ontogeny (development) of the immune system. Chemical and cellular techniques of immunology. The origin of diversity in antigen receptors. Practical: Working with experimental animals, the synthesis of hapten-protein conjugate, immunization, bleeding and serum production and an immuno-assay.</p>					
Prerequisites: [BCM251] and [BCM252] and [BCM261] and [BCM262]					
BCM362	NUTRITIONAL_BIOCHEMISTRY_362				
NAS_BCM	BCM413	English	1 + 0	K3	4
<p>Proximate analysis of nutrients. Review of energy requirements and expenditure. Metabolism of energy-yielding nutrients. Requirements and function of water, vitamins and minerals. Interpretation and modification of RDA values for specific diets, eg growth, exercise, pregnancy and lactation, aging and starvation. Comparison of monogastric and ruminant species. Significance of the composition of the carbohydrates eg mono-saccharides and disaccharides compared to fiber. Composition of triglycerides, fatty acids and arteriosclerosis.</p> <p>Cholesterol, polyunsaturated, essential fatty acids and dietary anti-oxidants. Essential amino acids and protein quality, nitrogen balance and determination of amino acid requirements. Interactions between nutrients. Biochemical functions of water and fat-soluble vitamins, hypo- and hypervitaminosis and assessment of vitamin status. Mineral requirements, biochemical function, deficiency and overload, imbalances, diarrhea and vomiting. Minerals in redox reactions and dietary antioxidants.</p>					
BCM363	XENO_BIOCHEMISTRY_363				
NAS_BCM	BCM421	English	1 + 0	K4	5
<p>Metabolism of xenobiotics: absorption, distribution and excretion; oxidation/reduction (Phase I), conjugations (Phase II), export from cells (Phase III); factors affecting metabolism and disposition. Toxic responses: tissue damage and physiological effects; teratogenesis, immunotoxicity, mutagenesis and carcinogenesis.</p> <p>Examples of toxins: biochemical mechanisms of common toxins and their antidotes. Food toxicology: natural toxins in animal, plant and fungal products. Ecological biochemistry: flower pollination, plant defence and animal adaptive responses.</p>					
BCM364	BUILDING_THE_CELL_364				
NAS_BCM	BCM322	English	1 + 0.5	S2	9
<p>Membrane structure: plasma membrane structure, organisation of lipid membranes, membrane proteins, glycoproteins and glycolipids, principles of membrane organisation, specialisations of the plasma membrane. Transport across cell membranes: major types of membrane transport proteins; diffusion of small molecules across pure phospholipid bilayers; uniporter-catalysed transport of specific molecules; ion channels, intracellular ion environment and membrane electric potential; active ion transport and ATP hydrolysis; cotransport catalysed by symporters and antiporters; osmosis, water channels and the regulation of cell volume.</p> <p>Organelle biogenesis: mitochondrial DNA; synthesis and localisation of mitochondrial proteins; chloroplast DNA and the biogenesis of chloroplasts and other plastids, peroxisome biosynthesis; protein traffic into and out of the nucleus. Synthesis and sorting of plasma membrane, secretory and lysosomal proteins.</p>					
BCM365	IMMUNOBIOCHEMISTRY_365				
NAS_BCM	BCH423	Double	1 + 0.5	S2	9
<p>Interactions between antigens and antibodies: Quantitative and qualitative properties, regulation of the immune response, integrated immunology. Practical: Tutorials on integrated and quantitative immunology.</p>					
Prerequisite: [BCM355 GS]					

BCM366	ENZYMOLGY_366				
NAS_BCM	BCM321	English	1 + 1	S2	9
<p>Nomenclature: enzyme nomenclature and classification. Specificity and mechanisms: the active site, mechanisms of catalysis and examples of specific enzyme mechanisms eg lysozyme and carboxypeptidase A. Enzyme kinetics: derivation of Michaelis-Menten (MM) equation by equilibrium and steady state assumptions, significance of Km and Vmax in the catalytic efficiency of enzymes and linear transformations of the MM equation. Enzyme inhibition: competitive, uncompetitive, non-competitive and irreversible inhibitors with examples of specific toxins and drugs. Multi-substrates: Cleland nomenclature and multi-substrate reactions. Allosteric enzymes: models by Koshland, Hill and Monod. Problems and answers: tutorials of problems and answers based on above concepts. Practicals: isolation of an enzyme, determination of pH and temperature optimum, determination of Km and Vmax, enzyme activation, enzyme inhibition, purification table and final report, oral defense of report.</p>					
BDO181	INDUSTR. & ORG. PSYCHOLOGY_181				
EB_BDO	n a	Bilingual	4 + 0	K4	5
<p>Capita selecta: This course will provide an introduction to personnel psychology, organisational behaviour and labour relations. It will refer to the selection of employees, the training and development of human resources in order to adapt to changing circumstances. The role of leadership in group utilisation and motivation will be discussed both theoretically and practically. Labour relations will be studied in terms of the institutional processes and service relationship and will include practical aspects such as grievance handling, disciplining and dispute resolution.</p>					
BEH311	HOUSING_311				
NAS_VBR	n a	Bilingual	4 + 0	S1	12
<p>Inter relationship between man's immediate environment (housing, neighbourhood and home range), his social behaviour and well being from an ecological perspective. Evaluation of different housing types in terms of functions, health, safety, climate control and durability. Acquiring housing, different types of housing, rent, build, buy, contracts, financing, role players in housing provision in SA, responsibilities of occupants.</p> <p>Prerequisite: [Third-year status]</p>					
BEM110	MARKETING_MANAGEMENT_110				
EB_BEM	n a	Bilingual	3 + 0	S1	10
<p>Fundamentals of marketing management and marketing instruments: General overview of marketing management including the marketing concept, the process of marketing management, evolution of marketing and the marketing environment. Consumer entity, market segmentation, positioning and marketing information. Perspective of various marketing instruments in the marketing mix, for example, product decisions, distribution decisions, marketing communication decisions and pricing decisions.</p>					
BEM161	MARKETING_MANAGEMENT_161				
EB_BEM	n a	Bilingual	3 + 0	K3	5
<p>Sales decisions: The selling process, selling techniques, management of selling corps and the management of sales promotions. A professional approach to selling techniques and the selling process, the position of personal sales in the execution of the marketing task; integration of various sales management tasks - recruitment, selection, training, remuneration and evaluation of the sales process and ethics of sales practices.</p>					
BEM162	MARKETING_MANAGEMENT_162				
EB_BEM	n a	Bilingual	3 + 0	K4	5
<p>Introduction to the marketing of professional services: Acquiring basic marketing skills will enhance the capabilities of professionals in inter alia the accounting profession. This module provides an overview of the seven marketing instruments of a professional services marketing mix. The focus will fall on the practical implications of the characteristics of intangible products and the pricing, promotion, placement, physical evidence, process and people dimensions of professional services.</p>					

BEM251	MARKETING_MANAGEMENT_251				
EB_BEM	n a	Bilingual	3 + 0	K1	8
Consumer behaviour: The use of marketing research in marketing decision making; the process of marketing research, research designs, random tests, consumer surveys, questionnaires, experimentation, observation, data analysis and analyses of marketing models. Scientific approach to marketing information, the influence of modern tendencies (computers, Internet).					
BEM252	MARKETING_MANAGEMENT_252				
EB_BEM	n a	Bilingual	3 + 0	K2	8
Marketing research: The use of marketing research in marketing decision making; the process of marketing research, research designs, random tests, consumer surveys, questionnaires, experimentation, observation, data analysis and analyses of marketing models. Scientific approach to marketing information, the influence of modern tendencies (computers, internet).					
BEM261	MARKETING_MANAGEMENT_261				
EB_BEM	n a	Bilingual	3 + 0	K3	8
Distribution decisions: The development and management of distribution channels - strategic aims, conventional marketing systems, the main role players, the integration of distribution with the other marketing instruments and relationship marketing; the influence of the external environment and channel design and management; the management of the internal channel environment; vertical marketing systems, concession agreements, relationship management and the forming of strategic alliances. Prerequisite: [BEM110 GS]					
BEM262	MARKETING_MANAGEMENT_262				
EB_BEM	n a	Bilingual	3 + 0	K4	8
Product decisions: Problem supposition and problem determination in connection with product decisions, management strategies of the enterprise, enterprise strategy, product strategy, organisation of product strategy, product and market development strategy. Case studies, group discussions, seminars, guest speakers, visits to enterprises for meaningful integration of theory and practice. Prerequisite: [BEM110 GS]					
BEM310	MARKETING_MANAGEMENT_310				
EB_BEM	n a	Bilingual	3 + 1	S1	20
Product decisions: Demarcation and terminology with regard to product decisions, management strategy of the enterprise, enterprise strategy, product strategy, organisation for product strategy, product and market development strategy. Pricing decisions: Enterprises that are primarily price determiners. Influence of cost demand and competition on the fixing of price determiners and sales prices. Practical (1 l.p.w.): Case studies, group discussions, seminars, and visits to enterprises for meaningful integration of the theory and practice. Marketing management in practice: Most recent marketing management principles and decisions. Prerequisites: [BEM151 GS] and [BEM152]					
BEM320	MARKETING_MANAGEMENT_320				
EB_BEM	n a	Bilingual	3 + 1	S2	20
Distribution decisions: design, modification and management of distribution channels. Marketing communication decisions: the role of advertising in the marketing strategy, role and selection of an advertising agency. Management of an advertising campaign. Publicity, sales-directed methods, sales management and oral communication. Practical (1 l.p.w.): Case studies, group discussions, seminars, guest speakers and visits to enterprises for meaningful integration of theory and practice.					
BEM361	MARKETING_MANAGEMENT_361				
EB_BEM	n a	Bilingual	3 + 1	K3	10
Strategic issues in marketing. Multi-level marketing; relationship marketing; e-marketing; brand loyalty; generation segmentation and ethics in marketing. Practical (1 l.p.w.): Case studies, group discussions, seminars, and visits to/by organisations for meaningful integration of the theory and practice. Prerequisites: [BEM261 GS] and [BEM262 GS] and [BEM351 GS] and [BEM352 GS]					

BEM362	MARKETING_MANAGEMENT_362				
EB_BEM	n a	Bilingual	3 + 1	K4	10
<p>Strategic marketing. Strategic analysis; customer management; market strategies; globalisation; strategy implementation; marketing planning and strategy evaluation and control.</p> <p>Practical (1 l.p.w.): Case studies, group discussions, seminars, and visits to/by organisations for meaningful integration of the theory and practice.</p> <p>Prerequisites: [BEM261 GS] and [BEM262 GS] and [BEM351 GS] and [BEM352 GS]</p>					
BEM781	MARKETING_MANAGEMENT_781				
EB_BEM	n a	Bilingual	3 + 0	S2	15
Information available at the Department					
BER210	BUSINESS_LAW_210				
EB_BEM	n a	Bilingual	3 + 0	S1	16
Basic principles of Law of Contract. Law of sales, credit agreements, lease.					
BER220	BUSINESS_LAW_220				
EB_BEM	n a	Bilingual	3 + 0	S2	16
Labour Law. Aspects of Security Law. Law of Insolvency. Entrepreneurial Law; Company Law, Law concerning close corporation. Law of Partnerships.					
BLG123	BIOLOGY_123				
NAS_ZEN	n a	Bilingual	3 + 1	S2	16
Study of animals and animal diversity. Functional morphology (structure) of vertebrates and invertebrates. Animal development, evolution and inheritance.					
BLG150	INTRODUCTORY_PLANT_BIOLOGY_150				
NAS_BOT	BLG150	Double	3 + 1	S1	16
<p>The following subjects are treated at an introductory level: Plant morphology and anatomy; reproductive biology of higher plants; properties of biomolecules; basic plant metabolism; protein biosynthesis; recombinant DNA-technology; principles of plant taxonomy; diagnostic properties of selected plant families.</p> <p>Note: The credits for this module may not be credited towards a BSc- or BSc(Agric) degree programme.</p>					
BLG160	INTRODUCTORY ANIMAL BIOL_160				
NAS_ZEN	n a	Bilingual	3 + 1	S2	16
Study of animals and animal diversity. Functional morphology (structure) of vertebrates and invertebrates. Animal development, evolution and inheritance.					
Note: The credits for this module may not be credited towards a BSc- or BSc(Agric) degree programme.					
BLG260	GENERAL_MICROBIOLOGY_260				
NAS_MBY	n a	Bilingual	4 + 1	K3	8
<p>General anatomy and morphology of bacteria, viruses and fungi. Basic nutritional requirements of micro-organisms and the effect of environmental factors on microbial growth. Micro-organisms as essential components of ecospheres: plant, water and soil ecosystems. Food decay, food poisoning and preservation of food by micro-organisms.</p> <p>Basic principles involved in disinfections, sterilization and control of microbes; techniques for microbial repression: sterilization by using heat, radiation, filtration, chemicals; decimation of numbers.</p>					

BME120	BIOMETRY_120				
NAS_WST	BME161,162	Double	4 + 1	S2	16
<p>Simple statistical analysis: Data collection and analysis: Samples, tabulation, graphical representation, describing location, spread and skewness. Introductory probability and distribution theory. Sampling distributions and the central limit theorem. Statistical inference: Basic principles, estimation and testing in the one- and two-sample cases (parametric and non-parametric). Introduction to experimental design. One- and two-way designs, randomised blocks.</p> <p>Multiple statistical analysis: Bivariate data sets: Curve fitting (linear and non-linear), growth curves. Statistical inference in the simple regression case. Categorical analysis: Testing goodness of fit and contingency tables. Multiple regression and correlation: Fitting and testing of models. Residual analysis.</p> <p>Computer literacy: Use of computer packages in data analysis and report writing.</p> <p>Prerequisites: [STK113 GS] and [STK123 GS] and [or at least 40% (HG) or 50% (SG) Grade 12 Mathematics or an equivalent Mathematics achievement.]</p>					
BME210	BIOMETRY_210				
NAS_WST	BME251,252	English	4 + 1	S1	24
<p>Analysis of variance: Multiway classification. Testing of model assumptions, graphics. Multiple comparisons. Fixed, stochastic and mixed effect models. Block experiments. Estimation of effects. Experimental design: Principles of experimental design.</p> <p>Factorial experiments: Confounding, single degree of freedom approach, hierarchical classification. Balanced and unbalanced designs. Split-plot designs. Analysis of covariance. Computer literacy: Writing and interpretation of computer programmes. Report writing.</p> <p>Prerequisite: [BME120]</p>					
BOT161	PLANT_BIOLOGY_161				
NAS_BOT	n a	Bilingual	2 + 0.5	S2	8
<p>Basic plant structure; plant organs at work; metamorphic plant organs and their function; introductory plant taxonomy and plant systematic; the ecosystem; adaptation of plants to extreme environments; introduction to veld evaluation and veld management.</p> <p>Prerequisite: [MLB111 GS] or [TDH]</p>					
BOT251	SA_FLORA_ & VEGETATION_251				
NAS_BOT	n a	Bilingual	2 + 1	S1	12
<p>Origin and affinity of South African flora and vegetation types; principles of plant geography;</p> <p>plant diversity in southern Africa; characteristics, environments and vegetation of southern African biomes; major vegetation types of southern Africa; centre of plant endemism; rare and threatened plant species; red data lists; plant conservation; international conventions; local environmental laws; conservation status of southern African vegetation types.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
BOT261	PLANT_BIOCHEM. EVOLUTION_261				
NAS_BOT	n a	Bilingual	2 + 1	S2	12
<p>Role of biochemical evolution in the survival of plants as stationary organisms (coordination of autotrophic and heterotrophic metabolism on cellular and whole plant level, nitrogen fixation, defence mechanisms and interaction with other organisms).</p> <p>Families of economic importance, interrelationship between humans and plants; food, medicine, drugs and poisons, landscape architecture, energy, water and industry.</p> <p>Prerequisites: [BOT161] and [CMY117] and [CMY127] or [TDH]</p>					

BOT356	PLANT_ECOPHYSIOLOGY_356				
NAS_BOT	n a	Bilingual	2 + 1	S1	18
<p>The emphasis is on the efficiency of the mechanisms whereby C3-, C4- en CAM-plants bind CO₂ and how it is impacted upon by environmental factors. The mechanisms and factors which determine the respiratory conversion of carbon skeletons and how production is affected thereby will be discussed. Insight into the ecological distribution and manipulation of plants for increased production is gained by discussing the internal mechanisms whereby carbon allocation, hormone production, growth, flowering and fruitset are influenced by external factors. To understand the functioning of plants in diverse environments, the relevant structural properties of plants and the impact of soil composition and water flow in the soil-plant-air continuum will be discussed. Various important techniques in the field of study will be illustrated in the practicals and may be employed to investigate aspects such as: the effect of herbicides on isolated chloroplasts, water-use efficiency of plants, factors affecting stomatal opening, determination of plant stress, photosynthetic rate and nitrogen fixation, compilation of Höfler diagrams and determination of elasticity coefficients.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
BOT357	CROP_BIOTECHNOLOGY_357				
NAS_BOT	n a	Bilingual	2 + 1	S1	18
<p>Molecular tools in crop biotechnology; whole crop plant physiology explored by molecular techniques; usefulness of model plants; gene and promoter identification and transfer techniques for crop improvement; investigation of plant transcriptomes using microarrays; molecular analysis of plant reactions to stress; transgenic plant strategies for improved stress resistance in crops.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
BOT358	PLANT_ECOLOGY_358				
NAS_BOT	n a	Bilingual	2 + 1	S1	18
<p>A description of the environment of plants. Theory of plant community concepts, vegetation change over space and time; surveying techniques of vegetation and environmental factors; floristic and structural composition. Data processing techniques; ecological interpretation and description of plant communities. Vegetation and environmental management; vegetation and the grazing animal. An examination of the ecological traits of plant populations; conventional and diagrammatic life tables; population growth and population regulation; population dynamics. Species interactions and an evaluation of their effects on interacting species.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
BOT365	PHYTOMEDICINE_365				
NAS_BOT	n a	English	2 + 1	S2	18
<p>The course will include a review on the discovery and use of plant medicines and phyto-therapeutically important molecules obtained from plants. Certain aspects of natural product chemistry i.e. the biosynthesis and ecological role of the three main classes of secondary compounds; terpenoids, phenolics, and alkaloids will be discussed. The role of these natural products in defence against microorganisms and herbivores will be presented during the course. The basics of alternative medicines such as homeopathy, ayurvedic medicine, acupuncture etc. will also be discussed. Key skills / practical elements to be covered in the module include modern techniques like high performance liquid chromatography and flash chromatography used for the detection and isolation of active compounds from medicinal plants. Practical drug discovery approaches using chromatographic techniques for phytochemical analysis of secondary metabolites such as tannins, alkaloids, sterols and saponins will be conducted. Bioassays on microorganisms will also be done during the practical sessions in order to develop the skills for the potential discovery of new antibiotics. Visits to several pharmaceutical laboratories will be arranged.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
BOT366	PLANT_DIVERSITY_366				
NAS_BOT	n a	Bilingual	2 + 0	S2	10
<p>Basic principles and methods of plant classification. Sources of plant variation. Modern methods to ascertain evolutionary relationships among plants. The extent and significance of vascular plant diversity. General structural, and biological characteristics of evolutionary end ecologically important plant groups. Botanical nomenclature.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					

BOT367	PRACT_PLANT_IDENTIFICATION_367				
NAS_BOT	n a	Bilingual	0 + 1	S2	10
<p>Plant identification in practice; identification methods, keys, herbaria and botanical gardens. Diagnostic characters for the field identification of trees, wild flowers and grasses. Family recognition of southern African plants.</p> <p>Available literature for plant identification. Methods to conduct floristic surveys. Nature and significance of voucher specimens.</p> <p>Prerequisite: [BOT161] or [TDH]</p>					
CHM215	CHEMISTRY_215				
NAS_CMY	CHM214	Double	3 + 1	S1	16
<p>Organic chemistry. Chemical properties of organic (including aromatic) compounds. Functional group transformation and synthesis.</p> <p>Physical Chemistry. Colloid chemistry. Surface chemistry and processes at solid surfaces. PVT properties of real gases.</p> <p>Prerequisites: [CHM171] and [CHM181]</p>					
CHM226	CHEMISTRY_226				
NAS_CMY	CHM216	Double	2 + 1	S2	8
<p>Theory: Introduction to instrumental chemical analysis. Integration of electronic, chemical, optical and computer principles for the construction of analytical instrumentation. Detail discussion of principles and some instrumental methods from three disciplines within analytical chemistry, namely electrochemistry, spectroscopy and chromatography.</p> <p>This includes potentiometry, (AA) atomic absorption-, (ICP) atomic emission-, ultraviolet (UV)-, and infrared (IR) spectroscopy, potentiometric and photometric titrations, gas chromatography, liquid chromatography as well as combinations of these techniques.</p> <p>Practical: IR spectroscopy, UV spectroscopy, AA spectroscopy, potentiometric titration, gas chromatography. (Note: Two lectures per week. Third quarter: Six 3 hour practical.)</p> <p>Prerequisites: [CHM171] and [CHM181]</p>					
CIL171	COMPUTER_&_INFORM.LITERACY_171				
EB_INF	n a	Double	2 + 0	K1	3
<p>Keyboard and mouse skills, e-mail, basic Internet and Web skills, basic theoretical introduction to hardware and software. Windows as operating system.</p> <p>Note: Prohibited combination: SCI152 and CIL171, CIL172.</p>					
CIL172	COMPUTER_&_INFORM.LITERACY_172				
EB_INF	n a	Double	2 + 0	K2	3
<p>Word-processing programmes: Creation, editing and formatting of documents, outline editing, automatic numbering and footnotes, tables and columns, insertion of multimedia, data exchanges etc.</p> <p>Presentation programmes: Creation of presentations, together with figures, text animation and the insertion of multimedia.</p> <p>Note: Prohibited combination: SCI152 and CIL171, CIL172.</p>					
CIL173	COMPUTER_&_INFORM.LITERACY_173				
EB_INF	n a	Double	2 + 0	K3	3
<p>Spreadsheet programmes: basic spreadsheet skills including formulas and diagrams. Data-base programmes: Basic database skills including searches, compilation of reports, etc.</p> <p>Note: Prohibited combination: SCI162 and CIL173, CIL174.</p>					

CIL174	COMPUTER_&_INFORM.LITERACY_174				
EB_INF	n a	Double	2 + 0	K4	3
Search strategy formulation: the use of Boolean operators, natural language and controlled language. Searches on CD-ROM and the Internet; the evaluation of Internet search engines. The analysis, organization and synthesizing of information. Resources study.					
Note: Prohibited combination: SCI162 and CIL173, CIL174.					
CMY101	FIRST COURSE_IN_CHEMISTRY_101				
NAS_CMY	n a	English	4 + 1.5	J1	16
Theory: (Four lectures or contact via the Virtual Campus, Web-CT). General introduction to inorganic and analytical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning various different types of chemical reactions. Atomic structure and periodicity. Molecular structure and chemical bonding using the VSEPR model. Equilibria, acid, bases, buffers and precipitates. Practical and tutorials: One 3 hour practical or tutorial per week.					
CMY102	GENERAL_CHEMISTRY_102				
NAS_CMY	n a	English	4 + 1.5	J1	16
Theory: General physical-analytical chemistry: Physical behaviour of gases, liquids and solids, intermolecular forces, solutions. Principles of reactivity: Energy and chemical reactions, entropy and free energy, electrochemistry. Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates, lipids and amino acids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds. (Note: Four lectures and one 3 hour tutorial per week, one 3 hour practical every second week.)					
Prerequisite: [CMY101]					
CMY117	GENERAL_CHEMISTRY_117				
NAS_CMY	CMY152, CMY153	Double	4 + 1	S1	16
Theory: General introduction to inorganic and analytical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities, atomic structure, periodicity. Inorganic and physical chemistry. Molecular structure and chemical bonding using the VSEPR models. Chemical equilibrium, acids and bases, buffers, precipitation. Practical: (Note: Four lectures and one 3 hour practical or tutorial per week.)					
Prerequisite: [Par 1.2]					
CMY127	GENERAL_CHEMISTRY_127				
NAS_CMY	CMY 161, CMY162	Double	4 + 1	S2	16
Theory: General physical-analytical chemistry: Physical behaviour of gases, liquids and solids, intermolecular forces, solutions: Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates, lipids and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds. (Note: Four lectures and one 3 hour practical or tutorial per week.)					
Prerequisite: [CMY117 GS or CMY101]					
CMY151	CHEMISTRY_151				
NAS_CMY	n a	Bilingual	4 + 1	S1	16
Theory: Introduction to general chemistry: Measurement in chemistry, matter and energy, atomic theory and the periodic table, chemical compounds and chemical bonds, quantitative relationships in chemical reactions, states of matter and the kinetic theory, solutions and colloids, acids, bases and ionic compounds, chemical Equilibria. Introduction to organic chemistry: Chemical bonding in organic compounds, nature, physical properties and nomenclature of simple organic molecules, isomerism, chemical properties of alkanes and cycloalkanes, alkenes, alcohols, aldehydes and ketones, carboxylic acids and esters, amines and amides, carbohydrates, proteins, and lipids. Practicals: (Note: Four lectures and one 3 hour practical or tutorial per week.) Prerequisite: [Par 1.2]					

CMY282	PHYSICAL_CHEMISTRY_282				
NAS_CMY	n a	English	4 + 1	K1	12
Theory: Classical chemical thermodynamics, gases, first and second law and applications, physical changes of pure materials and simple compounds. Phase rule: Chemical reactions, chemical kinetics, rates of reactions. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY117 or CMY101] and [CMY127 or CMY102]					
CMY283	ANALYTICAL_CHEMISTRY_283				
NAS_CMY	n a	English	4 + 1	K3	12
Theory: Statistical evaluation of data, gravimetric analysis, aqueous solution chemistry, chemical equilibrium, precipitation-, neutralisation- and complex formation titrations, redox titrations, potentiometric methods, introduction to electrochemistry. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY117 or CMY101] and [CMY127 or CMY102]					
CMY284	ORGANIC_CHEMISTRY_284				
NAS_CMY	n a	English	4 + 1	K2	12
Theory: Organic reactivity: Rates and equilibrium. Acidity and basicity. Conjugation and resonance: Allylic systems, aromaticity. Alkenes, alkyl halides, alcohols, ethers. Carbonyl compounds: ketones, aldehydes, carboxylic acids and their derivatives. Dynamic stereochemistry: Nucleophilic substitution, elimination, addition. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY117 or CMY101] and [CMY127 or CMY102]					
CMY285	INORGANIC_CHEMISTRY_285				
NAS_CMY	n a	English	4 + 1	K4	12
Theory: Atomic structure, structure of solids (ionic model). Co-ordination chemistry of transition metals: Oxidation states of transition metals, ligands, stereochemistry, crystal field theory, consequences of d-orbital splitting, chemistry of the main group elements, acid-base concepts, non-aqueous solvents, electrochemical properties of transition metals in aqueous solution, industrial applications of transition metals. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY117 or CMY101] and [CMY127 or CMY102]					
CMY382	PHYSICAL_CHEMISTRY_382				
NAS_CMY	n a	English	4 + 1	K4	18
Theory: Molecular quantum mechanics. Introduction: Shortcomings of classical physics, dynamics of microscopic systems, quantum mechanical principles, translational, vibrational and rotational movement. Atomic structure and spectra: Atomic hydrogen, multiple electron systems, spectra of complex atoms, molecular structure, the hydrogen molecule ion, diatomic and polyatomic molecules, structure and properties of molecules. Molecular spectroscopy: Rotational and vibrational spectra, electronic spectra, resonance techniques. Statistical thermodynamics: Molecular energy levels and the Boltzmann distribution, statistical entropy, partition functions, calculation of thermodynamic properties. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY282] and [CMY283] and [CMY284] and [CMY285]					
CMY383	ANALYTICAL_CHEMISTRY_383				
NAS_CMY	n a	English	4 + 1	K2	18
Theory: Separation methods: Extraction, multiple extraction, chromatographic systems. Spectroscopy: Construction of instruments, atomic absorption and atomic emission spectrometry, surface analysis techniques. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY282] and [CMY283] and [CMY284] and [CMY285]					
CMY384	ORGANIC_CHEMISTRY_384				
NAS_CMY	n a	English	4 + 1	K3	18
Theory: Aromatic and hetero-aromatic chemistry, synthetic methodology in organic chemistry: Carbon-carbon bond formation: Alkylation at nucleophilic carbon sites, aldol and related condensations, Wittig and related reactions, acylation of carbanions (Claisen condensation), cyclo-addition reactions. Practicals. (Note: Four lectures and one 6 hour practical per week.) Prerequisites: [CMY282] and [CMY283] and [CMY284] and [CMY285]					

CMY385	INORGANIC_CHEMISTRY_385				
NAS_CMY	n a	English	4 + 1	K1	18
Theory: Structure and bonding in inorganic chemistry: Molecular orbital approach, diatomic and polyatomic molecules, three-centre bonds, metal-metal bonds, transition metal complexes, magnetic properties, electronic spectra, reactivity and reaction mechanisms, reaction types, special topics. Practicals. (Note: Four lectures and one 6 hour practical per week.)					
Prerequisites: [CMY282] and [CMY283] and [CMY284] and [CMY285]					
COE400	SOCIAL_CONTEXTS_IN_EDUCAT._400				
OPV_OPV	n a	Bilingual	+	S1	12
Social Context of Education Contextual understanding of the human and sociological development impacting on education with particular reference to following an asset-based approach to managing a diverse, multicultural, multi-ethnic group of learners often contending with problematic home circumstances and under the threat of HIV/AIDS.					
COS110	PROGRAM_DESIGN:INTRODUCTION				
ING_COS	n a	Double	4 + 1	S1	16
Object oriented programming, graphical user interfaces and event handling. Teaches sound program design, leading to well structured, robust and documented programmes.					
Appreciation of the limits of computers. Prerequisite: [Par 1.2]					
COS130	INTRODUCT.TO_PROGRAMMING_130				
ING_COS	n a	Double	4 + 1	S1	16
The aim of this course is to acquire a sound knowledge of basic computer programming concepts. The theory of these concepts, as well as design methodologies, will be investigated. Understanding rather than memorising is emphasized in order to stimulate creative thinking and the development of innovative skills amongst students in the field of computer programming.					
The C programming language is used to implement these concepts. After completing this course, a student should be able to design and write structured, efficient programs using the C language, be familiar with the basic data structures, pointers and file processing, and have an introductory knowledge of advanced data structures.					
Prerequisite: [Par 1.2]					
COS140	NETCENTRIC_COMPUTER_SYST._140				
ING_COS	COS283	Double	4 + 1	S2	16
This course introduces the principles of netcentric computing that can be applied to the WWW and internet as well as to distributed applications.					
The main focus is on the concepts of client and server side programming, web based applications, port and socket interaction, writing programs that require remote function calls, and achieving database connectivity using the appropriate technology.					
The supporting technologies of markup languages, scripting languages are also studied. It will also test the ability of a student to use, integrate and maintain the necessary software and hardware required to illustrate the concepts specified. Students who pass this module may not enrol for INY324.					
Prerequisites: [COS110 or] and [and COS140 or TDH]					
COS151	INTR.TO_COMPUTER_SCIENCE_151				
ING_COS	n a	Bilingual	2 + 1	S1	8
This course introduces concepts and terminology related to the hardware of computers, system software and to communication systems.					
It also provides an understanding of basic algorithmic concepts, number systems and binary logic.					

COS212	DATA_STRUCTURES_ &_ALGORITHMS				
ING_COS	n a	Double	2 + 1	S2	12
<p>The primary objective of this course is to introduce students to the classic data structures and algorithms found in computer programs. Data abstraction is an important concept in producing correct and reusable software. In this course it is shown how abstract data types can be designed for the classic data structures, i.e. stacks, queues, lists, trees and graphs. Variations that can be made to the implementation of the structures without changing their interfaces are discussed as well as how to choose the appropriate version for efficiency. Classic algorithms for sorting, searching and traversing are investigated and their efficiency assessed. Recursion is also dealt with, and some of the algorithms are implemented recursively. The meaning of algorithmic complexity is introduced to gain an appreciation of the limits of computing through examples of problems that cannot be solved in reasonable time.</p> <p>Prerequisite: [COS110] or [TDH]</p>					
COS214	DESIGN_PATTERNS_214				
ING_COS	COS213	Double	2 + 1	S2	12
<p>This course teaches programming using design patterns. The focus of the course is on the theory and implementation of design patterns, in order to write modular and re-usable code. Popular object-oriented languages are used as implementation medium.</p> <p>Prerequisites: [COS110 or] and [COS283] or [TDH]</p>					
COS222	OPERATING_SYSTEMS_222				
ING_COS	n a	Double	2 + 1	S1	12
<p>We study fundamental concepts of modern operating systems in terms of their structure and the mechanisms they use. We define and analyse Real Time, Multimedia and Multiple Processor Systems. We study modern design issues of process management, deadlock, memory management, input/output management, file systems and security. After completion of the course a student should have knowledge of the fundamental concepts and be able to bring them in relation to modern design issues.</p> <p>Prerequisite: [COS110] or [TDH]</p>					
COS226	CONCURRENT_SYSTEMS_226				
ING_COS	COS223	Double	2 + 1	S1	16
<p>Most of computer science courses deal with sequential programs. This course looks at concurrency, what it means, how it can be exploited, and what facilities are available for proving programs correct and deadlock free. In the process we learn the Finite State Processes (FSP) language and run specifications on the Labelled State Transition Analyser (LTSA). These programs can be translated into Java implementations and tested for a variety of classic control and synchronisation processes, and some interesting modern examples.</p> <p>Prerequisite: [COS110] or [TDH]</p>					
COS284	COMPUTER_ARCHITECTURE_284				
ING_COS	n a	Double	2 + 1	S2	12
<p>The aim of this module is to gain a deeper understanding of computers by studying their underlying components. The CPU is studied in great detail, covering design decisions such as CISC/RISC architectures, paging and pipelining. Cache, memory and bus architectures will also be scrutinized. IO architectures will be covered (i.e. polling vs. interrupt driven or DMA). Topics such as parallel processing (SIMD) are also touched. A brief review of number systems, combinatorial circuits, and sequential circuits (latches, counters etc.). To illustrate many of the concepts in practice, the practicals will cover an assembly language. This will cover topics like interrupts, IO and video memory.</p> <p>Prerequisite: [COS110] or [TDH]</p>					
COS289	INTROD.TO_DIGITAL_SYSTEMS_289				
ING_COS	n a	English	2 + 1	S2	12
<p>Introduction to digital circuit design, digital representation of numbers, representation and simplification of logic functions, analysis and design of combinatorial circuits, components of sequential circuits, programmable components for combinatorial and sequential logic, microprocessor fundamentals.</p> <p>Prerequisites: [COS110] and [WTW115]</p>					

COS301	SOFTWARE_ENGINEERING_301					
ING_COS	n a	English	1 + 1	J1	18	
<p>The module exposes students to problems associated with software development on an industrial scale. Overall goals of the course are: to understand the software engineering process and to appreciate its complexity; to be exposed to a variety of methodologies for tackling different stages of the software life cycle. To become familiar with the latest trends in software engineering. To experience the advantages and problems of working in a group. To take responsibility a variety of roles within a group, and to understand the different requirements for these; to complete the development of a fairly large OO-based software product. The focus of the course is on a project that lasts the whole year. The project is tackled in groups of approximately 4 students.</p> <p>Prerequisite: [COS214] or [TDH]</p>						
COS314	ARTIFICIAL_INTELLIGENCE_314					
ING_COS	n a	English	2 + 1	S1	18	
<p>In this course, classical themes in AI are studied such as planning, searching, image recognition, machine learning, etc are studied. A particular focus is placed on the modern AI theme of computational intelligence, with reference to neural networks, intelligent agents, genetic and evolutionary algorithms, etc. Concepts are consolidated through homework and practical assignments.</p> <p>Prerequisites: [COS214] and [WTW128] or [TDH]</p>						
COS332	COMPUTER_NETWORKS_332					
ING_COS	n a	English	2 + 1	S2	18	
<p>The objective of this module is to acquaint the student with the terminology of communication systems and to form a good understanding of exactly how data is transferred in such communication networks, as well as applications that can be found in such environments. The study material includes: concepts and terminology, the hierarchy of protocols according to the OSI and TCP/IP models, protocols on the data level, physical level and network level as well as higher level protocols. The practical component of the course involves programming TCP/IP sockets using a high level language.</p> <p>Prerequisite: [COS214] or [TDH]</p>						
COS333	PROGRAMMING_LANGUAGES_333					
ING_COS	n a	English	2 + 1	S2	18	
<p>The overall goal of the course is to survey characteristics of the most important kinds of programming languages. Three paradigms are studied: imperative, functional and logic. The syntax, semantics and implementation of various languages within these paradigms are studied, critiqued and cross-compared. Students are given practical exercises in each of these language paradigms, as well as in scripting languages.</p> <p>Prerequisite: [COS110] or [TDH]</p>						
COS341	COMPILER_CONSTRUCTION_341					
ING_COS	n a	English	2 + 1	S1	18	
<p>The course illustrates how to build a complete compiler for a mini-language based on Java using a compiler generator. It covers LL and LR parsing, abstract syntax trees, semantic analysis, error recovery and code generation. Emphasis is placed on back-end analysis including intermediate codes, basic blocks, register allocation, liveness analysis and garbage collection.</p> <p>Prerequisite: [COS212] or [TDH]</p>						
COS343	TRENDS_IN_INFORM.TECHNOL._343					
ING_COS	n a	English	2 + 1	S1	18	
<p>The content of this module is specifically intended to keep students abreast of new and important trends in IT. The module focuses on relevant topics that vary from year to year at the discretion of the department.</p> <p>Prerequisite: [COS110] or [TDH]</p>						

COS344	COMPUTER_GRAPHICS_344				
ING_COS	n a	English	2 + 1	S2	18
The aim of this course is to acquire a sound knowledge of the basic theory of interactive computer graphics and basic computer graphics programming techniques. The theory will cover graphics systems and models, graphics programming, input and interaction, geometric objects and transformations, viewing in 3D, shading, rendering techniques, and introduce advanced concepts, such as object oriented computer graphics, discrete techniques. The module includes a practical component that enables students to apply and test their knowledge in computer graphics. The OpenGL graphics library and the C programming language will be used for this purpose. Prerequisites: [COS214] and [WTW126] or [TDH]					
COS389	MICROPROCESSOR_SYSTEMS_389				
ING_COS	n a	English	2 + 1	S2	18
Covers the following areas of the 80x86 IBM PC and compatible computers: microprocessors and supporting chips, memory and memory interfacing, input/output and interfacing, timer and music, interrupts, device drivers, buses, programming in C and assembly language. Prerequisite: [COS289] or [TDH]					
DAF200	ANIMAL_ANATOMY&PHYSIOLOGY_200				
NAS_VKU	n a	English	4 + 1	J1	36
General structure and plan of the body of livestock. Types and characteristics of cells and tissues. Body water. Anatomy, physiology and histology of systems: Skin; skeleton; muscles, connective tissue, ligaments, joints; nervous system; sensory organs of sight, sound, smell, touch, taste; circulatory system; respiratory system; endocrinology; male and female reproductive systems; digestive system, gastrointestinal tract, liver, pancreas; kidneys, acid-base balance and homeostasis; lactation; immune system. General species differences. Prerequisite: [CMY127] or [TDH]					
DAN310	ANIMAL_ANATOMY_310				
NAS_VKU	n a	Afrikaans	1 + 0.5	S1	8
Functional anatomy, growth and development of tissues and organ systems. Changes during maturation, reproduction, the post-partum period and lactation. Ageing and tissue changes with erosion diseases. The influence of hormones, production and reproduction on conformation and a critical evaluation of assessment of animals for functional efficiency. Prerequisite: [DAF200]					
DFS311	ANIMAL_PHYSIOLOGY_311				
NAS_VKU	n a	Bilingual	2 + 0	S1	10
Homeostasis and Homeorhesis in animals: Thermoregulation. Adaptation of glucose, lipid and protein metabolism in response to short and long-term changes in the supply and balance of nutrients and to changes in tissue demand for nutrients during different physiological states. Deviations from normal homeostasis, metabolic diseases and the prevention thereof. Pathogenesis of inflammation and infections; immunity. Prerequisite: [DAF200]					
DFS320	GROWTH_PHYSIOLOGY_320				
NAS_VKU	n a	Bilingual	2 + 0.5	S2	10
The underlying physiological processes in growth and development. Pre- and post-natal growth and factors which determine growth rate: growth curves, stimulants of growth, age, nutrition, race, gender, et al. Prerequisites: [DAN310] and [DFS311]					
EKN110	ECONOMICS_110				
EB_EKN	n a	Bilingual	3 + 0	S1	10
Conceptualise the interrelationships of the different sectors in South African economy. The functioning of international trade, government economics and policy, the labour market, monetary economics, economic development, and environmental economics with specific reference to the South African context. The impact of national and international decisions and events on the South African economy.					

EKN120	ECONOMICS_120				
EB_EKN	n a	Bilingual	3 + 0	S2	10
The economic environment and problem: working and course of the South African economy; functioning and interrelationships of the different economic sectors. Macro-economic theory and analysis. Analyse and interpret economic performance criteria: economic growth, inflation, job creation, balance of payments and exchange rate stability, income distribution. Calculate and interpret core economic indicators. Basic microeconomic principles: demand analysis (consumer theory); supply analysis (producer theory). Market analysis: market equilibrium; price determination; market forms; market failure; calculate and interpret price, income and cross elasticities. Prerequisite: [EKN110 GS]					
EKN214	ECONOMICS_214				
EB_EKN	n a	Bilingual	3 + 0	S1	16
From Wall and Bay Street to Diagonal Street, a thorough understanding of the mechanisms and theories explaining the workings of the economy is essential. Macroeconomic insight is provided on the real market, the money market, two market equilibrium, monetarism, growth theory, conjuncture analysis, inflation, Keynesian general equilibrium analysis and fiscal and monetary policy issues. Statistical and econometric analysis of macroeconomic issues.					
EKN215	ECONOMICS_215				
EB_EKN	n a	Bilingual	3 + 0	S1	20
The role and elements of the financial system in the economy, economic description, functions, historic development, legal framework and asset and liability structures of financial institutions in South Africa. Financial instruments in the money market, financial instruments in the capital market, fixed interest securities market, variable interest securities market, stock market (shares), capital market instruments, foreign exchange market and instruments, futures market and contracts, options market and contracts. The meaning and functions of money, understanding interest rates, portfolio choice, the behaviour of interest rates, risk and term structure of interest rates, an economic analysis of the financial structure, multiple deposit creation and the money supply process, determinants of the money supply, the demand for money (different schools of thought) transmission mechanisms of monetary policy, money and inflation, theory of rational expectations and efficient capital markets, rational expectations and implications for policy. Global finance and the world economic environment, International Monetary System, Eurocurrency market and offshore banking, overview of the global financial markets the current monetary policy framework and policy process in South Africa possible future developments (including inflationary targets and modern central banking trends), bank regulation: the key role banks must play in the financial system and the basic reason for bank regulation and electronic banking.					
EKN220	ECONOMICS_220				
EB_EKN	n a	Bilingual	3 + 0	S2	16
International economic insight is provided into; international economic relations and history, theory of international trade, international capital movements, international trade politics, economic and customs unions and other forms of regional co-operation and integration, international monetary relations, foreign exchange markets, exchange rate issues and the balance of payments, as well as open economy macroeconomic issues.					
EKN224	ECONOMICS_224				
EB_EKN	n a	Bilingual	3 + 0	S2	16
Microeconomic insight is provided into: Consumer and producer theory, general microeconomic equilibrium, Pareto-optimality and optimality of the price mechanism, welfare economics, market forms and the production structure of South Africa. Statistical and econometric analysis of microeconomic issues.					
EKN251	ECONOMICS_251				
EB_EKN	n a	Bilingual	3 + 0	K1	8
From Wall and Bay Street to Diagonal Street, a thorough understanding of the mechanisms and theories explaining the workings of the economy is essential. Macro-economic insight is provided on: the real market, the money market, two market equilibrium, monetarism, growth theory, conjuncture analysis, inflation, Keynesian general equilibrium analysis and fiscal and monetary policy issues.					

EKN252	ECONOMICS_252				
EB_EKN	n a	Bilingual	3 + 0	K2	8
Micro-economic insight is provided into; consumer and producer theory, general micro-economic equilibrium, pareto-optimality and optimality of the price mechanism, welfare economics, market forms and the production structure of South Africa.					
EKN271	ECONOMICS_271				
EB_EKN	n a	Bilingual	1 + 0	J1	8
A practical module designed to bring together the knowledge gained in Economics 251, 252 and 220 and combine it with statistics, basic mathematics and research knowledge in order to gain analytical experience needed in the job market.					
This module will make use of computers and information technology in order to build practical skills required of every economist and econometrician.					
EKN310	ECONOMICS_310				
EB_EKN	n a	Bilingual	3 + 0	S1	20
Welfare economics (optimality of the market mechanism, general equilibrium, market failure and the role of the government); general macro-economic policy: public finance theory and fiscal policy, monetary policy, public debt management policy; international trade and balance of payments adjustment policies; modern macro-economic policy considerations and development. Macro-economic policy					
– implementation in South Africa: monetary policy, fiscal policy, competition policy, labour policy, South African development issues/policies.					
Prerequisite: [STK120]					
EKN314	ECONOMICS_314				
EB_EKN	n a	Bilingual	3 + 0	S1	20
International economic insight is provided into international economic relations and history, theory of international trade, international capital movements, international trade politics, economic and customs unions and other forms or regional co-operation and integration, international monetary relations, foreign exchange markets, exchange rate issues and the balance of payments, as well as open economy macroeconomic issues.					
EKN320	ECONOMICS_320				
EB_EKN	n a	Bilingual	3 + 0	S2	20
The identification, collection and interpretation process of relevant economic data; the national accounts (i.e. income and production accounts, the national financial account, the balance of payments and input-output tables); economic growth; inflation; employment, unemployment, wages, productivity and income distribution; business cycles; financial indicators; fiscal indicators; social indicators; international comparisons; relationships between economic time series - regression analysis; long-term future studies and scenario analysis; overall assessment of the South African economy over the period from 1960 onwards.					
EKN363	ECONOMICS_363				
EB_EKN	n a	Bilingual	3 + 0	S2	20
Economic systems: Types, origin and historical development, history of economic thought, underdeveloped countries, types of underdeveloped countries, influence of population pressure and international relations on development; underdeveloped regions in developed countries, development co-operation and development policy, the history of western and other economic systems.					
EOT151	LANGUAGE_PROFICIENCY_(1)_151				
GW_EOT	n a	Bilingual	2 + 0	K1	3
Knowledge of basic grammar and basic vocabulary is revised, using documentary texts that are thematically subject related. In terms of skills the focus is placed on the development of the receptive skills (listening and reading) on text level, while the development of the productive skills (speaking and writing) will also receive attention, but only on paragraph level.					

EOT152	LANGUAGE_PROFICIENCY(2)_152				
GW_EOT	n a	Bilingual	2 + 0	K2	3
<p>Knowledge of general academic vocabulary is developed by means of general academic texts, which are thematically subject related. A foundation is laid in the knowledge of text grammar and argumentation forms.</p> <p>All four the linguistic skills (listening, reading, speaking and writing) are practiced on text level.</p>					
EOT153	LANGUAGE_PROFICIENCY(3)_153				
GW_EOT	n a	Bilingual	2 + 0	K3	3
<p>Knowledge of subject specific vocabulary is developed, using subject specific academic and scientific texts.</p> <p>Basic knowledge of text grammar and argumentation forms is broadened. Specific attention is given to the application of the two receptive skills (listening and reading) for academic purposes.</p>					
EOT154	LANGUAGE_PROFICIENCY(4)_154				
GW_EOT	n a	Bilingual	2 + 0	K4	3
<p>The focus is on developing and applying the four linguistic skills on text level for academic purposes.</p> <p>The two productive skills (speaking and writing) will receive special attention.</p>					
EOT161	ACADEMIC_READING_SKILLS_161				
GW_EOT	n a	English	3 + 0	K1	6
<p>Developing academic reading skills in English, including summarizing, vocabulary building and critical reading.</p> <p>*Not for students who are compelled to enroll for EOT151, EOT152, EOT153, EOT154.</p>					
EOT162	ACADEMIC_WRITING_SKILLS_162				
GW_EOT	n a	English	3 + 0	K2	6
<p>Developing academic reading skills in English, including structuring and sustaining arguments, and basic English grammatical and editing skills.. *Not for students who are compelled to enroll for EOT151, EOT152, EOT153, EOT154.</p>					
EOT164	COMMUNIC_IN_ORGANIZATIONS_164				
GW_EOT	n a	English	3 + 0	K4	6
<p>This module focuses on the role of language in organizations. Techniques for persuasion, finding information, conducting interviews, etc. are covered, as well as methods used in advertising and skills needed for public speaking. The criteria for drawing up a successful CV, for conducting meetings successfully, writing letters, agendas, minutes and reports are discussed and practiced. *Not for students who are compelled to enroll for EOT151, EOT152, EOT153, EOT154.</p>					
ERG280	ERGONOMICS_280				
NAS_VBR	n a	Bilingual	2 + 1	S1	12
<p>Study of general ergonomic principals as applied to the design of workplaces, work and ways of performing work. The interactions between the human (user) and his work, workspace and general environment (climate, lighting, and noise, etc.) serve as a point of reference.</p>					
EST121	AESTHETICS_121				
NAS_VBR	EST310	Bilingual	1 + 1	S2	9
<p>Presentation techniques: story boards and technical drawings. Presentation techniques using CAD.</p>					
EST211	AESTHETICS_211				
NAS_VBR	EST120, 211	Bilingual	2 + 1	S1	12
<p>Introduction to aesthetics: framework of approach; physical as premise; role of clothing and clothing environments; perceptual process; factors that influence evaluation. Aesthetics of the product: Design elements in clothing products; visual, tactile, audio and olfactory elements; complexity, order, novelty. Aesthetics of the consumer: figure analysis; colour; design elements: clothing product and figure. Aesthetics of the environment: visual presentation in clothing environments.</p>					

FAR381	PHARMACOLOGY_381				
MED_FAR	n a	Bilingual	2 + 0	S1	20
Introduction, receptors, antagonism, kinetic principles, the autonomic nervous system, pharmacotherapy of hypertension, angina pectoris, myocardial infarction, heart failure, arrhythmias, and epilepsy. Diuretics, glucocorticosteroids, local anaesthetics, anaesthetic drugs, analgesics, iron and vitamins, oncostatics and immuno suppressants.					
FAR382	PHARMACOLOGY_382				
MED_FAR	n a	Bilingual	2 + 0	S2	15
Hormones, drugs that act on the histaminergic, serotonergic, and dopaminergic receptors. Pharmacotherapy of diabetes mellitus, schizophrenia, depression, obesity, anxiety, insomnia, gastrointestinal diseases. Anticoagulants, antimicrobial drugs.					
FBS110	FINANCIAL_MANAGEMENT_110				
EB_RFB	n a	Bilingual	3 + 0	S1	10
Purpose and functioning of financial management. Basic financial management concepts. Accounting concepts and the use of the basic accounting equation to describe the financial position of a business. Recording of financial transactions. Relationship between cash and accounting profit. Internal control and the management of cash. Debtors and short-term investments. Stock valuation models. Depreciation. Financial statements of a business. Distinguishing characteristics of the different forms of business. Overview of financial markets and the role of financial institutions. Risk and return characteristics of various financial instruments. Issuing ordinary shares and debt instruments. Prerequisite: [Par 1.2]					
FBS120	FINANCIAL_MANAGEMENT_120				
EB_RFB	n a	Bilingual	3 + 0	S2	10
Analysis of financial statements. Budgeting and budgetary control. Tax principles and normal income tax for individuals. Time value of money and its use for financial and investment decisions. Calculating the cost of capital and the financing of a business to maintain the optimal capital structure. Capital investment decisions and a study of the financial selection criteria in the evaluation of capital investment projects. The dividend decision and an overview of financial risk management. Prerequisite: [Par 1.2]					
FBS252	FINANCIAL_MANAGEMENT_252				
EB_RFB	n a	Bilingual	3 + 0	K2	8
Business valuation; current asset management; long term financing decisions.					
FBS262	FINANCIAL_MANAGEMENT_262				
EB_RFB	n a	Bilingual	3 + 0	K4	8
Cost of capital; determination of capital requirements and the financing of a business to maintain the optimal capital structure; dividend decisions.					
FCL400	FACILITATING_LEARNING_400				
OPV_OPV	n a	Bilingual	+	S2	24
Facilitating Learning Conceptualising changes in education and demonstrating change in education practice. Personal development through reflection on preferences, exploring own intelligences, own learning styles and clarifying a world vision on life and education. Studying the philosophy and principles of facilitating learning focussed on learner's potential development. Explore outcomes based education system. redefine existing teaching strategies in context of the learning paradigm. Develop a learning curriculum, design and implement learning challenges enabling learners to learn. Also those experiencing barriers to learning. Creating and managing a learning environment in which learners can construct and share meaning. Develop internal discipline, resolve conflict through debate, argument and negotiation. Rehearse the skills of communication, observation, reflection and lifelong learning to cope with learning, learning difficulties and diversity in the group. Utilise appropriate managing and intervention strategies to respond to authentic learning contexts such as HIV/AIDS, drugs violence, abuse, poverty, disability and other Special Education Needs. Understand the importance of collaboration, team teaching and networking. Develop an integrated approach supported by ICT pertaining to the seven roles of the teacher.					

FIL155	SCIENCE_AND_WORLD_VIEWS_155				
GW_FIL	n a	Double	1 + 0	S1	6
Role played by mathematics and observation (experiment). Induction and falsification. Causality and determinism. Scientific revolutions: theory of relativity, quantum and evolution theory. Brain and consciousness. How is ethics possible? Euthanasia and abortion.					
FLG211	INTRODUCTORY_&_NEUROPHYS_211				
NAS_FLG	n a	Afrikaans	2 + 1	S1	16
Orientation in physiology, homeostasis, cells, tissues, muscle, neurophysiology and the special senses.					
Prerequisites: [CMY117 GS] and [MLB111 GS] and [PHY171 GS or GS]					
FLG212	CIRCULATORY_PHYSIOLOGY_212				
NAS_FLG	n a	Afrikaans	2 + 1	S1	16
Body fluids; haematology; cardiovascular physiology and the lymphatic system.					
Prerequisites: [CMY117 GS] and [CMY127 GS] and [MLB111 GS] and [PHY171 GS or GS]					
FLG221	LUNG/RENAL_PHYS,ACID/TEMP_221				
NAS_FLG	n a	Afrikaans	2 + 1	S2	16
Structure, gas exchange and secretory function of the lungs, structure, excretory and non-urinary function of the kidneys; acid-base balance as well as the skin and body temperature control.					
Prerequisites: [FLG211] and [FLG212]					
FLG222	DIGEST.,ENDOCR.&_REPROD/SYS222				
NAS_FLG	n a	Afrikaans	2 + 1	S2	16
Nutrition, digestion and metabolism; hormonal control of the body functions and the reproductive systems.					
Prerequisites: [FLG211] and [FLG212] or [TDH]					
FLG311	APPL.CELLULAR_PHYSIOLOGY_311				
NAS_FLG	n a	Afrikaans	1 + 1	S1	14
Study of cell morphology, functions of the cell organelles, synthesis of the various membrane cytoskeleton proteins, activation of proteins through phosphorylation which is controlled by signal transduction mechanisms, processes involved in controlling cell numbers, background for cell based experiments and research.					
Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]					
FLG312	DEVELOPMENTAL_PHYSIOLOGY_312				
NAS_FLG	n a	Afrikaans	1 + 0	S1	9
Study on the physiological development and adaptations from the foetus to old age.					
Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]					
FLG313	RESEARCH_METH.&_LIT.STUDY_313				
NAS_FLG	n a	Afrikaans	1 + 1	S1	14
Research methodology, career planning, subject orientated literature studies and seminars.					
Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]					
FLG314	IMMUNOLOGY_314				
NAS_FLG	FLG321	Afrikaans	1 + 0	S1	9
Introduction to basic, applied and integrated immunological mechanisms.					
Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]					

FLG322	INDUSTRIAL_ PHYSIOLOGY_ 322				
NAS_FLG	n a	Afrikaans	1 + 1	S2	14
<p>Problem orientated course, with the emphasis on occupational health and safety in the industrial environment. Integration of different physiological systems.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FLG323	PHYSIOL.CONTR.SYST.& MODELL323				
NAS_FLG	n a	Afrikaans	0 + 1	S2	9
<p>An introduction to the theory of control systems and examples in physiology to explain them; simulation of physiological functions making use of signal flow diagrams and mechanical, electrical and numerical models.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FLG324	EXERCISE_ PHYSIOLOGY_ 324				
NAS_FLG	n a	Afrikaans	1 + 1	S2	14
<p>Mechanisms of muscle contraction and energy sources. Cardio-respiratory changes, thermoregulation and other adjustments during exercise.</p> <p>Use and abuse of substances to improve performance.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FLG325	NUTRITION_ PHYSIOLOGY_ 325				
NAS_FLG	n a	Afrikaans	1 + 0	S2	9
<p>The importance of nutrients and micro-nutrients in the composition of a normal diet; the neuro-endocrine control of food intake and special aspects of immunology of the digestive tract.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FLG327	HIGHER_ NEUROLOGICAL_ FUNCT.327				
NAS_FLG	n a	Afrikaans	0 + 2	S2	20
<p>Tutorials and seminars on higher functions of the brain and interaction between the neurological, endocrine and immune systems.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FLG328	PATHOPHYSIOLOGY_ 328				
NAS_FLG	n a	Afrikaans	1 + 0	S2	9
<p>Human pathophysiology.</p> <p>Prerequisites: [BCM251 GS] and [BCM252 GS] and [BCM261 GS] and [BCM262 GS] and [FLG221] and [FLG222]</p>					
FOE400	FOUNDATIONS_ OF_ EDUCATION_ 400				
OPV_OPV	n a	Bilingual	+	S1	6
<p>Foundations of Education</p> <p>Exploration of theories and philosophies of learning and pedagogical knowledge impacting on change in education. Issues impacting on education related to decision- making in the classroom: school system, interpretation of policy documents and programme studies.</p>					

FPP451	CHEM/MICROBIOL_ASPEC/FOOD_451				
NAS_VDW	VOV483	English	2 + 1	S1	20
<p>Chemical aspects: The role and composition of the major chemical components of food (water, carbohydrates, proteins and lipids). The content and nutritional role of different minor chemical components of food (minerals and vitamins). The principles and control of enzymic and non-enzymic browning. The composition and use of enzymes in food processing.</p> <p>Microbiological aspects: Introduction to micro-organisms. Intrinsic and extrinsic factors that affect growth and survival of micro-organisms. Important microbial groups in food. Microbial spoilage of foods. Determination of micro-organisms and/or their products in foods. The preservation of foods. Microbial indicators of food safety and quality. Food borne diseases and intoxications. The utilisation of micro-organisms in food production.</p> <p>Prerequisite: [Third-year status or TDH]</p>					
FPP452	FOOD_PROC.EQUIP/OPERATIONS_452				
NAS_VDW	VOV485	English	3 + 0.5	S1	20
<p>Dimensions and units. Introduction to mass and energy balance. Heat transfer theory, Energy for food processing.</p> <p>Fluid flow and rheology, unit operations including: materials handling, cleaning, sorting and grading, peeling, disintegration, separation, pumping, mixing and forming, heating, concentration, drying, extrusion, cooling.</p> <p>Prerequisite: [Third-year status or TDH]</p>					
FPP461	APPRO.FOOD_PRES.VATION_TECH461				
NAS_VDW	n a	English	2 + 0.5	K3	20
<p>Food security. Post-harvest losses (biochemical spoilage, chemical spoilage, physical spoilage, physiological spoilage, microbial spoilage, insects and rodents). Post-harvest handling of food (storage, transport and packaging). Appropriate processing and preservation technologies (drying, fermentation, chemical preservation, heat treatment, hurdle technology, milling).</p> <p>Prerequisites: [FST451 GS] and [FST452 GS] or [TDH]</p>					
FPP462	APPRO.FOOD_PROCES_TECHNO_462				
NAS_VDW	VOV483	English	2 + 0.5	K4	20
<p>Cereals (milling, fermentation, baking). Oilseeds and legumes (extraction, refining, bleaching, hydrogenation). Fruits and vegetables (drying, canning, pickling). Dairy (fermentation, concentration). Meat (fermentation, drying, canning, smoking and curing).</p> <p>Prerequisites: [FST451 GS] and [FST452 GS] or [TDH]</p>					
FPP463	PROJECT_463				
NAS_VDW	VOV472	English	2 + 0.5	S2	20
<p>Exercise in beneficiating a locally produced agricultural raw material into an added-value food product with an extended shelf life; applying food preservation and processing principles, performing a mass-energy balance and costing of the process.</p> <p>Prerequisites: [FST451 GS] and [FST452 GS] or [TDH]</p>					
FRB711	FINANCIAL_RISK_MANAGEMENT_711				
EB_FRK	n a	Bilingual	2 + 0	S1	20
<p>Introduction to risk and financial risk; Financial risk exposures; Evolution and use of risk management products; measurement of internal and external risk through modelling and forecasting; market (price) risk; portfolio risk; Value-at-Risk; capital requirements; fixed-income risk; liquidity, operational and legal risks; credit (default) risk; regulation (governance) and compliance environment; firm-wide risk management; Implementing a risk management programme.</p>					

FRB721	FINANCIAL_RISK_MANAGEMENT_721				
EB_FRK	n a	Bilingual	2 + 0	S2	20
Introduction to derivatives; mechanics of futures and forward markets; forward and futures prices; hedging with futures; interest rate futures; swaps; Option contracts and markets; option trading strategies; option pricing: binomial and Black and Scholes; options on stock indices and foreign currencies; options on futures; interest rate options; option greeks.					
FRK111	FINANCIAL_ACCOUNTING_111				
EB_FRK	n a	Bilingual	4 + 0	S1	10
The nature and function of Accounting; the development of Accounting; financial position; financial result; the recording process; processing of Accounting data; elementary income statement and balance sheet; flow of documents; accounting systems; introduction to internal control and internal measures; bank reconciliations; control accounts; adjustments; financial statements of a sole proprietorship. Prerequisite: [Par.1.2]					
FRK121	FINANCIAL_ACCOUNTING_121				
EB_FRK	n a	Bilingual	4 + 0	S2	12
Elements of financial statements in detail. The conceptual framework. Income statement, balance sheet, cash flow statement and analysis and interpretation of clubs, partnerships close corporations. Introduction to companies. Prerequisite: [FRK111 GS]					
FRK181	FINANCIAL_ACCOUNTING_181				
EB_FRK	n a	Bilingual	2 + 0	S2	3
Computer processing of accounting information. Prerequisites: [FRK111 GS] and [Par 1.2]					
FSG110	PHYSIOLOGY_110				
BA_GW	n a	Bilingual	3 + 0	S1	6
Information available at the Department					
FSG120	PHYSIOLOGY_120				
BA_GW	n a	Bilingual	3 + 0	S2	6
Information available at the Department Prerequisite: [FSG110 GS]					
FSK116	PHYSICS_116				
NAS_PHY	n a	Double	4 + 1	S1	16
Mathematical introduction, motion in a straight line, vectors, motion in two and three dimensions, forces and motion, kinetic and potential energy, work, collisions, rotation, oscillations, waves. Prerequisites: [WTW114 #] and [Par 1.2]					
FSK126	PHYSICS_126				
NAS_PHY	n a	Double	4 + 1	S2	16
Electric charge, electric fields, Gauss' law, electric potential, capacitance, electric current and resistance, circuits, magnetic fields, induction and inductance, alternating current, electromagnetic waves, mirrors, lenses. Prerequisite: [FSK116 GS]					
FST250	INTRO/FOOD_SCIENCE_&_TECH_250				
NAS_VDW	VDW211	English	2 + 1	S1	12
Lectures: How food is produced, processed and distributed (food pipeline). Human nutrition and human food requirements. Constituents of foods. Food quality. Food deterioration and control (food preservation). Unit operations in food processing. Food safety, risks and hazards. Selected food industries. Principles of food packaging. Food legislation and labelling. Food processing and the environment. Practicals: Group assignments applying the theory in practice; practical demonstrations in pilot plants; guest lecturers on the world of food scientists; factory visit/videos of food processing. Prerequisites: [CMY117] and [CMY127] and [MBY161] and [PHY131] and [WTW134] or [TDH]					

FST260	PRIN/FOOD_PROC._&_PRESERV._260				
NAS_VDW	VDW222	English	2 + 1	S2	12
Lectures: Raw material preparation: storage, cleaning, sorting, grading and peeling. Food conversion processes: emulsification and homogenisation; mixing and forming; mechanical separations).					
Food preservation technologies: concept of hurdle technology; heat (blanching, pasteurisation and sterilisation); cold (refrigeration and freezing); concentration and dehydration; food irradiation; new methods of food preservation.					
Practicals: Practical applications of above processes. Physical, chemical and sensory evaluation of processed foods. Assignment: Application of hurdle technology concept to a specific food product.					
Prerequisites: [CMY117] and [CMY127] and [MBY161] and [PHY131] and [WTW134] or [TDH]					
FST350	INTEGRATED_FOOD_SCIENCE_350				
NAS_VDW	VDW400	English	1 + 0	S1	18
Literature studies and seminar presentations on topics in Food Science.					
Prerequisites: [FST250] and [FST260] or [TDH]					
FST351	FOOD_CHEMISTRY-(1)_351				
NAS_VDW	VDW314	English	2 + 1	S1	18
Lectures - Chemistry of major food components: Carbohydrates. Proteins. Lipids. Water. Chemical and nutritional aspects of food processing; implications of different processing techniques on the major food components.					
Functional properties of the major food components. Modification of functional properties of the major food components. Food analysis methodology. Practical work: Food analysis.					
Prerequisites: [BCM251] and [BCM252] and [BCM261] and [BCM262] or [TDH]					
FST352	FOOD_CHEMISTRY-(2)_352				
NAS_VDW	VDW324	English	2 + 1	S1	18
Lectures - Basic Food Analysis and Chemistry of the Minor Food Components: Basic food analysis, vitamins, minerals, additives, contaminants.					
Chemical and nutritional aspects of food processing: implications of different processing techniques on minor food components).					
Functional properties of the minor food components. Food analysis methodology. Practical work: Food analysis.					
Prerequisites: [BCM251] or [TDH] and [BCM252] or [TDH] and [BCM261] or [TDH] and [BCM262] or [TDH]					
FST353	FOOD_ENGINEERING_353				
NAS_VDW	LPR311,312	English	3 + 0.5	S1	18
Lectures- Mass and energy balance. Heat transfer theory: Convection, conduction and radiation.					
Energy for food processing. Fluid flow and rheology.					
Unit operations: materials handling, cleaning, sorting, grading, peeling, disintegration, separation (e.g. membrane technology), pumping, mixing and forming, heating, concentration, drying, extrusion, refrigeration, freezing.					
Tutorials/practicals - Calculations on mass and energy balances, psychrometry, refrigeration and freezing.					
Prerequisites: [CMY117] and [CMY127] and [FST260] and [PHY131] and [WTW134] or [TDH]					

FST360	PLANT_FOOD_SCIENCE_360				
NAS_VDW	n a	English	2 + 1	S2	18
<p>Fruit and vegetable science: Overview of structure and chemical composition.· Nutritional value of fresh fruits and vegetables. Post-harvest physiology and biochemistry. Quality evaluation of fresh produce.</p> <p>Post-harvest handling: storage, packaging and transport. Shelf life extension of fresh produce. Cereal science: Sources of cereal products in the world. Structure and chemistry of cereal grains. Chemistry of wheat proteins. Storage of cereals. Nutritional value of cereals.</p> <p>Dough rheology. Oilseeds and legumes science. Structure and chemistry of the most important legumes and oil seeds (soya beans, peanuts, sunflower seeds).</p> <p>Practical work: Laboratory analyses of components and products of cereals, oilseeds, legumes and fruits and vegetables. Modified atmosphere packaging of fruits and vegetables; Determination of quality.</p> <p>Prerequisites: [FST250] and [FST260] and [FST351] and [FST352] or [TDH]</p>					
FST361	ANIMAL_FOOD_SCIENCE_361				
NAS_VDW	n a	English	2 + 1	S2	18
<p>Dairy science: Composition of milk; some physical properties of milk; factors affecting composition of milk; microbiological aspects of milk production; lactation; mechanical milking; milk defects; nutritive value of milk and milk products.</p> <p>Practical work: Chemical and microbiological tests of milk. Demonstration of the cheese-making process.</p> <p>Meat, poultry, fish and egg science: The composition, nutritional value and quality of meat, poultry, fish and eggs; factors affecting quality from slaughter or harvesting to consumption. Practical work: Visits to red meat and poultry abattoirs; quality determinations, egg quality and protein functionality.</p> <p>Prerequisites: [FST250] and [FST260] and [FST351] and [FST352] or [TDH]</p>					
FST400	RESEARCH_METHODODOLOGY_&_SEM.400				
NAS_VDW	FST453	English	2 + 1	J1	20
<p>Lectures and practicals/assignments: Research methodology. Literature study and seminar presentations on topics in Food Science and/or Technology.</p> <p>Prerequisite: [Third-year status] or [TDH]</p>					
FST401	ANIMAL_FOOD_TECHNOLOGY_401				
NAS_VDW	FST452	English	3 + 1.5	J1	30
<p>Dairy technology: The technology of fluid, concentrated, dried, frozen and fermented dairy products and starter cultures.</p> <p>Requirements for milk supply and other ingredients. Principles for the manufacturing of products in this category. Possible defects, causes and prevention. Practical work:</p> <p>Preparation of condensed milk, custard, ready-to-eat milk-based desserts, flavoured milk beverages, dairy-fruit juice mixtures; ice cream and other frozen desserts; yoghurt and cultured milk products; cheeses.</p> <p>Evaluation and analysis of the products. Factory visits. Meat, poultry, fish and egg technology: Meat, poultry, fish and egg processing and equipment. Meat emulsion, curing, dehydration and fermentation technology. Preservation and storage. Packaging. Legislation. Quality control and hygiene. Practical work: Manufacturing of dried, cured, fermented and emulsion type products. Visits to processing factories.</p> <p>Prerequisite: [FST361] or [TDH]</p>					

FST402	PLANT_FOOD_TECHNOLOGIES_402				
NAS_VDW	FST462	English	3 + 1.5	J1	30
Fruit and vegetable technology: Extension of shelf life of minimally processed fruits and vegetables. Pre-processing. Processing and preservation: canning, freezing, dehydration, concentration, juice extraction, irradiation and fermentation. Effect of processing of nutritional, sensory and microbiological quality. Practical work: Practical execution of the processes described above in pilot factory; factory visits; execution and reporting of a practical project on extended shelf life of fresh juice or of minimally processed fruits and vegetables. Cereal technology: Dry and wet milling extraction processes. Bread baking technology. Soft wheat products technologies. Malting and brewing technology. Production of RTE (ready-to-eat) breakfast cereals. Pasta and noodle technology. Alternative uses of cereals. Traditional African cereal products. Practical work: Visits to mills, bakeries and breweries. Experiments to determine the milling and baking quality of wheat. Rheological, chemical and baking tests of wheat. Small-scale processing, factory visits, basic analytical methods and quality control of cereal products. Oilseeds and legumes technologies. Processability, functional characteristics and food applications of the most important legumes and oil seeds (soy beans, peanuts, sunflower seeds). Practical work: Visits to food factories; small-scale processing of oilseeds and legumes. Prerequisite: [FST360] or [TDH]					
FST410	PRODUCT_DEVELOPMENT_410				
NAS_VDW	VDW442,FST461	English	2 + 1	S1	20
Lectures: Principles involved and steps followed in the development of new food products. Practicals: Applying the theory of food product development: A product development project will be planned, executed and presented orally and in a written format. Prerequisites: [FST260] and [FST351] and [FST352] or [TDH]					
FST411	SENSORY_ANAL.&QUAL.MAN.SYS.411				
NAS_VDW	VDW442,FST461	English	2 + 1	S1	20
Lectures: Quality management systems with specific reference to Good Manufacturing Practices, HACCP and ISO 9000. Principles and applications of sensory evaluation. Types of panels, tests and test conditions and their functions. Selection and training of panellists for descriptive sensory evaluation. Instrumental sensory quality measurements. Statistical analysis and interpretation of data. Application and implementation of HACCP. Practicals: Practical aspects and execution of sensory evaluation techniques, analysis and interpretation of data. Instrumental sensory quality measurements. Prerequisites: [FST260] and [FST351] and [FST352] or [TDH]					
FST412	SENSORY_ANALYSIS_412				
NAS_VDW	n a	English	1 + 1	S1	10
Capita selecta FST411. Principles and applications of sensory evaluation. Types of panels, tests and test conditions and their functions. Selection and training of panellists for descriptive sensory evaluation. Instrumental sensory quality measurements. Statistical analysis and interpretation of data. Practicals: Practical aspects and execution of sensory evaluation techniques, analysis and interpretation of data. Instrumental sensory quality measurements. Prerequisite: [TDH]					
FST420	ADVANCED_FOOD_SCIENCE_420				
NAS_VDW	FST451	English	2 + 1	S2	20
Lectures: Lectures in advanced level food chemistry, food microbiology, food engineering, food processing and nutrition. Problem solving and literature discussion. Practicals and/pr assignments: Advanced techniques of analyses and applications or assignments in food chemistry, food microbiology, food engineering, food processing and nutrition. Prerequisite: [Third-year status] or [TDH]					
FST463	RESEARCH_PROJECT_463				
NAS_VDW	n a	English	1 + 2	S2	20
Planning, execution and reporting of a research project on a selected Food Science and/or Technology subject. Prerequisite: [Third-year status in Food Science or TDH]					

GGY132	CARTOGRAPHIC_SKILLS_132				
NAS_GGY	n a	Bilingual	0 + 1	S1	4
Principles of cartography. Map reading, analysis and interpretation; introductory survey techniques. Prerequisite: [Par 1.2]					
GGY153	GEOGRAPHY_OF_CITIES_153				
NAS_GGY	n a	Double	4 + 0	K1	6
An introduction to the forms and functions of cities from ancient times to the 17th century as a basis for understanding early South African towns. The essence of the segregated and apartheid forms of the modern South African city. Prerequisite: [Par 1.2]					
GGY155	HUMAN_GEOGRAPHY_OF_SADC_155				
NAS_GGY	n a	English	4 + 0	K2	6
Foundations for understanding contemporary human geographic processes in Southern Africa. The course will trace the major changes in the economic, political and population geography of Southern Africa including those associated with the formation of the South African Development Community. * Check with Department if course is offered in 2004.					
GGY162	REMOTE_SENSING_162				
NAS_GGY	n a	Bilingual	0 + 1	S2	4
Use, interpretation and analysis of satellite imagery, aerial photography and other remotely sensed data. Prerequisite: [Par 1.2]					
GGY163	BIOGEOGRAPHY_OF_SA_163				
NAS_GGY	n a	Double	4 + 0	K3	6
Introduction to the biogeography of South Africa; the environment as ecological system; ecological laws and processes; natural regions and biomes; humans as ecological elements; resource utilisation, management and mismanagement in South Africa. Prerequisite: [Par 1.2]					
GGY164	PHYSICAL_GEOGRAPHY_OF_SA_164				
NAS_GGY	n a	Double	4 + 0	K4	6
Introduction to the physical geography of South Africa including climate and weather patterns, landscape evolution and topographical distribution. Landscaping processes within arid, semi-arid and coastal environments; fluvial systems and processes; mountain environments.					
GGY252	PROCESS_GEOMORPHOLOGY_252				
NAS_GGY	n a	Bilingual	4 + 2	K2	12
Physical processes that influence the earth's surface and management. Specific processes and their interaction in themes such as weathering; soil erosion; slope, mass movement and fluvial processes.					
GGY263	URBAN_MODELLING_263				
NAS_GGY	n a	English	4 + 2	K3	12
The utility of existing models for urban planning for cities in developing countries, and the challenges presented by urban realities will be examined using empirical case studies of cities and planning in Africa. Themes discussed include urban agriculture, peri-urban settlement, tenure insecurity, and the importance of the informal economy. In light of the realities of the aforementioned factors, the development of new, more appropriate urban models will be considered.					
GGY264	URBAN_SOCIAL_MORPHOLOGY_264				
NAS_GGY	n a	English	4 + 2	K4	12
The structure and spatial distribution of class, income, ethnicity, age and other demographic variables in urban environments in South Africa and other parts of the world. Qualitative and quantitative analyses of social change and transformation in cities, including segregation, desegregation and gentrification. Other themes include urban perception, urban living, social area analysis, and spatial strategies for social integration.					

GGY283	INTRODUCTORY_GIS_283				
NAS_GGY	n a	English	2 + 1	S1	12
Introduction to Geographic Information Systems (GIS), types of GIS, data input, data analysis and associated technology. GIS applications and data analysis techniques in practicals comprise concepts presented in lectures. The practical application of GIS is emphasised rather than mastering software. This module is also presented in the second semester.					
GGY353	URBAN_DEVELOPMENT_STUDIES_353				
NAS_GGY	n a	English	4 + 2	K2	18
Relationships between land values and land uses under changing conditions affected by corporations, super corporations, powerful individuals, and local authorities with selected examples from London, Paris and Johannesburg.					
GGY354	DEVELOPMENT_GEOGRAPHY_354				
NAS_GGY	n a	English	4 + 2	K1	18
Principles of development, perspectives on development. Aspects of development strategy such as population growth, urbanisation, rural development. Development in Third World cities. Frameworks for development in South Africa.					
GGY361	ENVIRONM.GEOMORPHOLOGY_361				
NAS_GGY	n a	Bilingual	4 + 2	K3	18
Interactions of geomorphic processes within the physical and built environments; themes such as geomorphology and environmental change, slope processes and the environment, geomorphic risks and hazards, soil erosion and conservation, geomorphology in environ-mental management, weathering in urban environments, preservation of buildings, and deterioration and preservation of indigenous rock art. Practicalcs involve fieldwork and subsequent laboratory analysis.					
GGY363	APPLIED_GEOMORPHOLOGY_363				
NAS_GGY	n a	Bilingual	4 + 0	K3	12
Interactions of geomorphic processes within the physical and built environments. Geomorphology in environmental management, weathering in urban environments, conservation and preservation of buildings. (Course for Landscape Architecture and Architecture students)					
GIS220	GEOGRAPHIC_DATA_ANALYSIS_220				
NAS_GGY	n a	English	3 + 1	S2	12
Collection, management, analysis and representation of geographic data; data sampling, and preparation; geographic referencing; interpolation; data integration; presentation.					
GIS310	GEOGRAPHIC_INFORMATION_SYS.310				
NAS_GGY	n a	English	3 + 1	S1	24
Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications.					
Prerequisite: [GGY283] or [TDH]					
GIS320	SPATIAL_ANALYSIS_320				
NAS_GGY	n a	English	3 + 1	S2	24
Introduction to spatial analysis techniques classification, interpolation, extrapolation, geo-referencing, kriging, topology, visualisation, networks, spatial interaction, spatial statistics and general spatial systems analysis. Prerequisite: [GIS310] or [TDH]					
GKD250	INTRODUCTORY_SOIL_SCIENCE_250				
NAS_PGWS	GKD213	Bilingual	3 + 1	S1	12
Origin and development of soil, weathering and soil formation processes. Profile differentiation and morphology. Physical characteristics: texture, structure, soil water, atmosphere and temperature. Chemical characteristics: clay minerals, ion exchange, pH, buffer action, soil acidification and salinisation of soil. Soil fertility and fertilisation. Soil classification. Practical work: Laboratory evaluation of simple soil characteristics. Field practicals on soil formation in the Pretoria area. Prerequisite: [CMY117 GS] or [TDH]					

GKD260	SOIL_FERTIL.&_PLANT_NUTRIT.260				
NAS_PGW	GKD228	Bilingual	3 + 1	S2	12
Principles of plant nutrition. Essential plant nutrient elements. Soil as growth medium for plants. Macro and micro element supply to plants. Micro elements. Deficiencies and toxicities. Evaluation of soil fertility. Practical work: Laboratory evaluation of soil fertility. Pot experiments in glass house. Prerequisite: [GKD250 GS]					
GKD350	SOIL_CLASSIF.&_SURVEYING_350				
NAS_PGW	GKD317	Bilingual	2 + 1	S1	14
A taxonomic system for South Africa. USDA's Soil Taxonomy. Land suitability evaluation. Optimal resource utilization. The conservation component. Ecological aspects. Ecotype, land types. Soil maps. Practical work: Field practicals and compulsory excursion. Identification of soil horizons, forms and families. Land suitability evaluation. Elementary mapping exercise. Prerequisite: [GKD250 GS]					
GKD351	SOIL_PHYSICS_351				
NAS_PGW	GKD329	Bilingual	1 + 0.5	S1	10
A study of some soil physical properties of soil: structure, texture, compacting and crusting. Sedimentation and sieve analyses for the determination of particle sizes. Conduction of heat. Practical work: Determination of some physical properties of soil. Prerequisite: [GKD250]					
GKD370	SOIL_CHEMISTRY_370				
NAS_PGW	GKD318	Bilingual	2 + 1	S1	14
The more exact chemistry of soils systematically explained by understanding the particular chemical principles. Charge origin. Chemical equilibriums. Manifestations of sorption. Ion exchange. Acidic soils, saline soils and the organic fraction of soil. The chemistry of the important plant nutrient elements P, K and N is explained. Prerequisite: [GKD250]					
GKD460	ENVIRONMENTAL_MANAGEMENT_460				
NAS_PGW	PGW411+GKD414	Bilingual	4 + 1	S2	26
Chemical, physical and biological soil degradation (with the emphasis on pollution); types, causes, effects, combating. Biogeochemical element cycles. Sewage. Acid rain. Pesticides. Aspects of soil erosion. Integrated environmental management. Environmental impact studies as well as planning, implementation and auditing of environmental management plans. Strip and open cast mining. Management of catchments, desertification, modifications of global environment, control of invasive exotics, bush encroachment and pollution of air and water. Practical work: Studies on the aspects of lectures. Prerequisites: [GKD250] and [GKD350]					
GKD461	SOIL_MINEROL.&SOIL_GENESIS_461				
NAS_PGW	GKD415	Bilingual	2 + 1	S2	14
Pedogenetic processes. Soil forming factors. Clay mineralogy: structure, nomenclature, classification and synthesis of clay minerals.					
GKD480	RESOURCE_SURVEYS_480				
NAS_PGW	GKD487	Bilingual	3 + 1	S2	14
Techniques for the execution of detailed soil surveys (including field work and the composition of maps and reports); analysis of climatic data; field and capacity evaluation; analysis of water resources. Practical exercises in all of these aspects. Prerequisites: [GKD250] and [GKD350]					
GLY151	INTRODUCTORY_GEOLOGY_151				
NAS_GLY	GLY112	English	4 + 1	K1	8
Solar system; structure of solid matter; minerals and rocks; introduction to symmetry and crystallography; important minerals and solid solutions; rock cycle; classification of rocks. Crystal models, mineral and rock samples. Prerequisite: [Par 1.2]					

GLY152	PHYSICAL_GEOLOGY_152				
NAS_GLY	GLY113	English	4 + 1	K2	8
External geological processes (gravity, water, wind, sea, ice) and their products (including geomorphology). Internal structure of the earth. The dynamic earth – volcanism, earthquakes, mountain building – the theory of plate tectonics. Geological processes (magmatism, metamorphism, sedimentology, structural geology) in a plate tectonic context. Geological maps and rock specimens. Prerequisite: [Par 1.2]					
GLY161	HISTORICAL_GEOLOGY_161				
NAS_GLY	GLY123	English	4 + 1	K3	8
Principles of stratigraphy and stratigraphic nomenclature; geological dating and international and SA time scales; Africa framework and tectonic elements of SA; introduction to depositional environments. Overview of the historical geology of SA, from the Archaean to the present: major stratigraphic units, intrusions and tectonic-metamorphic events - their rock types, fossil contents, genesis and economic commodities. Principles of palaeontology and short description of major fossil groups: fossil forms, ecology and geological meaning. Geological maps and profiles; rock samples. Prerequisite: [Par 1.2]					
GLY162	ENVIRONMENTAL_GEOLOGY_162				
NAS_GLY	n a	English	4 + 1	K4	8
Geological processes and their influence on man's environment: earthquakes, volcanoes, slope movement, subsidence, floods, coastal processes, meteorite impacts, atmospheric changes. Natural resource utilization and the impact of man on the geological environment: urban development, dams, mining, agriculture, transport systems, heavy structures, construction materials, groundwater extraction, waste disposal, environmental pollution. Geological maps, profiles and rock specimens, fossil specimens. Prerequisite: [Par 1.2]					
GLY251	CRYSTAL_OPTICS_ &_CRYS.CHEM.251				
NAS_GLY	GLY214	English	4 + 2	K1	12
The properties of light in isotropic and anisotropic solids; the polarizing microscope; nature and identification of isotropic, uniaxial and biaxial crystals in transmitted and reflected light. Atoms and atomic structure; crystal structure and crystal field theory. Prerequisites: [CMY117 GS] and [GLY151]					
GLY252	MINERALOGY_252				
NAS_GLY	n a	English	4 + 2	K2	12
Phase rule of Willard Gibbs. Phase diagrams in pressure-temperature-compositional space. One and two component systems. Systematic review of the major rock-forming silicate, sulphide and oxide minerals in terms of optical properties, crystal structure, crystal chemistry, pressure-temperature conditions of formation, alteration and association in rock systems. Optical identification and description of minerals and their mutual relationships in thin section. Prerequisite: [GLY251 GS]					
GLY253	SEDIMENTOLOGY_253				
NAS_GLY	GLY215	English	4 + 2	K2	12
Introduction to sedimentology; grain studies; composition and textures of sedimentary rocks; flow dynamics and behaviour of sediment particles in transport systems; description and genesis of sedimentary structures; diagenesis; depositional environments and their deposits, modern and ancient; chemical sedimentary rocks; economic sedimentology; field data acquisition from sedimentary rocks and writing of reports; sieve analysis; Markov analysis; analysis of palaeocurrent trends; interpretation of sedimentary profiles.					
GLY254	STRUCTURAL_GEOLOGY_254				
NAS_GLY	GLY216	English	4 + 2	K1	12
Integrated theoretical and practical course dealing with the principles of rock deformation and analysis of deformed rocks. Stress, strain and rheology; fault systems, reactivation of faults, inversion tectonics, balanced cross sections; folds, interference (superposed) folds; tectonic fabrics; shear zones, progressive deformation; mapping and analysis of deformed rocks; regional tectonics.					

GLY261	IGNEOUS_PETROLOGY_261				
NAS_GLY	GLY316	English	4 + 2	K3	12
<p>Classification and nomenclature of igneous rocks. The nature of silicate melts; physical and chemical factors influencing crystallisation and textures of igneous rocks. Phase diagrams, fractional crystallisation and partial melting.</p> <p>Trace elements and isotopes, and their use in petrogenetic studies. Global distribution of magmatism and its origin. Mid-oceanic ridges, active continental margins, intraplate magmatism.</p>					
GLY262	METAMORPHIC_PETROLOGY_262				
NAS_GLY	GLY316	English	4 + 2	K4	12
<p>Classification of metamorphic rocks. Anatexis, migmatite and granite; eclogite. Metamorphic textures. PT-time loops. Metamorphism in various plate tectonic environments.</p> <p>Prerequisite: [GLY252]</p>					
GLY263	SA_STRATIGRAPHY_&_ENG.GEOL.263				
NAS_GLY	n a	English	4 + 2	K3	12
<p>The crustal development of southern Africa and the geomorphologic history of the Post-Gondwana era. The engineering geological properties and problems associated with the different lithostratigraphic units occurring in southern Africa. Mapping techniques.</p> <p>Prerequisite: [TDH]</p>					
GLY264	INTRODUCTION_TO_GEOPHYSICS_264				
NAS_GLY	n a	English	4 + 2	K4	12
<p>Physical properties of rocks and minerals relevant to exploration geophysics: porosity, and permeability; density; magnetic properties; natural radioactivity; elastic properties; seismic wave attenuation; thermal properties; electrical properties.</p> <p>Basic principles and applications of various geophysical techniques: gravity, magnetic, resistivity, electromagnetic, seismic and radiometric techniques. Mapping techniques.</p> <p>Prerequisite: [TDH]</p>					
GLY351	GROUNDWATER_351				
NAS_GLY	n a	English	4 + 2	K1	18
<p>Origin and classification of groundwater; classification of aquifers; groundwater movement; equations for groundwater flow into boreholes; the La Place equation and solutions for pump tests; execution and interpretation of pump tests.</p> <p>Groundwater flow modelling; classification of aquifers in southern Africa; groundwater exploration and management. Mapping techniques.</p> <p>Prerequisite: [GLY263]</p>					
GLY352	ORE_FORMATION_352				
NAS_GLY	GLY323	English	4 + 2	K2	18
<p>Principles of ore forming processes and geological environments of ore formation; classification schemes; exploration models; economic factors; valuable by-products; market fluctuations; resources and their renewability. Mapping techniques.</p> <p>Prerequisite: [GLY261]</p>					
GLY361	ORE_DEPOSITS_361				
NAS_GLY	GLY323	English	4 + 2	K3	18
<p>Systematic review of major metallic and non-metallic ore types and examples in South Africa and world-wide; ore type models (grades, tonnages); geometry of ore bodies; mining. Ore samples and ore mineralogy. Mapping techniques.</p>					

GLY362	GEOSTAT.& ORE_RESERV. CALC.362				
NAS_GLY	GLY323	English	4 + 2	K4	18
Review of classical geostatistical methods; problem evaluation; descriptive statistics, normal-, lognormal, three parameter lognormal distributions; confidence intervals; student-t. Sampling; cut-off values; grid generation and trend surface analysis. Semivariogram; error estimation; Kriging (BLUE) techniques. Ore reserve calculations. Mapping techniques.					
GMA220	REMOTE_SENSING_220				
NAS_GGY	n a	English	3 + 1	S2	16
The electromagnetic spectrum, atmospheric and surface properties related to aerial photography. History of photogrammetry. Camera and film parameters, types of conventional and digital aerial photographs and their uses, photo mosaics, orthophotos. Flight plans and photo acquisition. Stereoscopic analysis, height measurements and mapping. Applications and interpretation of aerial photographs for a wide range of disciplines.					
GMA320	REMOTE_SENSING_320				
NAS_GGY	n a	English	3 + 1	S2	24
The electromagnetic spectrum, atmospheric and surface properties related to satellite imagery. History of satellite remote sensing. Orbit and sensor parameters, resolution types, satellite types and their uses, passive and active systems. Introductory digital image processing. Web sites and data acquisition. Applications and interpretation of satellite data for a wide range of disciplines.					
GMC110	CARTOGRAPHY_110				
NAS_GGY	n a	English	3 + 0	S1	8
An overview of the development of cartography, the concepts, processes, techniques and data sources. Practical digital mapping. Prerequisite: [GGY132]					
GMC210	CARTOGRAPHY_210				
NAS_GGY	n a	English	3 + 1	S1	12
Rules of graphical communication and the depiction of spatial data. Projections, Graphical elements of design and symbolisation and visualisation of spatial referenced data in application areas such as sociology, economics, environmental management, etc. Prerequisite: [GMC110]					
GMC310	CARTOGRAPHY_310				
NAS_GGY	n a	English	3 + 1	S1	24
The traditional and digital approaches to cartographic design and user/supplier requirements. Evaluation of the cartographic processes for applicability. The functionality of digital mapping programs and the cartographic software of Geographic Information Systems. The cognitive processes of spatial data capture and spatial data visualisation. Knowledge-based map design techniques. Multimedia and virtual reality as visualisation techniques. The role of Cartography in information visualisation systems. Prerequisite: [GMC210]					
GMT320	PROJECT_ GEOMATICS_320				
NAS_GGY	n a	English	3 + 1	S2	24
A project which is approved by the lecturer and in which one or more of the studied techniques of data acquisition and processing are used to produce an output of spatially referenced information. The project must be fully described in a project report. Prerequisite: [GIS310] or [TDH]					
GPE400	GLOBAL_PERSPECTIVES_IN_EDU.400				
OPV_OPV	n a	Bilingual	+	S1	6
Global Perspectives in Education Dealing with futuristic scenarios in education emerging from globalisation, word of work and contextual impact on education in South Africa. Interpreting the works of contemporary visionaries on the future education scenarios impacting on education in context of Africa. Creating management strategies in dealing with the age of technology, HIV/AIDS, new social structures, gender and racial issues. (WEBCT)					

GPH352	APPLIED_NUMERICAL_METHODS_352				
NAS_GLY	GPH311	English	4 + 2	K2	18
<p>Numerical techniques: interpolation, integration, Fourier analysis, filter design and differentiation. Special emphasis on geophysical applications.</p> <p>Prerequisite: [TDH]</p>					
GPH361	GRAVITY_METHODS_361				
NAS_GLY	GPH312	English	4 + 2	K3	18
<p>Basic definitions and units; gravity potential; measurement of gravity; gravity field of the earth; spheroid and geoid.</p> <p>Reduction of gravity values; Bouguer anomaly values; residual gravity anomalies; isostasy; terrain corrections; field surveys, data presentation;</p> <p>filter and contour techniques; rock densities; interpretation techniques and algorithms; computer interpretations.</p>					
GPH362	MAGNETIC_METHODS_362				
NAS_GLY	GPH312	English	4 + 2	K4	18
<p>Fundamental magnetization theory; magnetic potential; units; geomagnetic field; magnetic anomalies; origin and shape of; magnetic susceptibilities of rocks;</p> <p>palaeomagnetism and global tectonics; magnetometers; field surveys;</p> <p>aeromagnetic surveys; data presentation and manipulation; filters; interpretation techniques; algorithms for the calculation of the magnetic effect due to bodies with arbitrary shapes.</p> <p>Quantitative and qualitative computer interpretation.</p>					
GSS310	FAMILY_STUDIES_310				
NAS_VBR	GSS351,352	Bilingual	2 + 0	S1	8
<p>Roles, responsibilities and development tasks of family members during the life cycle regarding aspects concerning food, nutrition, clothing, housing.</p> <p>Prerequisite: [Prescribed Psychology & Sociology modules up to 200 level]</p>					
GTS161	INTRODUCTORY_GENETICS_161				
NAS_GTS	GTS122	Double	2 + 0.5	S2	8
<p>Principles of Mendelian inheritance: concepts such as locus and allele, dominance interactions and epistasis. Introductory cytogenetics, the karyotype and cell division.</p> <p>Probability studies. Genetic linkage and chromosome mapping.</p> <p>Sex determination and sex linked traits. Inheritance of cytoplasmic DNA and cytoplasmic effects.</p> <p>Prerequisite: [MLB111 GS] or [TDH]</p>					
GTS251	GENE_&_CHROMOSOME_ORGANIZ_251				
NAS_GTS	GTS215, GTS217	English	2 + 2	S1	12
<p>Introduction to molecular genetics: Gene structure, transcription and translation, gene regulation, DNA replication, mutation,</p> <p>DNA repair and transposition. Extranuclear inheritance.</p> <p>The genetic basis of cancer and immunity.</p> <p>Prerequisite: [GTS161 GS]</p>					

GTS261	GENETIC_ANAL_ & MANIPULA_261				
NAS_GTS	GTS215, GTS217	English	2 + 0.5	S2	12
Creation of variation in micro organisms: transformation, conjugation and transduction. Basic concepts of recombinant DNA technology and its applications in gene analysis and manipulation. Introduction to genetic analysis of populations: allele and genotypic frequencies, breeding systems and quantitative inheritance.					
Prerequisite: [GTS161 GS] or [TDH]					
GTS351	EUKARYOTIC_GENE_CON.& DEVL.351				
NAS_GTS	GTS325	English	2 + 1	S1	18
Regulation of gene expression in eukaryotes: regulation at the genome, transcription, RNA processing and translation levels. Applications of the principles of gene control: cancer, development and differentiation of plants and animals. Aspects of the epigenetic control of gene expression.					
Prerequisites: [GTS251 GS] and [GTS261 GS] or [TDH]					
GTS352	GENOMES_352				
NAS_GTS	n a	English	2 + 1	S1	18
Analysis of the genome as central entity in molecular genetics. Comparison of the molecular organization of prokaryote and eukaryote genomes, nuclear and mitochondrial genomes. Genome organization in different organisms; gene families, overlapping genes, pseudogenes, DNA repeat content. Genetic techniques for genome mapping, physical mapping, genome sequencing and the localization of genes. Processing of DNA sequencing data using computer technology. Approaches for studying genome function. Functional genomics, transcriptomics and proteomics. Genome evolution.					
Prerequisites: [GTS251 GS] and [GTS261 GS] or [TDH]					
GTS353	ADV_POPULATION_GENETICS_353				
NAS_GTS	GTS326	English	2 + 1	S1	18
Genetic variation and mating systems. Allele frequency change: genetic drift, natural and kin selection, mutation and migration. Molecular evolution: nucleotide substitutions to multigene families, and the neutral theory. Quantitative genetics: analysis of genetic variation, heritability, natural selection and artificial selection of quantitative traits. Identification of quantitative trait loci (QTLs).					
Prerequisites: [GTS251 GS] and [GTS261 GS] or [TDH]					
GTS361	HUMAN_GENETICS_361				
NAS_GTS	GTS314	English	2 + 1	S2	18
Human karyotype. Pedigree analysis and the inheritance of single gene traits in humans, concepts such as X-chromosome inactivation, variable expressivity, penetrance, locus heterogeneity, genomic imprinting and mosaicism. Developmental genetics. Genetic differentiation of sex and sex chromosome abnormalities. Cytogenetic and molecular basis of genetic diseases. Linkage analysis and the identification of human disease genes. Genetics of the immune system.					
Prerequisite: [GTS352 GS] or [TDH]					
GTS363	EVOLUTIO_ & PHYLO-GENETICS_363				
NAS_GTS	n a	English	2 + 1	S2	18
Origin of life's code. Molecular evolution and analytical tools. Determining the molecular ecology and evolutionary history of populations and species, and its applications in conservation, medical sciences and human evolution. Optimality, phylogenetic and molecular studies of adaptation; Evolution of sexual reproduction, resistance and virulence, and its practical applications; Evolutionary arms races.					
Prerequisite: [GTS353 GS] or [TDH]					
GTS364	VETERINARY_GENETICS_364				
NAS_GTS	n a	English	2 + 0	S2	9
Molecular basis of disease and disease treatment, vaccine development, diagnostic tests and cancer. Genomics-individual variation in disease susceptibility, multigenic diseases, implications for medicines, microarray technology and cytogenetics. Epidemiology, domestication and association studies. Conservation genetics. Host parasite co-evolution, virulence, disease resistance, evolutionary medicine and emerging diseases.					

GTS365	APPLIED_MEDICAL_GENETICS_365				
NAS_GTS	n a	English	2 + 1	S2	18
The clinical manifestations of common Mendelian diseases and congenital anomalies; Risk assessment/calculation and genetic counselling; Genes and diseases - the use of polymorphisms, gene mapping, gene linkage and association studies in medicine; Genetic diagnosis - common molecular and cytogenetic techniques and the applications thereof; Carrier detection and predictive testing; Population screening - prenatal- and neonatal screening; Treatment of genetic disease and gene based therapy; Pharmacogenetics and cancer genetics. Ethical issues.					
Prerequisites: [GTS251 GS] and [GTS261 GS] or [TDH]					
GTS366	PLANT_GENETICS_ & BIOTECHN_366				
NAS_GTS	GTS362	English	2 + 1	S2	18
Plant genetic resources and genetic systems. Plant genome organization and evolution. Control of gene expression in plants: cis and trans regulation, mRNA stability, gene silencing and RNA signaling, regulation of cytoplasmic genes, light/dark regulation, hormonal control and signal transduction during defense. Protein processing. Developmental genetics: seed/embryo development, control of vascular development and flowering. Genetics of male sterility and self-incompatibility. Plant biotechnology, tissue and cell cultures, plant transformation and regeneration.					
Prerequisites: [GTS251 GS] and [GTS261 GS] or [TDH] and [GTS351 GS is recommended] and [GTS352 GS is recommended]					
GTS451	SEMINAR_ & TECHNIQUES COURSE451				
NAS_GTS	GTK401, GTK403	English	2 + 0.5	S1	18
Techniques course: molecular techniques, plant tissue culture and transformation, DNA genotyping and analysis, hybridisation techniques. Seminars and literature discussion: writing and presentation of seminars, article discussion groups.					
Prerequisite: [GTS352 GS] or [TDH]					
GTS452	ADVANCED_PLANTBREEDING_452				
NAS_GTS	GTK402	English	2 + 0.5	S1	18
Genetic systems, recombination and variability. Population structure and variability. Sources of variation including induced mutations, hybridisation and chromosome manipulation. Assessment of variation. Manipulation of genetic systems: incompatibility systems, male sterility, asexual systems, as well as cell and tissue cultures. Selection methods: selection strategies, choice of breeding methods and applications; marker-assisted selection: trait/gene-linked markers, application of markers in backcross-breeding, Mapping quantitative characters; gametophytic and sporophytic selection; in vitro selection. Adaptation: genotype x environment interaction, modelling.					
Prerequisite: [GTS366 GS] or [TDH]					
GTS461	PLANTBREEDING_STRATEGIES_461				
NAS_GTS	GTS442	English	2 + 0.5	S2	18
Specific breeding strategies. Breeding for specific traits. Biotechnology: approaches and available techniques, role of gene technology in plant breeding. Ethical aspects. Comprehensive plant breeding strategies. Population growth, world food supply and sustainable agriculture, role of plant breeding.					
Prerequisite: [GTS452 GS] or [TDH]					
GTS462	APPLICATIONS_IN_PLANTBREED.462				
NAS_GTS	GTK403	English	1 + 1	S2	18
Research project related to specific breeding strategies: cereals, forestry species, horticulture and floriculture.					
Prerequisite: [GTS452 GS] or [TDH]					
GTX351	ENGINEERING_GEOLOGY_351				
NAS_GLY	GTX321	English	4 + 2	K1	18
Definition and scope of Engineering Geology; properties and use of rock material; engineering properties of rock masses; origin of soil and description of the soil profile; engineering properties and use of soils; stages and methods of geotechnical site investigation, report writing.					
Prerequisites: [GLY263] and [GLY264] or [TDH]					

GTX361	SOIL_MECHANICS_361				
NAS_GLY	GTX312	English	4 + 2	S2	13
Capita selecta from SGM322.					
GVK420	LARGE_STOCK_SCIENCE_420				
NAS_VKU	n a	Afrikaans	2 + 0.5	S2	12
Industrial science and management of large stock. Revision of the principles of agricultural management. Aspects of business management of the large stock enterprise. Management programmes, production systems and techniques applicable to beef cattle, dairy cattle and horses. Design and planning of farm buildings and structures. Storage and handling of fodder. The handling and management of refuse. Hygiene and herd health programmes. Prerequisites: [LEK210] and [RPL320] and [VGE301] and [VKU210] and [VNE361]					
HNT210	HUMAN_NUTRITION_210				
MED_HNT	n a	Bilingual	1 + 1	S1	12
Application of scientific principles in human nutrition. Menus (diet, mealplan, menus), ration scale, food composition tables. Standards and guidelines. Prerequisite: [VDG250 #]					
HSC252	CROP_PROPAGATION_252				
NAS_PGW	TBK221	Bilingual	2 + 0.5	S1	12
Propagation by seed: seed development, including pollination, fertilisation, embryogenesis fruit and seed development; principles and techniques of seed production; seed physiology; principles and practical aspects of seed germination; seed testing and legislation. Vegetative propagation: principles and techniques of rooting/cuttings; budding and grafting; propagation using specialized organs; micro propagation (tissue culturing). Students will get hands-on experience and will visit companies and nurseries. Prerequisite: [BOT161 or]					
HSC350	CITRICULTURE_350				
NAS_PGW	TBK410	Bilingual	3 + 1	S1	14
Climatic requirements, cultivation regions, economic importance. Commercially important cultivars and rootstocks, scion/rootstock interactions: influence on vegetative growth and fruit quality. Fruit morphogenesis studied anatomically and morphologically. The effect of fertilization and irrigation on seasonal vegetative and reproductive phenology, as well as reserve status. Diseases and pests important for economic reasons. The module includes an excursion to production regions. Prerequisites: [HSC252] and [PPK251]					
HSC351	NURSERY_MANAGEMENT_351				
NAS_PGW	STZ311	Bilingual	2 + 0.5	S1	14
The nursery industry in South Africa. Greenhouse environmental control. Requirements for soil-based and soil-less growing media. The production of plants in a nursery. Management, economical and marketing aspects of different nursery operations. Practical experience on the experimental farm or in nurseries of own choice is compulsory for all participants in this module.					
HSC362	DECIDUOUS_POMOLOGY_362				
NAS_PGW	TBK320	English	2 + 0.5	S2	14
Pome fruits, stone fruits, berries and nuts: economic importance, production areas internationally and nationally, origin and classification, climate requirements, cultivars and rootstock, cultural and management practices, harvest and handling. An excursion to production areas is compulsory. Prerequisite: [PPK251]					
HSC450	SUBTROPICAL_POMOLOGY_450				
NAS_PGW	TBK314	Bilingual	2 + 0.5	S1	14
Integration of the seasonal phenology of subtropical fruit crops with management systems through a study of the appropriate botany, biochemistry and physiology, as well as climate, soil, water and diseases, in order to achieve the maximum yield, quality and profit. Prerequisites: [HSC252] and [PPK251]					

HSC460	PROD.SYS.1V:SUBTROP.FR.U.PR.460				
NAS_PGW	HSC483	English	2 + 0.5	S2	12
<p>Integration of the seasonal phenology of subtropical fruit crops with management systems through a study of the appropriate botany of the crop, its biochemistry and physiology, as well as the influence of climate, soil, water, diseases and pests, in order to achieve the maximum yield, quality and profit. Identification of ornamental plants for commercial and landscape use. Climatic, reproduction and maintenance requirements of above mentioned trees, palms, shrubs, flowering plants, ground covers, climbers and indoor plants. Functional and aesthetic value of plants in a landscape or indoors. Practical experience on the experimental farm is compulsory for all participants in this module.</p>					
HSC470	PROD.SYS.111:TEMP.FRUIT.PR.470				
NAS_PGW	HSC484	English	2 + 0	S1	10
<p>Integration of seasonal phenology of temperate fruit crops with management systems through a study of the appropriate botany, biochemistry and physiology, as well as climate, soil, water and diseases, in order to achieve the maximum yield, quality and profit. Prerequisites: [HSC252] and [PPK251]</p>					
HSC490	ORNAMENT_HORTICULTURE_490				
NAS_PGW	HSC352.451	Bilingual	2 + 0.5	S1	14
<p>Economic importance of cut flowers and pot plants. Taxonomy and plant description. Climatic requirements and production practices including establishing, growth manipulation, nutritional requirements, irrigation, pest and disease control, harvest and post-harvest handling. Identification of ornamental plants for commercial and landscape use. Climatic, reproduction and maintenance requirements of above mentioned trees, palms, shrubs, flowering plants, ground covers, climbers and indoor plants. Functional and aesthetic value of plants in a landscape or indoors. Excursions to nurseries and practical experience on the experimental farm is compulsory for all participants in this module.</p>					
IAS211	ACTUARIAL_MATHEMATICS_211				
NAS_VWT	n a	Bilingual	2 + 1	S1	12
<p>Accumulation functions, interest, time value of money, compounding periods, cashflow models, equations of value, annuities certain, continuous time application, life tables, derivation of contingent probabilities from life tables, contingent payments, fundamentals of survival models, simple laws of mortality, expectation of life, elementary survival contracts, commutation functions, premiums for elementary survival contracts. Prerequisites: [WTW114 60%] and [WTW128 60%]</p>					
IAS221	ACTUARIAL_MATHEMATICS_221				
NAS_VWT	n a	Bilingual	2 + 1	S2	12
<p>Select and ultimate life tables, advanced life annuities, accumulation and discounting, life insurance, net and gross premiums, reserves, pension applications, statistical considerations, loan schedules, performance measurement, valuation of fixed interest securities. Prerequisite: [IAS211 GS]</p>					
IAS261	LIFE_ASSURANCE_PRAK.IN_RSA_261				
NAS_VWT	n a	Bilingual	3 + 0	K3	8
<p>Structure of and organisations in the life assurance industry, products, law, tax, organisation and operation of the insurer, personal financial planning. This module is not presented every year - please consult the Head of Department. Prerequisite: [IAS211 GS]</p>					
IAS262	LIFE_ASSURANCE_PRAK.IN_RSA_262				
NAS_VWT	n a	Bilingual	3 + 0	K4	8
<p>Life assurance policy design and rating, policy values and alterations, actuarial valuation, surplus, reinsurance, investment of life assurance funds. This module is not presented every year - please consult the Head of Department. Prerequisites: [IAS211 GS] and [IAS221 #]</p>					

IAS282	FINANCIAL_MATHEMATICS_282				
NAS_VWT	AKM702	Bilingual	3 + 0	S2	12
Generalised cash-flow model. The time value of money. Interest rates. Discounting and accumulating. Compound interest functions. Equations of value. Loan schedules. Project appraisal. Investments. Simple compound interest problems. The "No Arbitrage" assumption and forward contracts. Term structure of interest rates. Stochastic interest rate models.					
Prerequisite: [IAS211 0.7]					
IAS351	SHORT-TERM_INS.PRAC.IN_RSA_351				
NAS_VWT	n a	Bilingual	3 + 0	K3	10
Structure of and organisations in the short term insurance industry, law, types of insurance, Lloyds, risk management. Prerequisite: [IAS211 GS]					
IAS352	SHORT-TERM_INS.PRAC.IN_RSA_352				
NAS_VWT	n a	Bilingual	3 + 0	K4	10
Short-term insurance rating, reserving, reinsurance, investment of short-term insurance funds.					
Prerequisites: [IAS211 GS] and [IAS221 GS] and [IAS351 #]					
IAS361	RETIREMENT_FUND_PRAC.I_RSA_361				
NAS_VWT	n a	Bilingual	3 + 0	K3	10
Structure of and organisations in the retirement fund industry, instruments, typical benefits, law, tax, retirement fund design.					
Prerequisite: [IAS211 GS]					
IAS362	RETIREMENT_FUND_PRAC.I_RSA_362				
NAS_VWT	n a	Bilingual	3 + 0	K4	10
Retirement fund design, financing, role of the actuary, investment of funds, group insurance.					
Prerequisites: [IAS211 GS] and [IAS221 GS] and [IAS361 GS]					
IAS382	ACTUARIAL_MODELLING_382				
NAS_VWT	n a	Bilingual	2 + 1	S2	20
Principles of actuarial modelling and stochastic processes. Markov chains and continuous-time Markov jump processes. Simulation of stochastic processes. Survival models and the life table. Estimating the lifetime distribution $F_x(t)$. The Cox regression model. The two-state Markov model. The general Markov model. Binomial and Poisson models. Graduation and statistical tests. Methods of graduation. Exposed to risk. The evaluation of assurances and annuities. Premiums and reserves.					
Prerequisite: [IAS282]					
INB320	INTERIOR_PLANNING_320				
NAS_VBR	n a	Bilingual	1 + 1	S2	11
The planning and arrangement of existing living and working spaces to provide for the various needs of the individual, family or group. Evaluation of floor plans; arrangement of furniture.					
Prerequisites: [ERG280] and [ITW310] and [OBG110]					
INB321	INTERIOR_PLANNING_321				
NAS_VBR	n a	Bilingual	1 + 2	S2	17
The planning and designing of living and working spaces to provide for the different needs of the client. Visual and oral presentations for clients.					
Prerequisites: [ERG280] and [ITW310] and [OBG110] and [OKU210]					
INB410	INTERIOR_PLANNING_410				
NAS_VBR	n a	Bilingual	1 + 2	S1	23
Advanced interior planning					
Prerequisites: [INB321] and [OKU210]					

INF112	INFORMATICS_112				
EB_INF	n a	Bilingual	3 + 0	S1	10
Introduction to information systems, information systems in organizations, hardware: input, processing, output, software: systems and application software, organization of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.					
Prerequisite: [Par 1.2]					
INF153	INFORMATICS_153				
EB_INF	n a	Bilingual	2 + 0	S1	5
General systems theory, creative problem solving, soft systems methodology.					
Prerequisite: [Par 1.2]					
INF154	INFORMATICS_154				
EB_INF	n a	Bilingual	1 + 2	S1	5
Introduction to programming.					
Prerequisite: [Par 1.2]					
INF163	INFORMATICS_163				
EB_INF	n a	Bilingual	2 + 0	S2	5
The systems analyst, systems development building blocks, systems development, systems analysis methods, process modelling.					
Prerequisites: [INF153 GS] and [Par 1.2]					
INF164	INFORMATICS_164				
EB_INF	n a	Bilingual	1 + 2	S2	5
Advanced programming, use of a computer-aided software engineering tool.					
Prerequisites: [INF154 GS] and [Par 1.2]					
INF214	INFORMATICS_214				
EB_INF	n a	Bilingual	3 + 1	S1	14
Development design, rational model, structured query language (SQL), entity relationship modelling, normalization, database development life cycle, practical introduction to database design. Databases: Advanced entity relationship modelling and normalization, object-orientated databases, database development life cycle, advanced practical database design.					
Prerequisites: [CIL171] and [CIL172] and [CIL173] and [CIL174]					
INF261	INFORMATICS_261				
EB_INF	n a	Bilingual	3 + 2	K3	7
Database management; transaction management, concurrent processes, recovery, database administration: new developments: distributed databases, client-server databases: practical implementation of databases. Combination with COS222 not allowed.					
Prerequisite: [INF214 GS]					
INF262	INFORMATICS_262				
EB_INF	n a	Bilingual	3 + 2	K4	7
Operating systems: memory management, processor management, device management, file management, system management, concurrent processes, practical application in commercial operating systems. Combination with COS222 not allowed.					

INF271	INFORMATICS_271				
EB_INF	INF253	Bilingual	2 + 0	J1	14
Systems analysis, systems design: construction, application architecture, input design, output design, interface design, use of computer-aided development tools, programming. Prerequisites: [CIL171] and [CIL172] and [CIL173] and [CIL174] and [INF163] and [INF164] and [Par 1.2]					
INF272	INFORMATICS_272				
EB_INF	INF263	Bilingual	2 + 0	J1	14
Systems design: internal controls, program design, object design; project management, system implementation, use of computer-aided development tools, advanced programming. Prerequisites: [CIL171] and [CIL172] and [CIL173] and [CIL174] and [INF163] and [INF164] and [Par 1.2]					
INK110	INTERIOR_PRODUCTION_110				
NAS_VBR	n a	Bilingual	1 + 1	S1	9
Basic and more advanced construction and sewing techniques; use of various sewing machines and materials in the construction of selected interior products.					
INK210	INTERIOR_PRODUCTION_210				
NAS_VBR	n a	Bilingual	1 + 1	S1	10
Evaluation of ready-made interior products; measuring, planning and construction of custom made interior products: window coverings, upholstery and assorted furnishings. Prerequisite: [INK110] or [KLR120]					
INK310	INTERIOR_PRODUCTION_310				
NAS_VBR	n a	Bilingual	1 + 1	S1	11
A study of fashion and market trends in interior textile products. Development of a sample file. Exposure to mass production of selected interior products. Prerequisite: [INK210]					
IPO380	INTERIOR_EXPERIENTIAL_TRAI.380				
NAS_VBR	n a	Bilingual	0 + 2	S2	8
Controlled experiential training. Prerequisites: [INK310] and [ITW310]					
ITP480	PROJECT:_INTERIOR_MERCH_.480				
NAS_VBR	n a	Bilingual	3 + 0	J1	30
Project to illustrate the ability to integrate relevant theory in the planning and presentation of an interior merchandise project for specific clients. Prerequisites: [INB321] and [INB410 #] and [SEM380 GS] and [Final-year status]					
ITW120	INTERIOR_MERCHANDISE_120				
NAS_VBR	n a	Bilingual	2 + 1	S2	10
Household material and equipment studies: Metals and non-metals used for the manufacturing of objects, equipment and components of appliances for household use. Study and evaluation of selected non-electrical household equipment in terms of specific end-use situations.					
ITW220	INTERIOR_MERCHANDISE_220				
NAS_VBR	n a	Bilingual	2 + 1	S2	12
Equipment studies: study of major and portable electrical household appliances in terms of consumer needs, specific end use situations, running and life cycle costs, sustainability aspects and environmental concerns to facilitate consumer decision making.					
ITW261	INTERIOR_MERCHANDISE_261				
NAS_VBR	n a	Bilingual	2 + 1	Q3	6
Equipment studies: study of selected major and portable electrical household appliances in terms of consumer needs, specific end use situations, running and life cycle costs, sustainability aspects and environmental concerns to facilitate consumer decision making.					

ITW310	INTERIOR_MERCHANDISE_310				
NAS_VBR	n a	Bilingual	2 + 1	S1	14
Choice of lifestyle products (furniture and textile products), wall and floor finishing and lighting in specialised spaces. Prerequisites: [ITW120] and [TKS220 GS]					
KEP220	CULTURAL_EATING_PATTERNS_220				
NAS_VBR	VDG120/KEP261	Bilingual	3 + 0	S2	12
Origin and development of food habits; Factors influencing food habits and choice; Dynamics of food habits. Influence of religion on food habits. Food habits of different ethnic groups. The influence of culture on cuisines. Study of the cuisines of selected African, European and Eastern countries.					
KEP261	CULTURAL_EATING_PATTERNS_261				
NAS_VBR	VDG120	Bilingual	3 + 0	K3	6
Origin and development of food habits; Factors influencing habits and choice; Dynamics of food habits. Influence of religion on food habits. Food habits of different ethnic groups.					
KGK255	DESIGN_HISTORY_1750-1940_255				
GW_KGK	n a	Double	3 + 0	K2	10
Study of the appearance of styles in visual culture in relation to the changes in ideas and technology, 1750-1940. The origins and characteristics of industrial design. Influence of cultural codes and conventions on design styles. Description and contextualisation of design styles with reference to South Africa.					
KGK356	SOUTH_AFRICAN_ART:_THEMES_356				
GW_KGK	n a	Double	3 + 0	K4	15
This module focuses on the art historical concepts of representation and identity in contemporary South African art. Different aspects of representation and identity are investigated by means of the art of artists such as Leora Faber, Wilma Cruise, Robert Hodgins, Tommy Motswai and Minette Vari.					
KLD210	COSTUME_&_FASHION_HISTORY_210				
NAS_VBR	KLD220	Bilingual	3 + 0	S1	12
Costume and fashion history: Appearance characteristics of Western dress. Influencing factors. Evolution of styles from Ancient Egyptian up to and including the present.					
KLD222	FASHION_FORECASTING_222				
NAS_VBR	New + KLD411	Bilingual	3 + 0	S2	12
Basic principles of fashion; fashion as a product. Fashion production: Haute Couture and ready-to-wear clothes. Fashion forecasting and fashion analyses.					
KLD320	CLOTHING_320				
NAS_VBR	KLD364,365	Bilingual	2 + 0	S2	6
Clothing textile product utilisation in South Africa: A clothing consumer model; demographic and psycho-graphic image; knowledge and information needs; rights and support; communication and source of information. Clothing consumer behaviour of different groups: the family and family life-cycle and applicable groups; physical development; wardrobe planning.					
KLD321	SOCIAL_CULTURAL_ASPECTS_OF_CLOTHING_321				
NAS_VBR	KLD221, KLD320	Bilingual	5 + 0	S2	20
Social-Psychological and cultural aspects of clothing: Development of a framework; Symbolic-Interaction as a framework; the cognitive approach. Development of the self: self and self-concept: the body as indicator; personal values and norms. Appearance management and presentation of the self: role acceptance, identity, social control, roles in social cognition. Cultural context and dress: reflection of human adaptation; culture creations (technical, moral and ceremonial patterns); societies and clothing; beauty standards and beauty ideals. Social context, identity, change and clothing: the family, politics, religion, economy and the role of clothing as a reflection of social and personal identities; mentefacts and identities; social change and clothing.					
Prerequisite: [TKS220 GS]					

KLD410	CLOTHING_RETAIL_MANAGEMENT_410				
NAS_VBR	n a	Bilingual	3 + 0	S1	15
Clothing retail and marketing aspects: fashion marketing communication; clothing ranges; textiles, footwear and accessories merchandise characteristics; customer service; packing and packaging. Global interdependence: appreciation of cultural differences; respect for diversity; trade agreements and implications; understanding of import/export regulations. Prerequisite: [Fourth-year status]					
KLD412	CLOTHING_SMALL_BUSINESS_MGT412				
NAS_VBR	n a	Bilingual	3 + 0	S1	15
The small business enterprise: Introduction: clothing small business enterprises; types and locations. Marketing aspects: target market selection; product mix; pricing methods; distribution channels; marketing communication mix; financial aspects. Prerequisite: [Fourth-year status]					
KLD420	CLOTHING_MERCHANDISING_420				
NAS_VBR	KLD420, KLD411	Bilingual	3 + 0	S2	15
Clothing merchandise managerial aspects: planning, purchasing, control; search for suppliers; relationship with suppliers; management roles and responsibilities; technology; ethical and legal behaviour. Visual merchandising: basic components; tools and techniques; planning. Retail and wholesale: Introduction: factors influencing stock movement; redistribution of stock; merchandising processes. Planning stock movement; factors influencing buying strategies. Prerequisite: [Fourth-year status]					
KLD421	CLOTHING_SMALL_BUSINESS_MGT421				
NAS_VBR	n a	Bilingual	3 + 0	S2	15
Die kleinsakebedryf. Algemene bemarkingsfunksies: aankoopbeplanning; werksomskrywing en indiensneming; administratiewe sisteme: wetlike en etiese gedrag. Produkvoorstelling: Modeparades; beplanning; apparaat en tegnieke. Prerequisite: [Fourth-year status]					
KLR110	CLOTHING_PROD:SEWING_TECH_110				
NAS_VBR	n a	Bilingual	1 + 1	S1	9
A study of sewing appliances and equipment and the handling and use of different types of fabric. Functional and creative sewing techniques; grading and quality assurance.					
KLR120	CLOTHING_PRODUCT:PROCESSES_120				
NAS_VBR	n a	Bilingual	1 + 1	S2	9
Processes (collars, pockets, buttonholes, fasteners, belts, hems, etc.) Application: Unstructures, multi-sized garment or selected interior product. Prerequisite: [KLR110]					
KLR211	FLAT_PATTERN_DESIGN_211				
NAS_VBR	KLR320	Bilingual	2 + 2	S1	20
Flat pattern design. Production design (flat pattern design + CAD) Prerequisite: [KLR120]					
KLR221	PATTERN_USE_AND_GOOD_FIT_221				
NAS_VBR	KLR210	Bilingual	1 + 1	S2	10
Pattern use and good fitting. Wardrobe planning strategies. Prerequisite: [KLR210]					
KLR311	TAILORING_311				
NAS_VBR	KLR220	Bilingual	1 + 1	S1	11
Tailoring. Prerequisites: [KLR211] and [KLR221]					

KLR321	CLOTHING_PRODUCTION_321				
NAS_VBR	KLR310	Bilingual	1 + 1	S2	11
Small scale production: Industrial machines, production systems, quality assurance.					
Prerequisite: [KLR221]					
KLR411	CLOTHING_PRODUCTION_410				
NAS_VBR	KLR420	Bilingual	1 + 1	S1	14
Production: product analysis, planning and execution. Application clothing, textile and consumer knowledge by utilising a CAD-program for planning and assembling apparel.					
Prerequisites: [KLR221] and [KLR320]					
KLR420	CLOTHING_PRODUCTION_420				
NAS_VBR	KLR452,461,KLD455	Bilingual	1 + 1	S2	12
Production: product analysis, planning and execution. Application clothing, textile and consumer knowledge by utilising a CAD-programme for planning and assembling apparel.					
Prerequisites: [EST310] and [KLR310]					
KOB183	COMMUNICATION_MANAGEMENT_183				
EB_BEM	n a	Bilingual	3 + 0	K3	5
Information available at the Department					
KOB261	COMMUNICATION_MANAGEMENT_261				
EB_BEM	n a	Bilingual	3 + 0	K3	8
Information available at the Department					
KTP100	EXPERIENTIAL_TRAINING_100				
NAS_VBR	n a	Bilingual	0 + 1	J1	4
Compulsory practical training in the clothing industry during the first year, approved in consultation with the head of the department.					
KTP200	EXPERIENTIAL_TRAINING_200				
NAS_VBR	n a	Bilingual	0 + 1	J1	8
Compulsory practical training in the clothing industry during the first year, approved in consultation with the head of the department.					
KTP300	EXPERIENTIAL_TRAINING_300				
NAS_VBR	n a	Bilingual	0 + 1	J1	12
Compulsory practical training in the clothing industry during the third year, approved in consultation with the head of the department.					
KTP402	CLOTHING_TEXTILE_PROJECT_402				
NAS_VBR	n a	Bilingual	0 + 2	J1	18
Project in field of application: planning and execution.					
KVK420	SMALL_STOCK_SCIENCE_420				
NAS_VKU	n a	Afrikaans	2 + 0.5	S2	12
Small stock management, shearing organisation, sheds and equipment, pens, dipping, drinking and feeding facilities. Preparation and marketing of hides, mohair and karakul. Lambing seasons and herd management. Management programmes for the production of wool, meat, karakul pelt and mohair according to the particular ecological region and for conditions of drought. Herd health programmes.					
Prerequisites: [LEK210] and [RPL320] and [VGE301] and [VKU220] and [VNE361]					
LBC320	INDUSTRIAL_PRINCIPLES_320				
ING_LBI	LBC420	Afrikaans	2 + 0	S2	8
Laws. Mechanization, planning and management. Engineering models for agricultural production. Mathematical modelling of implement systems.					

LBP420	IRRIGATION_420				
ING_LBI	n a	Afrikaans	3 + 0.5	S2	15
Water and soil suitable for irrigation. Evaluation of irrigation systems and practices. Theory and design procedure for flood, sprinkler, drip and micro irrigation systems. Computer software for irrigation design.					
Prerequisite: [LHL311/LHL401]					
LBU260	AGROCLIMATOLOGY_260				
NAS_PGW	LBU260, LKM262	English	2 + 0.5	S2	12
Climate in Southern Africa. Irradiation and energy balance. Hydrological cycle with special reference to downpour and evaporation from vegetative surfaces. Wind-breaks and frost control.					
Influence of climate on farming systems. Instrumentation and measurement of downpour, evaporation, radiation, temperature, humidity and wind. This module may only be taken by students enrolled for a BSc(Agric) program or a BInstAgrarprogram.					
LBU410	LAND_USE_PLANNING_410				
NAS_PGW	PGW460, GKD430, LBU481	Bilingual	3 + 1	S1	14
Land suitability evaluation: background, principles and applications; aspects concerned, methods and resources (maps, reports, other resources).; Land suitability evaluation: background, principles and applications; steps of the planning process, critical aspects; application and examples. Land use planning focuses on irrigation-, dry land- and intensive agriculture: principles and critical aspects.					
Prerequisite: [GKD250]					
LBU420	PROJECT:LAND_USE_PLANNING_420				
NAS_PGW	n a	Bilingual	3 + 1	S2	14
Practical drafting of a land-use plan for a selected field of study; defending of the proposed plan in an oral examination before a panel of examiners.					
LEK220	AGRICULTURAL_ECONOMICS_220				
NAS_LEK	n a	Double	3 + 0	S2	12
The agribusiness system; the unique characteristics of agricultural products; marketing functions and costs; market structure; historical evolution of agricultural marketing in South Africa. Marketing environment and price analysis in agriculture: Introduction to supply and demand analysis. Marketing plan and strategies for agricultural commodities; market analysis; product management; distribution channels for agricultural commodities, the agricultural supply chain, the agricultural futures market.					
Prerequisites: [LEK251] and [LEK252 or EKN113 and/or EKN120]					
LEK251	INTRO._TO_FIN MAN IN AGRIC 251				
NAS_LEK	n a	Double	3 + 0	K1	6
Introduction to financial management in agriculture: Farm management and agricultural finance, farm management information; analysis and interpretation of farm financial statements; risk and farm planning. Budgets: partial, break-even, enterprise, total, cash flow and capital budgets. Time value of money.					
LEK252	INTR.TO_AGRIC_PROD_ECON_252				
NAS_LEK	n a	Double	3 + 0	K2	6
Introduction to production and resource use: the agricultural production function, total physical product curve, marginal physical product curve, average physical product curve, stages of production. Assessing short-term business costs; Economics of short-term decisions. Economics of input substitution: Least-cost use of inputs for a given output, short-term least-cost input use, effects of input price changes. Least-cost input use for a given budget. Economics of product substitution. Product combinations for maximum profit. Economics of crop and animal production.					
Prerequisite: [LEK251]					

LEK310	AGRICULTURAL_ECONOMICS_310					
NAS_LEK	n a	English	3 + 0	S1	12	
<p>Historical evolution of South African agricultural policy. Agriculture and the state: reasons for government intervention.</p> <p>Theoretical aspects of agricultural policy. Introduction to agricultural policy analysis. Welfare principles, pareto optimality.</p> <p>Macro-economic policy and the agricultural sector. International agricultural trade.</p> <p>Prerequisites: [LEK251 or] and [LEK252 or]</p>						
LEK320	AGRICULTURAL_ECONOMICS_320					
NAS_LEK	n a	Double	3 + 2	S2	18	
<p>The modern food and agribusiness system: The financing decision: capital acquisition, different capital sources, capital structures.</p> <p>The investment decision and working capital management. Strategic marketing. Operational management and human resources management.</p> <p>Prerequisite/s: [LEK220] and [LEK251] and [LEK252]</p>						
LEK415	AGRICULTURAL_DERIVATIVES_415					
NAS_LEK	n a	Bilingual	3 + 1	S1	18	
<p>Derivative instruments in agriculture: To prepare students for taking the SAFEX Agricultural Markets Division brokerage exam. Giving an in-depth knowledge on the importance of hedging.</p> <p>Giving an in-depth knowledge on designing and implementation of low/zero risk hedging strategies. Introduction to the mathematics of portfolio management and mathematical modeling of derivatives.</p> <p>Working knowledge of the mathematical relationships in the management of a hedged portfolio. Working knowledge on the applicable software for managing derivative portfolios.</p> <p>Introduction into the management of option portfolios.</p> <p>To expand the thinking on the uses of derivatives, by also dealing with the hedging of diesel cost, interest rates and weather events.</p> <p>Prerequisites: [EKN110] and [LEK220] and [WTW134]</p>						
LEK421	AGRICULTURAL_ECONOMICS_421					
NAS_LEK	n a	English	3 + 2	S2	24	
<p>Price and production function analysis; Input - output, input - input and product - product relationships; profit maximization; the production process through time, economies of size; risk and risk management; linear programming.</p> <p>Prerequisites: [LEK451] and [STK210] and [STK281]</p>						
LEK424	RESOURCE_ECONOMICS_424					
NAS_LEK	n a	English	3 + 0	K4	10	
<p>Definition and status of natural resources in Southern Africa; land, water, forests, minerals and environment. Introduction to resources and location.</p> <p>Optimal management of natural resources, Resource valuation. Cost Benefit analysis. Environmental policy.</p> <p>Prerequisites: [LEK251] and [LEK252]</p>						

LEK451	AGRI.DEMAND_ & _SUPP.ANALYSIS451				
NAS_LEK	n a	Double	3 + 2	K1	12
<p>This module will focus on the demand and supply shifters as well as the elasticities, flexibilities, and impact multipliers. After providing an appropriate background in the theoretical concepts of demand and supply these basics will be applied in the generation of econometric/ simulation models.</p> <p>Practical experience in the formulation of these models will be attained from practical sessions. Student will submit a project in which he/she must analyse the demand or supply patterns of a commodity of his/her choice by generating an econometric model.</p> <p>Prerequisite/s: [LEK252] and [LEK220] and [STK281]</p>					
LEK452	COMMODITY_PRICE_ANALYSIS_452				
NAS_LEK	n a	Double	3 + 2	K2	12
<p>This module will focus primarily on price determination under different market structures, which will be followed by practical sessions on measuring market structures in various ways. This will include the calculation of market concentration.</p> <p>Some time will also be spent on measuring price changes by using indexes, and especially seasonal indexing. All of this will be supported by the relevant practical sessions. The relevance of changes to the main macro economic indicators will be discussed through out this course.</p> <p>Prerequisite/s: [LEK252] and [LEK220] and [STK281]</p>					
LIR410	AGRICULTURAL_ENGINEERING_410				
ING_ING	n a	English	2 + 2	S1	8
<p>Surveying, water sources, hydrology, determination of runoff, channel flow, storm water drainage, terracing, rainfall erosion losses, sediment yield in runoff, buttress and arch dams, circular storage dams.</p>					
LIR421	AGRICULTURAL_ENGINEERING_421				
ING_ING	n a	Afrikaans	3 + 2	S2	8
<p>Soil conservation, mechanization management, farm machinery, hydraulics and pumps, applied electricity.</p>					
LIR422	AGRICULTURAL_ENGINEERING_422				
ING_ING	n a	English	3 + 1	S2	8
<p>Farm power, agricultural production machinery, mechanization management, tractor and implement costing, hitch systems.</p>					
LKM450	ENVIRONMENTAL_BIOPHYSICS_450				
NAS_PGW	LKM451,452	Bilingual	2 + 0.5	S1	16
<p>Environmental variables. Quantitative description and measurement of atmospheric environmental variables and water in organisms.</p> <p>Mass and energy fluxes. Quantitative description of energy fluxes in organisms' environments. Energy balances of animals and plant communities will be derived.</p> <p>Prerequisite: [WTW134]</p>					
LI420	RURAL_ENGINEERING_420				
ING_LBI	n a	Afrikaans	3 + 0	S2	9
<p>The planning, utilization and management of natural resources in rural areas on a sustainable basis, planning and management of different irrigation systems, surface and subsurface drainage, soil and water conservation and structures, waste control and environmental planning.</p>					
LLS410	AGRICULTURAL_STRUCTURES_410				
ING_LBI	n a	Afrikaans	3 + 0.5	S1	15
<p>Building construction. Functional requirements for and design of farm related structures; housing systems and handling facilities for different species of animals.</p>					

LNT400	LEARNING_THEORIES_400				
OPV_OPV	n a	Bilingual	+	S1	12
<p>Learning Theories</p> <p>This study focuses on different theories of learning. Students will be challenged to explore most recent research on learning style preferences and motivation, whole-brain learning and multiple intelligences and possible causes of poor and underachievement to enable them to cater for the diversity of learners.</p> <p>Concepts, elements and skills of critical and creative thinking will be dealt with to create challenging learning environments (Web-based).</p>					
LPR311	PROCESSING_311				
ING_LBI	n a	Bilingual	3 + 0	S1	8
<p>Food processing engineering. Mass and Energy Balance. Handling of fluids: theory and equipment. Centrifugation and Filtration. Storage and handling of solids. Basic instrumentation. Construction materials and their care. Cleaning-In-Position. Practical work: Viewing and demonstration of appropriate equipment, factory visits.</p>					
LPR312	PROCESSING_312				
ING_LBI	n a	Bilingual	2 + 0.5	S1	8
<p>Food processing equipment, heat transfer : convection, conduction and radiation. Heat exchanges. Pasteurisation, sterilisation and evaporation. Ovens and blast furnaces. Generation and distribution of steam. Mass transfer: distillation, extraction, ion exchange, membrane techniques, drying. Instrumentation and drawings. Practical work: Viewing and demonstration of appropriate equipment, factory visits.</p>					
MBY161	INTRODUCTION_TO_MICROBIOLO.161				
NAS_MBY	n a	Bilingual	2 + 0.5	S2	8
<p>General anatomy and morphology of bacteria, viruses and fungi. Basic nutritional requirements of micro-organisms and the effect of environmental factors on microbial growth. Micro-organisms as essential components of ecospheres: plant, water and soil ecosystems. Food decay, food poisoning and preservation of food by micro-organisms. Basic principles involved in disinfection, sterilization and control of microbes; techniques for microbial repression: sterilization by using heat, radiation, filtration, chemical; decimalation of numbers.</p>					
MBY251	GROWTH_DIVERS.&CONTROL/BAC.251				
NAS_MBY	n a	Bilingual	2 + 2	S1	12
<p>Envelope of gram positive and gram negative rods. Growth of bacteria, replication of the genome, regulation of septum formation, diversity of cell division mechanisms across the prokaryotes, bacterial survival structures. Control of bacterial growth; classes of antibacterial agents, cellular targets for growth inhibition and killing of cells. Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Structure and function versus phylogenetics. Biodiversity; bacteria occurring in the natural environment (soil, water and air), associated with humans, animals, plants, and those of importance in foods and in the water industry.</p>					
Prerequisite: [MBY161 GS]					
MBY261	GROWTH_ACT.&_CONTROL/FUNGI_261				
NAS_MBY	n a	Bilingual	2 + 1	S2	12
<p>Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Mechanisms, quantification, regulation of and chemical and physiological requirements for growth, nutrient acquisition, primary metabolism; secondary metabolism; regulation of metabolism; mating and meiosis; spore development; spore dormancy, dispersal and germination. Classes of antifungal agents, cellular targets for inhibition and killing of cells. Fungi as saprobes in soil, air, plant, aquatic and marine ecosystems; role of fungi as decomposers and in the deterioration of materials; fungi as predators and parasites; mycoses, mycetisms and mycotoxicoeses; fungi as symbionts of plants, insects and animals. Applications of fungi in biotechnology.</p>					
Prerequisite: [MBY161]					

MBY351	STRUCT.& DIVERS.OF VIRUSES_351					
NAS_MBY	n a	Bilingual	2 + 1	S1	18	
Introduction to the viruses as a unique kingdom inclusive of their different hosts, especially bacteria, animals and plants; RNA and DNA viruses; viroids, tumour viruses and oncogenes, mechanisms of replication, transcription and protein synthesis; effect on hosts; viral immunology; evolution of viruses.						
Prerequisites: [BCM251] and [CMY127] and [MBY161]						
MBY352	ENVIRONMENTAL MICROBIOLOGY_352					
NAS_MBY	n a	Bilingual	2 + 1	S1	18	
Basic principals in microbial ecology; microbial evolution, microbial interactions, ecosystems and communities, gene transfer, abiotic factors and extreme environments, microbial habitats which include air, water, soil, man, insects, animals and plants.						
The role of micro-organisms in biogeochemical cycling and microbial food webs. Potential exploitation of extreme environments, organisation of native populations in extreme environments, ecological aspects of deterioration control, soil, waste and water management.						
Prerequisite: [MBY161]						
MBY353	VERTIBRATE-MICROBE_INTERAC.353					
NAS_MBY	n a	Bilingual	2 + 1	S1	18	
Normal interactions between humans or animals and microorganisms; Host-pathogen interactions; Principles of pathogenesis;						
Important infectious diseases of man and animals; Principles of diagnostics; Introduction to epidemiology.						
MBY354	VETERINARY_VIROLOGY_354					
NAS_MBY	n a	Bilingual	2 + 0	S1	9	
Introduction to viruses important in veterinary science; mechanisms of virus replication, transcription and protein synthesis; effect on hosts; viral immunology; epidemiology and evolution of viruses; prions; diagnoses and control of viral diseases and viral vaccines.						
CAPITA SELECTION ONLY FOR BSc: VETERINARY PROGRAMME.						
Prerequisites: [BCM251] and [CMY127] and [MBY161]						
MBY361	INDUSTRIAL MICROBIOLOGY_361					
NAS_MBY	n a	Bilingual	2 + 1	S2	18	
Underlying principles: the catalyst of the reaction is a self-replicating cell, energy transfer, mass transfer, growth mode, reactor design and operation, growth kinetics. Product development: economics of biotechnology, market needs, scope and market analysis, production and marketing, intellectual property rights, bioprospecting, microbial diversity, classical isolation and screening.						
Strain improvement: Metabolic flux and metabolosome analysis, metabolic and pathway engineering, protein engineering; directed mutagenesis and gene shuffling. Production of amino acids, antibiotics, enzymes, microbial polymers, alcohols and organic acids.						
Prerequisites: [BCM251] and [MBY251]						
MBY362	FOOD MICROBIOLOGY_362					
NAS_MBY	n a	Bilingual	2 + 1	S2	18	
Microbial quality and spoilage of food: meat , poultry, seafood; dairy products; fruits, vegetables and grains. Microbial food safety: food borne pathogens; bacteria, viruses, parasites; toxins, mycotoxins; protective measures; preservation; HACCP. Food fermentations: Principles and organisms involved; examples: dairy, vegetables, traditional products, beer and wine. Microbial food analysis: Conventional approaches, rapid methods.						
Prerequisite: [MBY251]						

MBY363	MOLEC. BIOL.OF_PROKARYOTES_363				
NAS_MBY	n a	Bilingual	2 + 1	S2	18
Modification of genetic material: DNA damage and damage repair, photoreactivation, SOS response. Mobile elements, insertion sequences, transposons. Control of operons and regulons, negative control, positive control, mixed control, regulation by upstream DNA structure, sigma factors, the role of recombination in expression, regulation of translation, DNA-protein interactions. Posttranslational control and modifications of proteins: allosteric control, covalent modifications, posttranslational control by compartmentalisation. Global regulatory networks, carbon catabolyte repression, alarmones, signal transduction, chemotaxis, regulation of fermentation and respiration, stress responses, adaptation to extreme environments. Folding of proteins, protein export, repair of damaged proteins.					
Prerequisites: [BCM251] and [CMY127] and [MBY161]					
MBY364	GENE.MANIPULATION/MICROBES.364				
NAS_MBY	n a	Bilingual	2 + 1	S2	18
Isolation of clonable DNA (genomic libraries, cDNA synthesis) cloning vectors (plasmids, bacteriophages, cosmids) plasmid incompatibility and control of copy number. Ligation of DNA fragments, modification of DNA end and different ligation strategies. Direct and indirect methods for the identification of recombinant organisms. Characterization (polymerase chain reaction, nucleic acid sequencing) and mutagenesis of cloned DNA fragments. Gene expression in Gram negative (E.coli) Gram positive (B.subtilis) and yeast cells (S.cerevisea). Use of Agrobacterium and baculoviruses for gene expression in plant and insect cells respectively. Applications in protein engineering, diagnostics and synthesis of useful products. Prerequisites: [BCM251] and [CMY127] and [MBY161]					
MGW112	PEOPLE_&_THEIR_ENVIRONMENT_112				
MED_MGW	n a	Bilingual	4 + 0	S1	6
This module comprises basic psychology and sociology concepts relevant to Medicine. Basic psychiatric concepts are also taught. Students will not be credited for more than one of the following modules for their degree: MGW112, SLK154.					
MIT113	ENGINEERING_DRAWING_113				
ING_ING	n a	Bilingual	3 + 0	S1	16
Free-hand sketch work, covering: perspective, isometric and orthographic drawings. Drawing conventions, graphic techniques and assembly drawings. Evaluation of drawings and error detection. True lengths, planes, projections and intersection curves. Practical applications of these techniques. Schematic representation in chemical, electrical, electronic, mechanical and civil engineering systems. Introduction to computer aided drawing of components including: crosshatching, dimensioning and detailing. Machine elements including v-belt, gears, shafts, bearings and lubrication, couplings, brakes, cams and eccentrics.					
MLB111	MOLECULAR_&_CELL_BIOLOGY_111				
NAS_BOT	MLB111	Double	4 + 1	S1	16
Introductory study of the ultrastructure, function and composition of representative cells and cell components. General principles of cell metabolism, molecular genetics, cell growth, cell division and differentiation.					
MTL181	MEDICAL_TERMINOLOGY_181				
GW_MTL	n a	Double	3 + 0	S1	6
The module entails the acquisition of a basic medical orientated vocabulary compiled from Latin and Greek stem forms combined with prefixes and suffixes derived from these languages. The manner in which the meanings of medical terms can be determined by analyzing the terms into their recognizable meaningful constituent parts is taught and exercised. The functional application of medical terms in context as practical outcome of terminological application is continually attended to.					
MTT210	FURNITURE&_TEXTILE_HISTORY_210				
NAS_VBR	n a	Bilingual	3 + 0	S1	12
Influences of ideologies, social institutions and technology on the development of Western and other material cultures, especially on furniture and textiles. Style periods from Egyptian to the French Revolution.					

MTT220	FURNITURE&_TEXTILE_HISTORY_220				
NAS_VBR	n a	Bilingual	3 + 0	S2	12
Influences of ideologies, social institutions and technology on the development of Western and other material cultures, especially on furniture and textiles. Style periods from early nineteenth century to the present.					
Prerequisite: [MTT210 GS]					
OBG110	PRINCIPLES_OF_DESIGN_110				
NAS_VBR	n a	Bilingual	2 + 1	S1	10
Introduction to basic concepts in design (Design elements and principles) and practical application in interior planning and design, foods, clothing. Theories of colour.					
OBS110	BUSINESS_MANAGEMENT_110				
EB_OBS	n a	Bilingual	3 + 0	S1	10
Introduction to Business Management as a science, the environment in which the enterprise operates, the field of business, the mission and goals of an enterprise, management and entrepreneurship.					
The choice of a form of enterprise, the choice of products and/or services, profit and cost planning for different sizes of operating units, the choice of location, the nature of production processes and the layout of the plant or operating unit.					
OBS120	BUSINESS_MANAGEMENT_120				
EB_OBS	n a	Bilingual	3 + 0	S2	10
Introduction to and overview of general management, especially regarding the five management tasks, strategic management, contemporary developments and management issues, financial management, marketing, public relations. (Note: For marketing students, marketing is replaced by financial management, and public relations by small business management.) Introduction to and overview of the value chain model, management of the inputs, management of the purchasing function, management of the transformation process with specific reference to production and operations management, human resources management, and information management. (Note: For information management students, information management is replaced by small business management.)					
OBS156	BUSINESS_MANAGEMENT_156				
EB_OBS	n a	Bilingual	3 + 0	K2	5
A brief introduction to business management which includes a description of a business enterprise and its environments and stake holders; the business person's task in establishing a business, and the obtaining of finance; the general management principles which are used to manage the whole enterprise and its different functions in order to ensure competitiveness.					
OBS210	BUSINESS_MANAGEMENT_210				
EB_OBS	n a	Bilingual	3 + 0	S1	16
The role of logistics in an enterprise, definition and scope of customer service, electronic and other logistics information systems, inventory management, materials management with special reference to Japanese systems, management of the supply chain. Methods of transport and transport costs, types and costs of warehousing, electronic aids in materials handling, cost and price determination of purchases, organising for logistics management, methods for improving logistics performance.					
OBS220	BUSINESS_MANAGEMENT_220				
EB_OBS	n a	Bilingual	3 + 0	S2	16
Project management: Introduction. Project management concepts, needs identification, the project manager and the project team, types of project organisations, project communication and documentation. Planning and control: planning, scheduling and schedule control of projects, resource considerations and allocations, cost planning and performance evaluation.					

OBS310	BUSINESS_MANAGEMENT_310				
EB_OBS	n a	Bilingual	4 + 0	S1	20
<p>The environment in which human resource management takes place, job analysis, strategic human resource planning, equal employment opportunities, planning and management of training, development and careers, functioning in a global environment.</p> <p>The nature of negotiation preparation for negotiation, negotiating for purposes of climate, creation, persuasive communication, handling conflict and aggression, specialised negotiation, and collective bargaining in the South African context.</p>					
OBS325	BUSINESS_MANAGEMENT_325				
EB_OBS	n a	Bilingual	3 + 0	S2	20
See the Department					
Prerequisite: [OBS110 or]					
OKW413	WEED_SCIENCE_413				
NAS_PGW	OKW451,452	Bilingual	2 + 0.5	S1	14
<p>Identification of important weeds of crops, gardens and recreational areas. Identification of alien invasive and indigenous encroaching species. Impacts of weeds on desirable vegetation.</p> <p>Interference between crop and weed species through allelopathy and competition phenomena. Role of weeds in plant-biodiversity and crop production potential.</p> <p>Weeds of agronomic and horticultural crops. Weed biology and ecology. Mechanical, cultural, biological and chemical weed management practices.</p> <p>Integrated weed management. Herbicide formulations and application techniques.</p> <p>Modes of action of herbicides, and their behaviour and fate in the environment.</p>					
Prerequisite: [PPK251]					
OPI250	EXPER._TRAINING_IN_INDUST._250				
NAS_VBR	n a	Bilingual	0 + 1	J1	4
Compulsory practical training in the food industry during the second year, approved in consultation with the Head of the Department.					
OPI260	EXPER._TRAINING_IN_INDUST._260				
NAS_VBR	n a	Bilingual	0 + 1	J1	4
Compulsory practical training in the food industry during the second year, approved in consultation with the Head of the Department.					
OPI280	EXPER._TRAINING_IN_INDUST._280				
NAS_VBR	n a	Bilingual	0 + 1	J1	4
Compulsory practical training in the hospitality or retail industry during the second year, approved in consultation with the Head of the Department.					
OPI380	EXPER._TRAINING_IN_INDUST._380				
NAS_VBR	n a	Bilingual	0 + 1	J1	4
Compulsory practical training in the hospitality or retail industry during the third year, approved in consultation with the Head of the Department.					
OPI450	EXPER._TRAINING_IN_INDUST._450				
NAS_VBR	n a	Bilingual	0 + 1	J1	6
Compulsory practical training in the food industry during the fourth year, approved in consultation with the Head of the Department.					

OPI480	EXPER._TRAINING_IN_INDUST._480				
NAS_VBR	n a	Bilingual	0 + 1	J1	6
Compulsory practical training in the hospitality or retail industry during the fourth year, approved in consultation with the Head of the Department.					
PEL400	PROFESSIONAL_ETHICS_&_LAW_400				
OPV_OPV	n a	Bilingual	+	S1	6
Professional Ethics and Law This module explores and reflects on human rights, environmental and democratic issues impacting on own practices. Critical analysis of education systems (education policy) and its impact on the micro level (in the classroom) in education. Knowledge of the elements of effective school management, systems of discipline and defining activities that promote an awareness of citizenship, human rights and the principles and values of the Constitution. Interpret educational legislation dealing with HIV/AIDS, drugs and violence. Identifying and internalising ethical professional educator behaviour.					
PGB480	PROJECT:_HOSPITALITY_MANAG.480				
NAS_VBR	n a	Bilingual	4 + 0	J1	20
Research methodology. Planning, executing and reporting a research project in Hospitality Management.					
PGW350	SOIL_WATER_RELA.&_IRRIGAT._350				
NAS_PGW	PGW351,352	Bilingual	2 + 0.5	S1	16
Quantitative description and measurement of soil water content and potential as well as saturated and unsaturated hydraulic conductivity. Modelling water flow in soil (Darcy's law, Richards's equation). Infiltration, redistribution, evaporation, runoff and percolation. Irrigation in South Africa. Modelling and managing the soil water balance. Plant water consumption and the Soil-Plant-Atmosphere Continuum. Irrigation scheduling (soil, plant and atmosphere approaches). Managing poor quality water. Irrigation systems. Module includes a field trip to an irrigation scheme.					
Prerequisite: [GKD250]					
PGW361	EXPERIMENTAL_DESIGN_&_ANAL.361				
NAS_PGW	PGW421	Bilingual	2 + 0.5	S2	14
Basic experimental designs. Measurement and control over experimental error. Factorial experiments and interactions. Analysis of variance (ANOVA) and data interpretation.					
Prerequisite: [BME120]					
PGW400	SEMINAR_400				
NAS_PGW	PGW400	Bilingual	3 + 0	J1	20
Basic principles of the scientific process. Literature accessing and article assessment. Manuscript preparation and presentation of seminars. Basic instruction on the use of visual aids, etc. for effective oral presentations.					
PGW401	SCIENTIFIC_COMMUNICATION_401				
NAS_PGW	PGW401	Bilingual	1 + 0	J1	16
Basic principles of the scientific process. Literature accessing and article assessment. Manuscript preparation and presentation of seminars. Basic instruction on the use of visual aids, etc. for effective oral presentations.					
PHY101	GENERAL_PHYSICS_101				
NAS_PHY	n a	Double	4 + 1	J1	16
This is an extended version of PHY131. Units, vectors, one-dimensional kinematics, dynamics, work, equilibrium, sound, fluids, heat, electrical potential and capacitance, dc and ac currents, optics, modern physics, radioactivity.					
Prerequisite: [Par 1.2]					

PHY102	MECHANICS_AND_ELECTRICITY_102				
NAS_PHY	n a	Double	4 + 1	J1	16
<p>This module follows after PHY101 and together they are wquivalent to the PHY171 module. Kinematics of a point, relativistic kinematics, dynamics of particles, rotation and dynamics of rigid bodies, simple harmonic motion, electrostatics, electrodynamics, elementary alternating current.</p> <p>Prerequisite: [PHY101]</p>					
PHY131	GENERAL_PHYSICS_131				
NAS_PHY	n a	Double	4 + 1	S1	16
<p>This course is intended for students who require only a single semester of physics. Students who have passed the PHY131 course but would prefer to continue with the PHY171 year course, will have to do an additional course.</p> <p>This change can only be made after approval by the Head of the Department. Units, vectors, one dimensional kinematics, dynamics, work, equilibrium, sound, liquids, heat, electric potential and capacitance, direct current and alternating current, optics, modern physics, radio activity.</p> <p>Prerequisite: [Par 1.2]</p>					
PHY171	FIRST COURSE_IN_PHYSICS_171				
NAS_PHY	n a	Double	4 + 1	J1	32
<p>SI-units. Significant figures. Waves: sound, intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, dispersion, mirrors, thin lenses, instruments. Physical optics: Young-interference, coherence, thin layers, diffraction, gratings, polarisation.</p> <p>Hydrostatics and dynamics: density, pressure, Archimedes' law, continuity, Bernoulli. Heat: temperature and scales, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gases (ideal gas law), gravitation, spring, power. Kinetic energy. Potential energy: conservative forces, gravitation, spring.</p> <p>Conservation of mechanical energy and energy. Conservation of momentum. Impulse and collisions. System of particles: centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity. Simple harmonic motion and pendulums. Coulomb's law. Electric field: dipole, Gauss' law. Potential. Capacitance.</p> <p>Electric currents: resistance, resistivity, Ohm's law, energy, power, emiconductors, superconductors, emf, RC-circuits. Magnetism: Hall effect, Biot-Savart. Faraday's and Lenz's laws. LR-circuits. Alternating current: RLC-circuits, power, transformers.</p> <p>Modern physics: Theory of special relativity, wave/particle nature, photoelectric effect, matter waves, quantum theory, infinite potential well, hydrogen atom and spectra, nuclear physics, Rutherford model, nucleons.</p> <p>Prerequisite: [Par 1.2]</p>					
PHY253	SIMULAT_USING_MATHEMATICA_253				
NAS_PHY	n a	English	0 + 1	K1	6
<p>Introduction to programming in "Mathematica": Concept of an algorithm and the basic logic of a computer programme. Basics of "Mathematica" language and syntax.</p> <p>Symbolic manipulations with "Mathematica". Graphics with "Mathematica". "Mathematica" as a tool for numerical computations.Applications: Selected illustrative examples from Mathematics, Physics, Chemistry, Biology and Economics.</p> <p>Prerequisites: [PHY171 or PHY101] and [PHY102] and [WTW211 #] and [WTW218 #]</p>					

PHY254	GENERAL_PHYSICS_253				
NAS_PHY	n a	English	4 + 2	S1	24
Vibrating systems & Waves (12 lectures) Simple harmonic motion (SHM). Superposition (different frequencies, equal frequencies). Perpendicular vibrations (Lissajous figures). Damped SHM. Forced oscillations. Resonance. Q-value. Fourier analysis. Transverse wave motion. Plane wave solution using method of separation of variables. Reflection and transmission at a boundary. Normal & eigenmodes. Wave groups. Group velocity. Modern Physics (30 lectures) Special Relativity: Galilean & Lorentz transformations. Postulates. Momentum and energy. 4 vectors & tensors. General relativity. Quantum physics. Failure of classical physics. Bohr model. Particle-Wave duality. Schrödinger equations. Piece-wise constant potentials. Tunneling. Hydrogen atom. Angular momentum. Spin. X-rays. Laser. Nuclear physics: Fission. Fusion. Radioactivity. Heat & Thermodynamics (14 lectures) Heat. First Law. Kinetic theory of gases. Mean free path. Ideal, Clausius, Van der Waals and virial gases. Entropy. Second Law. Engines & refrigerators. Third Law. Thermodynamic potentials: Enthalpy Helmholtz & Gibbs Free energies, Chemical potential. Legendre transformations (Maxwell relations). Phase equilibrium. Gibbs phase rule Prerequisites: [PHY171 or PHY101] and [PHY102] and [PHY253] and [WTW211 #] and [WTW218 #]					
PHY263	GENERAL_PHYSICS_263				
NAS_PHY	PHY261, 262	English	4 + 2	S2	24
Classical Mechanics (28 lectures) Mechanics of deformable matter: Fluids. Pascal's Law. Archimedes' Law. Bernoulli equation. Elasticity. Bulk & Young's modulus. Shear. Fundamental concepts: Space & time. Newton's Laws. One-dimensional Motion. Conservative forces. Conservation of energy. Motion near equilibrium. Collision problems Energy & Angular Momentum: Energy. Conservative forces. Torque, angular momentum. Central forces. Hamilton's principle & Lagrange's equations. Central Conservative Forces: Conservation Laws. Inverse square force. Orbits equation. Scattering cross sections. Impact parameter. Rotating Frames: Angular velocity. Rate of change of a vector. Apparent gravity. Coriolis force. Precession of elliptic orbit around centre of force. Two Body problem: Centre-of-mass & relative coordinates - also Lagrange equations. The centre-of-mass frame (P, J and T). Many Body Systems: Momentum & centre of mass (CM) motion. Angular momentum & moments of internal forces. Kinetic & Potential Energy. Lagrange equations in CM & relative coordinates. Physical Optics (14 lectures) Electromagnetic Theory: Maxwell equations - simplified form for uniform transverse fields. Wave equation & plane-wave solutions. Electromagnetic character of light. Spherical waves. Waves at an interface: Fresnel equations. Evanescent waves. Conducting media. Complex index or refraction. Polarization: Law of Malus. Jones vectors & matrices. Crystal Optics: Dielectric tensor. Index ellipsoid & surfaces. Characteristic waves. Uniaxial crystals. Interference: Superposition of vector fields, wave-front splitting, amplitude splitting. Thin-film stacks - matrix methods. Diffraction: Huygens principle. Fraunhofer approximation. Single & double slit. Diffraction grating. Physics of Materials (14 lectures) Classification of materials. Atomic bonding. Crystallography. Point defects and diffusion. Line defects. Material strength. Phase diagrams. Ceramics. Polymers. Composites. Fracture. Electrical properties. Semiconductors. Surface physics. Smart materials. Nanotechnology. Prerequisites: [PHY253 GS] and [PHY254 GS] and [WTW211 GS] and [WTW218 GS] and [WTW220 #] and [WTW221 #]					
PHY351	QUANTUM_MECH_ & MODELLING_351				
NAS_PHY	n a	English	4 + 2	K1	18
Quantum mechanics: Wave function, probability interpretation, expectation values, Schrödinger equation, postulates of quantum mechanics, matrix formalism, momentum representation, applications. Modelling: numerical solutions and simulations. Prerequisites: [PHY251 #] and [PHY252 #] and [PHY261 GS] and [PHY262 GS] and [WTW220 GS] and [WTW221 GS]					

PHY352	SOLID_STATE_PHYS.&_OPTICS_352				
NAS_PHY	n a	English	4 + 2	K2	18
Solid State Physics: crystallography, diffraction, lattice vibrations, free electrons in metal, band theory, superconductivity. Optics: Fourier optics. Prerequisites: [PHY251 #] and [PHY252 #] and [PHY261 GS] and [PHY262 GS] and [PHY351 #] and [WTW220 GS] and [WTW221 GS]					
PHY353	PHYSICS_PROJECT_353				
NAS_PHY	n a	English	0 + 3	S1	12
A student is required to complete a project under guidance of the lecturer. The nature of the project is determined jointly by the student, lecturer and the Head of Department. Requirement: Admission only with the approval of the Head of Department and lecturer involved. Cannot be used as substitute for other Physics 300 modules to obtain admission to the BSc(Hons) in Physics. Prerequisite: [TDH]					
PHY361	ELECTROMAGNET &_amp; ELECTRONIC_361				
NAS_PHY	n a	English	4 + 2	K3	18
Electromagnetism: Coulomb's law, electric field, Gauss' law, capacitance, magnetism, magnetic induction, inductance, alternating currents, impedance, Maxwell's equations, transmission lines. Electronics: Properties of semiconductor materials, diodes, transistors, transistor amplifiers, operational amplifiers, logic circuitry. Prerequisites: [PHY251] and [PHY252]					
PHY362	STATISTICAL_PHYSICS_362				
NAS_PHY	n a	English	4 + 2	K4	18
Laws of thermodynamics, thermodynamic potentials, classical and quantum statistics, ensemble theory, black body radiation, Bose-Einstein condensation, applications. Prerequisites: [PHY251] and [PHY252] and [PHY261 #] and [PHY262 #] and [PHY351 GS] and [PHY352 GS] and [PHY361 GS] and [WTW220 #] and [WTW221 #]					
PHY363	PHYSICS_PROJECT_363				
NAS_PHY	n a	English	0 + 3	S2	12
A student is required to complete a project under guidance of the lecturer. The nature of the project is determined jointly by the student, lecturer and the Head of Department. Requirement: Admission only with the approval of the Head of Department and lecturer. Cannot be used as substitute for other Physics 300 courses to obtain admission to the BSc(Hons) in Physics. Prerequisite: [TDH]					
PLG251	INTRODUCT._CROP_PROTECTION_251				
NAS_MBY	PLG220	Bilingual	2 + 1	S1	12
Development and importance of crop protection. Basic principles in crop protection i.e. epidemic development of disease and insect pest populations, ecology of plant diseases and abiotic factors that affect plant health i.e. environmental pollution and pesticides, nutrient deficiencies and extreme environmental conditions. Ecological aspects of plant diseases, pest outbreaks and weed invasion. Important agricultural pests and weeds. Life cycles of typical disease causing organisms. Basic principles of integrated pest and disease management.					
PLG261	EPIDEMIOLOGY_261				
NAS_MBY	PLG412	Bilingual	2 + 1	S2	8
Interdisciplinary epidemiological principles. Concepts, definitions as well as mathematical models of epidemics. Classical epidemiological case studies selected from the fields of animal, human and plant diseases are discussed.					
PLG351	GENERAL_PLANTPATHOLOGY_351				
NAS_MBY	PLG220	Bilingual	2 + 1	S1	18
Fundamental principles of plant diseases as well as socio-economic importance thereof. The different types of diseases and their symptomatology. Biology and life cycles of selected diseases caused by fungi, bacteria, viruses and nematodes as well as abiotic factors. Plant disease diagnosis. Prerequisites: [MBY161] and [MBY261] or [TDH]					

PLG363	PLANT_DISEASE_CONTROL_363				
NAS_MBY	PLG421	Bilingual	2 + 1	S2	18
Principles of plant disease control. Non-chemical control including biological control, disease resistance, regulatory measures, cultivation practices, physical methods. Modern chemo-therapy: characteristics, mode of action and application of fungicides, bactericides and nematocides. Principles of integrated disease management.					
PLG364	HOST_PATHOGEN_INTERACTIONS_364				
NAS_MBY	PLG351	Bilingual	2 + 1	S2	18
Include fungal, bacterial and viral interactions. Focus on molecular and cellular events occurring during recognition, during fungal evasion of the host's defence mechanisms and during disease symptom development. Topics discussed will also include cell biology of interactions, systemic acquired resistance and the role of pathogenesis related proteins and toxins in pathogenesis.					
PLG461	NURSERY_ & SEED_PATHOLOGY_461				
NAS_MBY	PLG422	Bilingual	1 + 0.5	S2	10
Principles of disease control in nurseries. Quality assessment of nurseries. Chemical and non chemical control measures will be discussed including disinfection of soil and growth media. Plant improvement schemes, production of disease free plant material and indexing of mother material for plant pathogens. Seed pathology: principles, detection and control of seed borne diseases.					
PLG462	RESEARCH_PROJECT_462				
NAS_MBY	MBY401	Bilingual	1 + 1	J1	20
A practical research project of limited extent under the supervision of one of the lecturers in Plant Pathology within the Department. Any topic in Plant Pathology can be selected.					
PPF400	PROFESSIONAL_PORTFOLIO_400				
OPV_OPV	n a	Bilingual	+	S2	12
Professional Portfolio End of first semester progress assessment and feedback. End of the academic year: submission of a prepared professional portfolio as a valid and reliable scientific proof of learning, integrating all modules. Present and defend the professional portfolio to a panel of examiners for final evaluation.					
PPK251	SUSTAINABLE_PRODUCTION_SYS.251				
NAS_PGW	PPK210	Bilingual	2 + 0.5	S1	12
Sustainability in plant production. Principles and practices of monoculture, crop rotation, ley cropping and intercropping systems. Organic farming. Precision farming. Concepts such as target yield, maximum economic yield and the farming systems approach. Principles of soil cultivation and conservation.					
Prerequisite: [BOT161 or]					
PPR450	AGROFORESTRY_450				
NAS_PGW	PPR713	Bilingual	2 + 0.5	S1	12
Agro-ecological zones (climate and soil); trees for fruit, fodder, fuel and/or timber; intercropping or alley cropping with grains, vegetables or pasture; management (including aspects such as nursery production, establishment, fertilization, pest control) and utilization/marketing.					
PVK420	POULTRY_SCIENCE_420				
NAS_VKU	n a	Afrikaans	2 + 0.5	S2	12
Industrial science and management of production systems and feeding systems in poultry production units. Applied breeding of poultry. Design and utilization of equipment and housing facilities. Product quality and marketing of poultry products. Hygiene and health programmes.					
Prerequisites: [LEK210] and [VGE301] and [VKU220]					
RHD262	RURAL_HOUSEHOLD_DEVELOPM_262				
NAS_VBR	n a	Bilingual	2 + 1	K4	4
Introduction to PRA. PRA tools and techniques. Putting PRA into practice: designing and doing research, analysis of results, writing the research report; evaluation PRA training.					

RHD264	RURAL_HOUSEHOLD_DEVELOPM_264				
NAS_VBR	n a	Bilingual	1 + 2	S2	10
Rural households as contributors to development. Household economy and development. Practical application through analysis of case studies/small RRA projects.					
RHD351	RURAL_HOUSEHOLD_DEVELOPM_351				
NAS_VBR	n a	Bilingual	4 + 1	S1	18
Participation in decision making and problem solving. Management of household resources and situations. Practical application through case studies/small research project.					
Prerequisite: [RHD264]					
RHD480	RURAL_HOUSEHOLD_DEVELOPM_480				
NAS_VBR	n a	Bilingual	3 + 1	S1	20
Development of human resources. Planning and implementing programmes for development of human resources. Development of financial resources. Strategies for support of income generation by rural households. Prerequisite: [RHD351]					
RHD481	RURAL_HOUSEHOLD_DEVELOPM_481				
NAS_VBR	n a	Bilingual	2 + 2	S2	20
Practical application of RHD480 in a project. Prerequisite: [RHD480]					
RPL310	REPRODUCTION_SCIENCE_310				
NAS_VKU	n a	Bilingual	1 + 0.5	S1	8
Therionogenology, spermatogenesis, zoogenesis, the female sexual cycle. Species differences. Hormonal control of the sexual functions.					
Prerequisite: [DAF200]					
RPL320	REPRODUCTION_SCIENCE_320				
NAS_VKU	n a	Bilingual	2 + 0.5	S2	10
Artificial insemination. Semen collection techniques, the evaluation, dilution and conservation of semen. Collection, conservation and transfer of embryos. Collection of ova and in vitro fertilization. Handling of apparatus and practical insemination, oestrus observation and determination of gestation.					
Prerequisite: [RPL310]					
SCE170	RELIGIOUS_INSTRUCTION_170				
unk_SCE	n a	Bilingual	2 + 0	S1	6
Prominent religions in South Africa, world views associated with these religions, the cultural role of religions, importance of holy days. Mysticism and the occult.					
SCE200	SCIENCE_EDUCATION_200				
unk_SCE	n a	Bilingual	2 + 1	J1	18
An introduction to patterns of scientific thinking. The growth of scientific thinking and the development of misconceptions in children as a function of age. The infusion of scientific thinking into the science curriculum in a developmentally appropriate way. The Learning Cycle. Principles of curriculum design.					
SCE300	SCIENCE_EDUCATION_300				
unk_SCE	n a	Bilingual	2 + 4	J1	42
Implications of outcomes-based education (OBE) for the science teacher. The design of learning programmes by programme organisers. Macro planning in the natural science learning area. Provincial and national models of assessment. The assessment and implementation of learning programmes. The assessment of learner progress in the context of specific science learning programmes. Introduction to the principles of counselling. Some aspects of school guidance. Career planning and development. Practical: Practical experience with learning opportunities arranged by the Centre for Science Education form part of this module.					
Prerequisites: [CIL171] and [CIL172] and [CIL173] and [CIL174] or SCI152, SCI162]					

SCE301	EDUC.COMMUNITY_PROJECT_301				
unk_SCE	n a	Bilingual	0 + 0	J1	28
Students must demonstrate the ability to facilitate learning with particular emphasis on the application of team teaching, negotiation for resources, planning and implementation. Evaluation includes a essay by the student teacher, evaluation reports from a supervisor and participants. Additionally, the student teacher presents a report to peers in the form of a seminar. This contributes two weeks to Teaching Practice. Die project is arranged in cooperation with the Centre for Science Education.					
SCI150	NATURAL_SCIENCE_150				
NAS_CMY	n a	English	6 + 1	S1	12
Chemistry: Measurement and calculations in Chemistry. Matter and energy. Elements and atoms. Ions and nomenclature. Introduction to the periodic table. Chemical composition. Introduction to chemical reactions. Types of chemical reactions, chemical reactions in aqueous solutions. Calculations based on chemical reaction equations. Modern atomic theory. Chemical bonding. Physics: Use of mathematics in physics (vectors, trigonometry). Kinematics of a particle with constant acceleration in 1 dimension. Kinematics of a particle with constant acceleration in 2 dimensions. Concept of a force. Newton's first law of motion. Newton's second law of motion. Newton's third law of motion. Types of forces. Circular motion. Fluids. Note: The credits for this module may not be credited towards a BSc- or BSc(Agric) degree programme.					
SCI152	PROBLEM_SOLVING_SKILLS_152				
NAS_SCI	n a	English	0 + 1	S1	12
Computer literacy, using a word processor including mathematical formulas and graphics, Internet skills, Logical reasoning skills, interpreting and solving mathematical problems with LOGO. Note: Prohibited combination: SCI152 and CIL171, CIL172.					
SCI153	ACADEMIC_PROFICIENCY_153				
NAS_SCI	n a	English	0 + 1	K1	6
Goals and action plans, time management, taking notes, mind maps, technique for writing exams, personal CV.					
SCI154	EXPLORING_THE_UNIVERSE_154				
NAS_SCI	n a	English	4 + 0	S1	16
This module is presented in English only. Students from all faculties are welcome to join us in our exploration of the universe from an earth-bound perspective. We reflect on the whole universe from the sub microscopic to the vast macroscopic and mankind's modest position therein. To what degree is our happiness determined by stars? Echo's from ancient firmaments - the astronomy of old civilisations. The universe is born with a bang. Stars, milky ways and planets are formed. Life is breathed into the landscape on earth, but is there life elsewhere? The architecture of the universe – distance measurements, structure of our solar system and systems of stars. How does it look like on neighbouring planets? Comets and meteorites. Life cycles of stars. Spectacular exploding stars! Exotica like pulsars and black holes. The content of this course is the same as SCI164 and students are not allowed to register for both SCI154 and SCI164. Prerequisite: [Par 1.2]					
SCI160	NATURAL_SCIENCE_160				
NAS_CMY	n a	English	6 + 1	S2	12
Chemistry: Gases. Liquids and solids. Solutions. Acids and bases. Chemical equilibrium. Redox reactions and electrochemistry. Introduction to organic chemistry. Physics: Equilibrium of a particle and a fixed body. Work. Energy and Power. Momentum. Theory of Heat. Electrostatics. Electric current. Electric circuits. Note: The credits for this module may not be credited towards a BSc- or BSc(Agric) degree programme. Prerequisite: [SCI150]					

SCI162	PROBLEM_SOLVING_SKILLS_162				
NAS_SCI	n a	English	0 + 1	S2	12
Computer modelling of scientific problems using spread sheets and data bases. Note: Prohibited combination: SCI162 and CIL173, CIL174.					
Prerequisites: [CIL171] and [CIL172 or] and [] or [TDH]					
SCI163	BASIC_RESEARCH_SKILLS_163				
NAS_SCI	n a	English	0 + 1	K3	6
Scientific discoveries, the scientific method, scientific publications, ethics of science.					
SCI164	EXPLORING_THE_UNIVERSE_164				
NAS_SCI	n a	Afrikaans	4 + 0	S2	16
This course is presented in Afrikaans only. See SCI154 for a summary of the course content. The content of this course is the same as SCI154 and students are not allowed to register for both SCI154 and SCI164.					
Prerequisite: [Par 1.2]					
SEM180	SEMINAR_180				
NAS_VBR	n a	Bilingual	2 + 0	S2	6
Analytical approaches to the exploration of sources of scientific information to compile technically correct written scientific assignments. Professional orientation. Use of media.					
SEM380	SEMINAR_380				
NAS_VBR	n a	Bilingual	3 + 0	S2	15
Introduction to research methodology. The compilation of a well structured literature review.					
Prerequisite: [SEM180]					
SLK151	PSYCHOLOGICAL_PERSPECTIVES_151				
GW_SLK	n a	Bilingual	2 + 0	K1	6
This module is a general orientation to Psychology. An introduction is given to various theoretical approaches in Psychology, and the development of Psychology as a science is discussed. Selected themes from everyday life are explored and integrated with psychological principles. Compulsory introduction module.					
SLK152	COGNITIVE_PROCESSES_152				
GW_SLK	n a	Bilingual	2 + 0	K3	6
In this module, various cognitive processes are studied, including perception, memory, thinking, intelligence and creativity. Illustrations are given of various thinking processes, such as problem solving, critical, analytic and integrative thinking. Compulsory introduction module.					
SLK154	HEALTH_PSYCHOLOGY_154				
GW_SLK	n a	Bilingual	2 + 0	K4	6
This module is an introduction to psychological aspects related to illness and health. Themes such as the following are explored: the patient-helper relationship, stress and stress-related illnesses, lifestyle and illness/health, psychological aspects of physical illnesses, coping with emotional distress associated with illness, and psychological processes related to loss and death. Students will not be credited for more than one of the following modules for their degree: MGW112, SLK154.					
SLK157	BIOLOG.BASIS_OF_BEHAVIOUR_157				
GW_SLK	n a	Bilingual	2 + 0	K2	6
Biological basis of behaviour					
This module introduces the student to a basic knowledge and understanding of the biological bases of human behaviour. The module addresses the key concepts and terminology related to the biological subsystem, the rules and principles guiding biological psychology, and identification of the interrelatedness of different biological systems and subsystems.					

SLK251	PERSONOLOGY_251				
GW_SLK	n a	Bilingual	2 + 0	K1	10
In the module on Personology, various theories of personality are studied, including the psychoanalytical and social learning theories, the person-oriented approaches, and the ecosystemic approach. An African perspective is also discussed. These approaches are compared and critically evaluated with regard to their basic assumptions, view of the person, and philosophy of science, as well as their contribution towards understanding and explaining human behaviour within contemporary contexts.					
SLK253	DEVELOPMENT_PSYCHOLOGY_253				
GW_SLK	n a	Double	2 + 0	K2	10
In this module, the areas and determinants of early, middle and late adulthood development are studied. Incorporated are the developmental changes related to cognitive, physical, emotional and social functioning of the individual and the context of work. Traditional and contemporary theories of human development explaining and describing these stages are studied in order to address the key issues related to adulthood.					
SLK254	SOCIAL_PSYCHOLOGY_254				
GW_SLK	n a	Bilingual	2 + 0	K3	10
This module is a social-psychological perspective on interpersonal and group processes. Themes that are covered include communication, pro-social behaviour, social influence and persuasion, political transformation, violence, and group behaviour.					
SLK256	PSYCHOLOGICAL_ASSESSMENT(1)256				
GW_SLK	n a	Bilingual	2 + 0	K4	10
This module deals with the nature and role of psychological measurement and assessment. It includes an overview of different perspectives on psychological assessment, the classification, nature and scope of various categories of tests and techniques, the role of ethics in psychometry, and the areas of application of psychological assessment and evaluation.					
SLK351	COMMUNITY_PSYCHOLOGY_351				
GW_SLK	n a	Bilingual	2 + 0	K1	15
This module deals with a community psychological perspective on human behaviour and psychological interventions. The module focuses on themes such as definitions of key concepts, principles and aims of community psychology, and the role of the community psychologist. The application of these principles within the South African society, social change and psychological problems are investigated from a cross-cultural perspective.					
SLK352	ABNORMAL_BEHAVIOUR_352				
GW_SLK	n a	Bilingual	2 + 0	K3	15
This module provides an introduction to psychopathology and symptomatology of adult abnormal behaviour. Terminology, definitions of abnormal behaviour, problems in diagnosis, labelling, and myths regarding abnormal behaviour are discussed. Neurosis as a specific mental disorder is studied critically from a multi-dimensional perspective, including intrapsychic, interpersonal and social-cultural explanations. Requires SLK 251 and SLK 253					
SLK353	CRITICAL_PERSPECTIVES_353				
GW_SLK	n a	Bilingual	2 + 0	K4	15
This is a module that critically explores the contribution of various perspectives in Psychology. The impact of earlier thought frameworks on contemporary perspectives, and the implications of these ideas for practical initiatives focussed on mental health in communities, are discussed.					
SLK355	PSYCHOLOGICAL_ASSISTANCE_355				
GW_SLK	n a	Bilingual	2 + 0	K3	15
This is a practical module which offers opportunities for practising basic communication and interpersonal skills, reflection and the utilisation of available resources during psychological assistance. Prerequisites: [SLK251] and [SLK352] and [Closed: needs departmental permission]					

SLK362	CHILD_PSYCOPATHOLOGY_362				
GW_SLK	n a	Bilingual	2 + 0	K2	15
<p>Child psychopathology May not be taken if SLK157 is passed. Identification of abnormal behaviour in children based on knowledge of normal childhood development; introduction to the study of various models pertaining to abnormal behaviour; understanding and application of basic concepts in child psychopathology.</p>					
SOC151	THE_INDIVIDUAL_&_SOCIETY_151				
GW_SOC	n a	Bilingual	3 + 0	K1	6
<p>An introduction to sociology and the sociological paradigm.</p>					
SOC152	THE_SOCIOL.OF_INSTITUTIONS_152				
GW_SOC	n a	Bilingual	3 + 0	K2	6
<p>A focus on the social dynamics of the institutions of society such as family, the economy, government, the state and civil society.</p>					
SOC259	HOUSEHOLDS,FAMILY_&_GENDER_259				
GW_SOC	SOC252	English	3 + 1	K3	10
<p>This module focuses on theories and issues relevant to the understanding of gender, households and family life at a general level but with a particular emphasis on the Southern African context. The course will address issues such as poverty, survival strategies of rural and urban households. HIV/Aids and its effects on family life and domestic violence.</p>					
STK110	STATISTICS_110				
NAS_WST	n a	Double	3 + 1	S1	13
<p>Descriptive Statistics – Univariate: Sampling and the collection of data, frequency distributions and graphical representations. Descriptive measures of location and dispersion. Probability and inference: Introductory probability theory and theoretical distributions. Sampling distributions. Estimation theory and hypothesis testing of sampling averages and proportions (one and two sample cases). Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.</p>					
<p>Prerequisite: [Reg1.2(j)]</p>					
STK120	STATISTICS_120				
NAS_WST	n a	Double	3 + 1	S2	13
<p>Multivariate statistics: Analysis of variance, categorical data analysis, distribution-free methods, curve fitting, regression and correlation, the analysis of time series and indices. Statistical and economical applications of quantitative techniques: Systems of linear equations: Drafting, matrices, solving and application. Optimisation: Linear functions (two and more independent variables), non-linear functions (one and two independent variables). Marginal- and total functions. Stochastic and deterministic variables in statistical and economical context: producers' surplus, consumers' surplus, distribution functions, probability distributions and probability density functions. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.</p>					
<p>Prerequisite: [STK110 GS]</p>					
STK210	STATISTICS_210				
NAS_WST	n a	Double	3 + 1	S1	20
<p>Probability theory. Univariate probability distributions, expected values and moments. Special probability distributions: Binomial, hypergeometric, poisson, exponential, gamma, beta and normal distribution. Probability distributions and moments in the bivariate case. The bivariate normal distribution. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.</p>					
<p>Prerequisites: [STK110] and [STK120]</p>					

STK281	STATISTICS_281				
NAS_WST	n a	English	3 + 1	S2	10
Applied regression analysis: Simple and multiple regression, non-linear regression, correlation, the use of dummy variables, heteroscedasticity, serial correlation and lag structures. Applied time series analysis. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques. Prerequisites: [STK110] and [STK120]					
SUR220	SURVEYING_220				
NAS_GGY	n a	English	3 + 1	S2	16
Definition of Surveying. Adjustment and use of the following instruments: Level, compass and theodolite. Site surveying, levelling and tacheometry. Co-ordinate systems, angles of direction, joins and polars. Point positioning. Trigonometric height determination. Prerequisite: [WTW114 GS]					
SWK122	MECHANICS_122				
ING_ING	n a	Bilingual	4 + 0	S2	16
Equivalent force systems, resultants. Newton's laws, units. Forces acting on particles. Rigid bodies: principle of transmissibility, resultant of parallel forces. Vector moments and scalar moments. Relationship between scalar- and vector moments. Couples. equivalent force systems on rigid bodies. Resultants of forces on rigid bodies. Equilibrium in two and three dimensions. Hooke's law. Trusses and frameworks. Centroids and second moments of area. Hydrostatics: pressure at a point, resultant forces on submerged plane areas. Beams: distributed forces, shear force, bending moment, method of sections, relationship between load, shear force and bending moment.					
SWK210	STRENGTH_OF_MATERIALS_210				
ING_ING	n a	Bilingual	3 + 2	S1	16
Stresses, strains and material behaviour: Normal and shear stresses, factors and safety. Bar structures with axial loads: Displacements and stresses of statically determinate and indeterminate structures, thermal effects, transformation of stress, strain energy, dynamic loads. Torsion: Torsion of round bars, transformation of shear stress, relationship between E, G, ν , transmission of power, statically indeterminate axles, strain energy. Shear and bending of beams: Shear force and bending moment, strains and stresses. Analysis of stress and strain: Plane stress, tri-axial stress, 3-D stress, plane strain. Deflections of beams. Buckling.					
TBE151	TOURISM_MANAGEMENT_151				
EB_TBE	n a	Bilingual	4 + 0	K1	5
Structure and organisation of the tourism industry: This introductory module provides an introduction to and overview of the tourism industry. Firstly definitions and concepts are explored, whereafter the evolution of tourism through the ages is addressed. With a sound frame of reference in place, the structure and organisation of tourism at the international, national, provincial and private sector levels, is examined.					
TBE152	TOURISM_MANAGEMENT_152				
EB_TBE	n a	Bilingual	4 + 0	K2	5
The tourism system and the key components of tourism: This module provides various perspectives on the tourism system and then focuses on the specific components of the tourism system, their relationships and their interdependence. Specific attention is placed on key components such as attractions, transportation, distribution channels, hospitality and related services.					
TBE161	TOURISM_MANAGEMENT_161				
EB_TBE	n a	Bilingual	4 + 0	K3	5
Tourism demand, consumer behaviour and market research: As the consumer is central to success in the tourism industry, this module addresses tourism demand from both a quantitative and a qualitative perspective. An understanding is provided of tourist behaviour; cultural and international aspects of travel as well as the sociology of tourism. The latter part of this module focuses on the key role of travel and tourism research, particularly the application of research techniques and the interpretation of research results as an aid in tourism planning and decision-making.					

TBE162	TOURISM_MANAGEMENT_162				
EB_TBE	n a	Bilingual	4 + 0	K4	5
<p>Tourism supply, planning and development: This module focuses on supply side activities and services that need to be addressed to ensure quality visitor experiences.</p> <p>Particular attention is given to the formulation and implementation of sustainable tourism planning, development and management principles and practices.</p>					
TBE261	TOURISM_MANAGEMENT_261				
EB_TBE	n a	Bilingual	4 + 0	K3	8
<p>The management of tourism attractions: In this module the aspect of visitor attractions, which is at the core of successful tourism, will be addressed at three levels. Firstly, the key role of visitor attractions in the tourism industry will be outlined, whereafter the overall development process (feasibility studies, financial and design aspects, etc.) relating to visitor attractions will receive attention.</p> <p>The last part of this module focuses on the strategic management and operational aspects of visitor attractions.</p>					
TBE262	TOURISM_MANAGEMENT_262				
EB_TBE	n a	Bilingual	4 + 0	K4	8
<p>Strategic destination marketing: This module firstly explores the unique characteristics of and approaches to strategic destination marketing, with particular emphasis on global best practices in this regard. It then provides a management and operational framework for destination marketing.</p> <p>Within this framework new developments, trends, practices and case studies in destination marketing are also addressed.</p>					
TBE310	TOURISM_MANAGEMENT_310				
EB_TBE	n a	Bilingual	0 + 0	S1	20
<p>Hospitality management 1 - Rooms division and front office management: This section covers the "guest cycle" and addresses the process and procedures, from the moment a potential guest contacts an accommodation establishment to the time that he or she departs. All the operational and management functions of this process as well as key supportive aspects such as hospitality, social skills and customer care are covered in detail. A distinction is drawn between revenue centres and support centres. All the key support centres such as housekeeping, maintenance and security are covered. This section concludes with a well-rounded overview of the operational and management aspects of the front office and its support units.</p> <p>Hospitality management 2 - Food and beverage and financial management. This section firstly covers the key operational and management aspects of food and beverage management, which forms a vital part of hospitality management. Industry exposure and practical involvement is an essential ingredient of this section. As financial management and costing is critical to the success of any hospitality organisation, the second part of this section covers all the policies, principles and procedures pertaining to financial operations and financial management in such establishments.</p>					
TBE361	TOURISM_MANAGEMENT_361				
EB_TBE	n a	Bilingual	4 + 0	K3	10
<p>Hospitality management 1 - Rooms division and front office management: This module covers the "guest cycle" and addresses the process and procedures, from the moment a potential guest contacts an accommodation establishment to the time that he or she departs. All the operational and management functions of this process are covered in detail as well as key supportive aspects such as hospitality, social skills and customer care.</p> <p>A distinction is drawn between revenue centres and support centres. All the key support centres such as housekeeping, maintenance and security are covered. This module concludes with a well-rounded overview of the operational and management aspects of front office and its support units.</p>					

TBE362	TOURISM_MANAGEMENT_362				
EB_TBE	n a	Bilingual	4 + 0	K4	10
Hospitality management 2 - Food and beverage and financial management: This module firstly covers the key operational and management aspects of food and beverage management, which forms a vital part of hospitality management. Industry exposure and practical involvement is an essential ingredient of this module. As financial management and costing is critical to the success of any hospitality organisation, the second part of this module covers all the policies, principles and procedures pertaining to financial operations and financial management in such establishments.					
TKS210	TXT:UTILITY,FIBRES_ &_YARNS_210				
NAS_VBR	n a	Bilingual	3 + 1	S1	16
Utility aspects: basic components of textiles, consumer decision making, utility aspects that include durability, comfort, maintenance, health/safety/protection and aesthetic aspects. Fibres and yarns: Fibre structure and performance including textile chemistry, fibre morphology and formation, fibre properties, classification and identification. Yarn structure and performance (including spun yarns, filament yarns, compound and novelty yarns)					
TKS211	TEXTILES:_UTILITY_211				
NAS_VBR	n a	Bilingual	3 + 1	K1	8
Utility aspects: basic components of textiles, consumer decision-making, utility aspects that include durability, comfort, maintenance, health/safety/protection and aesthetic aspects.					
TKS220	TXT:FABRIC_STRUCT.&_FINISH.220				
NAS_VBR	TKS261,262	Bilingual	3 + 1	S2	16
Fabric structures: Introduction to fabric structures. Woven fabrics, knits, non-woven fabrics and compound fabrics. Finishes and dyeing processes: Introduction to fabric finishing. Preparatory and final finishes. Finishes for special end-uses: durability, comfort and protection; ease of maintenance; aesthetic appeal. Dyed and printed fabrics. Prerequisite: [TKS210 GS]					
TKS310	NEW_DEV.&_TEXTILES_IN_USE_310				
NAS_VBR	TKS362	Bilingual	2 + 0	S1	10
New developments (apparel textiles). Textile product use and assessment of performance. Prerequisites: [TKS210] and [TKS220 GS]					
TKS420	TXT:A_CONS.&MARKETING_PERS.420				
NAS_VBR	TKS420, 221, KLD321	Bilingual	2 + 1	S2	14
Clothing textiles and textile products from a marketing and consumer perspective. Practical performance problems and solutions. Prerequisites: [TKS210] and [TKS220] and [TKS310]					
TLR320	ANIMAL_BREEDING_320				
NAS_VKU	n a	Bilingual	2 + 0.5	S2	10
Introduction to applied breeding of animals; basis of heredity: cells, chromosomes and gametes, genes and mutations. Phenotypical showing of genes and different forms of interaction between genes. Gene frequencies. Comparison of qualitative and quantitative heredity. Population genetics: biometric concepts, population parameters and their calculation. Selection: efficiency, methods and aids. Breeding evaluation. Breeding systems. Prerequisite: [GTS261]					
TLR411	ANIMAL_BREEDING_411				
NAS_VKU	n a	Afrikaans	2 + 0.5	S1	12
Advanced theory in co-variance estimations of characteristics in farm animals. Heredity and genetic correlation and its use in breeding systems. Economically important characteristics. Index selection and estimation of indexes. Biometry of herd data: frequency distribution, normality, variances, scaling and transformations. Breeding values: estimation and use. Mating systems: inbreeding, hybridisation and assortive/disassortive mating in cattle; circumstances in which it can be used. Selection for growth efficiency, reproduction etc. Breeding structures and group breeding schemes. Prerequisite: [TLR320]					

TLR420	ANIMAL_BREEDING_420				
NAS_VKU	n a	Afrikaans	2 + 0.5	S2	12
Applied animal breeding. Performance testing of livestock, the associated legislation and administration. The analysis, interpretation and application of performance test data. Livestock breed societies and related industries. Prerequisite: [TLR411]					
TRN215	SITE_SURVEYING_215				
NAS_GGY	n a	English	2 + 1	S1	8
Definition of surveying; maps, scales, map projection elements, the South African projection; measuring tape and engineer's level; plane surveying, distances, height determination by levelling, contours and interpolation; simple co-ordinate calculations, area and volume calculations; drawing of a simple site plan.					
TRN217	SITE_SURVEYING_217				
NAS_GGY	n a	English	2 + 1	S1	8
Tacheometer, Angle measurement and tacheometry; plot and drawing of detail site plans; construction surveys, areas and volumes, setting out of works. Tacheometric traverse.					
VAP300	VET.ANATOMY_ & PHYSIOLOGY_300				
NAS_VET_PAS	n a	English	10 + 2	J1	72
Comparative anatomy, physiology, histology and embryology of the skin, locomotor system, nervous system, cardiovascular system, respiratory system, digestive system and urogenital system of the domestic animals. Topographical anatomy of the domestic animals. Prerequisite: [Only students selected for BSc(Veterinary Biology)III]					
VBF410	CONSUMER_FACILITATION_410				
NAS_VBR	VBF451,452	Bilingual	3 + 0	S1	15
Consumer decision making through the family life cycle; determinants of consumer satisfaction. Consumer education; development of consumer skills; less privileged consumers. Expenditure patterns of the diverse SA consumer market. Consumerism. Globalisation.					
VBM400	SUBJ_DID: USINESS_MANGEM_400				
NAS_VBR	n a	Bilingual	2 + 1	J1	24
Basic principles of community nutrition. Nutritional assessment. Nutrition problems and programmes in South African communities.					
VDB320	FOOD_SERVICE_MANAGEMENT_320				
NAS_VBR	VDB361,362	Bilingual	4 + 1	S2	26
Planning and layout of food service units for different food service systems. Equipment for food services. Factors influencing the choice and purchasing of equipment for different food service units. Hygiene and safety in food services. Principles of management as applied to food service systems. Human Resource Management in food service systems. Financial management in food services. Prerequisite: [VDS320 #]					
VDB410	FOOD_SERVICE_MANAGEMENT_410				
NAS_VBR	VDB451,452	Bilingual	3 + 1	S1	24
The professional food service manager's roles, responsibilities and characteristics. Contemporary leadership and management styles in food service systems. Professionalism and ethics. Advanced food service systems and production management techniques. Marketing of food services. Prerequisite: [VDB320] or [ABR311 and ABV320]]					
VDB411	PROJECT_FOOD_SERVICE_MANAG_411				
NAS_VBR	VDB453	Bilingual	0 + 1	S1	10
A study of the current trends in foods and food service management by reviewing and integration of the latest research findings and publications in these areas with previous course work. Prerequisite: [VDB410 or #]					

VDG220	NUTRITION_220				
NAS_VBR	VDG163	Bilingual	3 + 0	S2	12
Integration of natural science concepts basic to the study of human nutrition. Cell and tissue; digestive system, absorption and metabolism; energy metabolism and balance; body temperature; cardiovascular system; kidneys and acid-base equilibrium.					
VDG250	NUTRITION_250				
NAS_VKU	n a	English	3 + 0.5	S1	12
Nutrition in the context of growth, development and composition of organisms. Metabolic processes and control in the body. Overview of nutritional processes. The study of the fundamental principles of nutrient metabolism (including macro- and micro-nutrients and water) and digestion physiology.					
Applications are made regarding man and animals. Practical work: Experimental work and problem orientated tasks. Prerequisite: [CMY127]					
VDG255	NUTRITION_255				
NAS_VBR	n a	English	3 + 0	K1	6
Cell and tissue, digestive system, absorption and metabolism, energy metabolism and balance. Study of macro-nutrients with regard to the composition, properties, functions, food sources and symptoms of deficiency and toxicity.					
VDG256	NUTRITION_256				
NAS_VBR	n a	English	3 + 0	K1	6
A study of micro-nutrients with regard to the composition, properties, functions, food sources and symptoms of deficiency and toxicity. Food groups and dietary guides.					
VDG310	NUTRITION_310				
NAS_VBR	VDG211,251,252,253,254	Bilingual	3 + 1	S1	19
The study of nutrients and water regarding their chemical composition, characteristics, basic digestion, absorption, metabolism, functions, food sources and symptoms of deficiency and toxicity. Energy metabolism. Dietary recommendations and guidelines, dietary guides and meal planning. The use and application of food composition tables in dietary analysis.					
Prerequisites: [FSG110] and [FSG120 or VDG163]					
VDG320	NUTRITION_320				
NAS_VBR	VDG361,362	Bilingual	3 + 1	S2	19
The role of nutrition in the life cycle. The role of nutrition in the prevention of lifestyle related diseases - osteoporosis, cancer, coronary heart disease, tooth decay. Vegetarianism. Different conditions of malnutrition: Protein Energy Malnutrition and obesity.					
Prerequisites: [HNT210] and [VDG250]					
VDG363	NUTRITION_363				
NAS_VBR	n a	English	3 + 1	K3	10
The role of nutrition in the life cycle.					
Prerequisites: [VDG255] and [VDG256]					
VDG483	NUTRITION_483				
NAS_VBR	n a	English	3 + 0	S1	20
Basic principles of community nutrition. Nutritional assessment. Nutrition problems and programmes in South African communities.					
Prerequisites: [KEP261] and [KEP262] and [VDG255] and [VDG256] and [VDG363]					
VDS110	FOODS_110				
NAS_VBR	VDS151,152	Bilingual	3 + 0	S1	9
Basic food preparation and food preparation techniques. Weighing and measurement techniques, equipment and terminology as applied in food preparation. Basic food quality control.					

VDS210	FOODS_210					
NAS_VBR	n a	Bilingual	3 + 1	S1	18	
The study of different food systems with regard to food preparation. Physical and chemical properties and the influence of the composition in food preparation. Weighing and measuring techniques, equipment and terminology as applied in food preparation. Food preparation basics of the following: soups and sauces; fruit and vegetables; salads; frozen desserts; gelatine. Prerequisite: [VDS110] or #						
VDS221	FOODS_221					
NAS_VBR	n a	Bilingual	3 + 1	S2	18	
The composition and physical properties, as well as food preparation basics of the following: meat; poultry; fish, legumes, eggs and milk, starches and cereals; baked products (whole spectrum); leavening agents. Prerequisite: [VDS210]						
VDS310	FOODS_310					
NAS_VBR	VDS351,352	Bilingual	3 + 1	S1	21	
Planning executing and reporting consumer food research. Food evaluation techniques. Experiments in food, emphasizing ingredient function and standard preparation methods. Application of experimental methods through which the chemical and physical reactions of food to different food handling, preparation and preservation techniques are illustrated. Quality evaluation of food products. Prerequisites: [VDS210] and [VDS221]						
VDS320	FOODS_320					
NAS_VBR	n a	Afrikaans	3 + 3	S2	31	
MODULE 1 AND PRACTICAL WORK: Principles of large-scale food preparation and the practical application thereof in a practical restaurant situation. Restaurant management. Recipe formats and adjustment applicable to large-scale food preparation. Work scheduling and the practical exposure to the use of large scale catering equipment in a real life situation. MODULE 2: Menu planning for different food service systems and styles of food service MODULE 3: Large scale food procurement, consumption and storage. Prerequisites: [KEP261 or KEP220] and [VDS221]						
VDS353	FOODS_353					
NAS_VBR	n a	Bilingual	3 + 1	K1	10	
Principles and implementation of household food preservation techniques: drying, fermentation, canning, chilling and freezing, as well as other relevant food preservation trends. Prerequisites: [VDS220] and [VDS221]						
VDS354	FOODS_354					
NAS_VBR	n a	Bilingual	3 + 0	K2	8	
Principles of food safety and food hygiene. Consumer rights and protection.						
VDS363	FOODS_363					
NAS_VBR	n a	English	3 + 1	S2	15	
Principles of large scale food procurement and food preparation. Recipe enlargement for large scale food preparation. Menu planning for groups and special functions. Prerequisites: [VDS251] and [VDS252] and [VDS261] and [VDS262]						
VDS413	FOODS_413					
NAS_VBR	n a	Bilingual	3 + 2	S1	30	
Recipe development process. Development of appropriate recipes and food products for a given situation. Standardisation of recipes. Food styling and food photography. Prerequisite: [VDS320]						

VDS414	CULINARY_ART_414				
NAS_VBR	n a	Bilingual	2 + 1	S1	19
Advanced food preparation and presentation techniques with regard to: starters, side dishes, soups, sauces and stocks, baked and confectionary products, desserts.. Prerequisites: [VDS210] and [VDS221]					
VDS415	VISUAL_MERCHANDIS.OF_FOODS_415				
NAS_VBR	n a	Bilingual	3 + 0	S1	15
Aspects of food retailing with special emphasis on food packaging and labelling of food products. Aspects of food retailing with regard to display, presentation and shop layout as applied to food products.					
VDS422	PROJECT_FOODS_422				
NAS_VBR	n a	Bilingual	1 + 2	S2	23
Research methodology. Planning, executing and reporting a research project in a food related field. Prerequisite: [VDS310]					
VDS423	FOODS_423				
NAS_VBR	n a	Bilingual	3 + 0	S2	15
Factors influencing food consumption, consumer behaviour and food choice. Food product advice. Consumer advice, marketing of food products, consumer education.					
VDS424	CULINARY_ART_424				
NAS_VBR	n a	Bilingual	2 + 1	S2	19
Advanced food preparation and presentation techniques with regard to: meat, poultry, fish and shellfish. Event planning and banqueting. Prerequisites: [VDS221] and [VDS320 #] and [VDS414]					
VDS425	PROJECT_FOODS:VISUAL_MERCH.425				
NAS_VBR	n a	Bilingual	3 + 0	S2	15
Practical application of the principles in visual merchandising of food and food retailing in the food industry. Prerequisites: [VDS415] and [VDS423]					
VGE301	NUTRITION_SCIENCE_301				
NAS_VKU	n a	English	3 + 0.5	J1	32
Digestion and metabolism of feeds. The division of food energy and food energy systems. Protein quality and requirements. Mineral and vitamin requirements. Nutritional standards. Voluntary intake. Water quality. Characteristics of fodder. Rumen function and microbial fermentation. Practical work: In vivo and in vitro digestibility studies. Prerequisites: [BCM261] and [BCM262] and [DAF200] and [VDG250] and [VKU220]					
VGE411	NUTRITION_SCIENCE_411				
NAS_VKU	n a	English	4 + 0.5	S1	18
Specialised nutrition of monogastric animals: poultry, pigs, horses and selected freshwater aquatic organisms. The use of computer systems in feeding management. Prerequisite: [VGE301]					
VGE421	NUTRITION_SCIENCE_421				
NAS_VKU	n a	English	3 + 0	S2	16
Specialized small stock and game nutrition. Nutrition of rams, ewes and lambs for optimal production. Principles of creep feeding, drought feeding, winter and supplementary feeding. Feeding pen nutrition and final nutritional preparation of lambs. Influence of nutrition on wool, pelts and Angora wool. Nutrition of meat and milk goats. Fodder flow planning. Nutrition of the race horse and working horse Practical work: Formulation of lowest cost rations and practical work with animals. Prerequisite: [VGE301]					

VGE423	NUTRITION_SCIENCE_423				
NAS_VKU	n a	English	3 + 0	S2	16
Specialized nutrition of beef and dairy cattle according to production systems. The use of computer systems in feeding management. The practicals will include compiling rations in terms of requirements and least cost formulations, specialised assignments and on-farm experiential training. Prerequisite: [VGE301]					
VHK400	DIDACTICS: CONSUMER STUDIES_400				
NAS_VBR	n a	Bilingual	3 + 1	J1	24
The study field of Didactics: Consumer studies. Examples of theme study from the secondary school syllabus for Grades 10,11 & 12, the reduction of learning content, evaluation of the school subject. Principles of lesson design. Prerequisite: [VHK310]					
VHS400	DIDACTICS: HOSPITALITY STUDIES_400				
NAS_VBR	n a	Bilingual	0 + 1	J1	24
The study field of Didactics: Hospitality studies. Examples of theme study from the secondary school syllabus for Grade 10, 11 & 12, the reduction of learning content, evaluation of the school subject. Principles of lesson design.					
VKD410	PIG_SCIENCE_410				
NAS_VKU	n a	Afrikaans	1 + 0.5	S1	8
Industrial science and management of pigs - sow, boar and growing pigs. Production systems and feeding systems. Design and utilization of housing facilities. Product quality and marketing. Hygiene and herd health programmes. Prerequisites: [LEK210] and [VGE301] and [VKU220] and [VNE361]					
VKF411	ANIMAL_SCI.PHARMACOLOGY_411				
NAS_VKU	n a	Afrikaans	3 + 0	S1	12
The pharmacology, laws, control and use of substances for animal production. Prerequisites: [DFS320] and [VGE301]					
VKK155	FOUNDATIONS_OF_VISUAL_LANG.155				
GW_GW	n a	Bilingual	3 + 0	K1	6
Study of the form, content and aims of static and moving images in diverse media (for example, fine arts and design). Introduction to the scientific and systematic analysis and interpretation of visual images and visual media. Formalistic analysis. Introduction to visual language and the visual communication process. Visual communication and visual literacy in relation to cultural conventions and codes, visual metaphors, icons, symbols, myths and ideology.					
VKK257	STYLE&ANTI-STYLE_1940-PRES.257				
GW_GW	n a	Bilingual	2 + 0	K3	10
Changes in the appearance of visual culture from 1940 to the present. Contextualisation of popular visual culture and consumer culture. Influence of youth- and sub-cultures such as Beatniks, Hippies, Punks, and Grunge on contemporary design styles. Influence of cultural codes and conventions on design styles. Description and contextualisation of design styles with reference to South Africa.					
VKK258	VISUAL_IDENTITY_&_BRANDING_258				
GW_GW	n a	Bilingual	2 + 0	K4	10
The aims and functions of visual communication in the marketing context. Visual communication as foundation for the creation of corporate, product and brand identity, as well as advertising and promotion. Methods of analysis and evaluation of advertisements and visual identity. Influence of target audience and media characteristics on visual communication.					
VKK353	DECODING_VISUAL_CULTURE_353				
GW_GW	n a	Bilingual	2 + 0	K3	15
Critical decoding of culturally encoded ideas and ideologies as embodied in visual culture. The emphasis is placed on the semiotic decoding of aspects of visual culture. Application to clothing and South African identity; entertainment landscapes and theme parks in South Africa, and the 'myth of Africa'. The necessity of a critical attitude towards visual messages.					

VKU210	ANIMAL_SCIENCE_210				
NAS_VKU	n a	English	1 + 0.5	S1	6
A global overview of the livestock industry. Historical background on the origin of animals. Principles of animal work production. Stock science. Practical work includes the introduction to general care and handling of farm stock.					
VKU211	ANIMAL_SCIENCE_211				
NAS_VKU	n a	English	2 + 0.5	S1	6
General principles of breeding of farm stock, viz. large stock, small stock, poultry and pigs. Heredity and race improvement.					
VKU220	ANIMAL_SCIENCE_220				
NAS_VKU	n a	English	2 + 0.5	S2	12
Animal production systems. Stock farming regions of South Africa. Introduction to the basic principles and terminology of large stock, small stock, pig and poultry production systems. Practicals include the general caring and handling of farm animals. Prerequisite: [VKU210]					
VKU320	ANIMAL_SCIENCE_320				
NAS_VKU	n a	English	3 + 1	S2	12
Functional management of intensive and extensive beef, dairy, sheep and goat production systems. Discussions and literature studies on applied animal nutrition, breeding production planning and production processes. Prerequisites: [VKU210] and [VKU220] and [WDE250]					
VKU361	ANIMAL_ECOLOGY_361				
NAS_VKU	VNE310	Bilingual	2 + 0	S2	8
Animal ecology, interaction between genotype and environment. Animal-ecological factors which influence regional classification. Animal ecology factors which must be taken into consideration in the obtaining of the production factors, planning and management of the cattle farming enterprise. Conservation farming and adapted farming and management systems; environmental conservation. Prerequisites: [VKU210] and [VKU220]					
VKU362	ANIMAL_SCI_BIOTECHNOLOGY_362				
NAS_VKU	n a	Bilingual	1 + 0.5	S2	8
Application of biotechnology in farm animals with specific reference to reproductive biotechnology such as AI MOET and sex manipulation, which has an effect on genetic progress. Application of DNA-technology such as parentage verifications, identification of genetic defects, QTL's and MAS. Prerequisite: [GTS226]					
VKU411	SEMINAR_411				
NAS_VKU	n a	Afrikaans	1 + 0	S1	8
Literature studies and seminars in Animal Science. Prerequisite: [TDH]					
VKU412	RESEARCH_METHODOLOGY_412				
NAS_VKU	n a	Afrikaans	1 + 0	S1	8
Research methodology in Animal Science: Handling of queries, introduction to the problem, approach to problem solving, reporting. Practice. Prerequisite: [TDH]					
VSX420	MEAT_AND_DAIRY_SCIENCE_420				
NAS_VKU	n a	Afrikaans	2 + 0	S2	10
Meat industry. Meat species. Composition of carcass and meat, slaughtering process and meat quality. Hygiene and marketing. The role of the producer, wholesale and retail dealers and the consumer. Dairy industry. Composition and nutritional value of milk and factors that influence it. Lactation. Milk production, milk quality and marketing. Prerequisite: [DFS320]					

VVW350	COM.NUTRITION_&PUBL.HEALTH_350				
NAS_VDW	n a	Bilingual	3 + 1	S1	21
Theory and practice of community nutrition and public health (cap sel CMT411). Environmental health issues and health indicators in communities. Prerequisites: [HNT210] or [TDH] and [VDG250] and [VDG320]					
VVW361	LEGIS&LABEL/ANI&HUMAN FOOD_361				
NAS_VDW	n a	Bilingual	2 + 1	S2	18
National and international standards, Codex Alimentarius, FDA. Nutritional labelling. Application of food legislation including toxicological issues; food additives; GMO's. Dietary supplementation, enrichment and fortification. Prerequisites: [FST351] and [FST352] or [TDH]					
VVW363	FOOD,_NUTRITION_AND_HEALTH_363				
NAS_VDW	n a	Bilingual	3 + 1	S2	21
The science of food for lifestyles - sport nutrition, nutrition for prevention of non-communicable diseases. Food allergies and intolerance. Prerequisites: [HNT210] or [TDH] and [VDG250] and [VDG320]					
VWP410	PROJECT:_HOME_ECONOMICS_410				
NAS_VBR	n a	Bilingual	2 + 2	S1	28
Planning and execution of the production of a food, clothing or interior product as applicable for the school syllabus. Application of entrepreneurial and marketing principles. Prerequisite: [Fourth-year status]					
VWP411	PROJECT:_HOTELK.&_CATERING_411				
NAS_VBR	n a	Bilingual	0 + 2	S1	28
Project applicable to the school situation. The theoretical and practical aspects of teaching Hospitality studies will be covered. Industry exposure and practical involvement is an essential ingredient in this module. Prerequisite: [Fourth-year status]					
WDE210	VELD_MANAGEMENT_PRACTICES_210				
NAS_PGW	WDE271,272	Bilingual	2 + 0.5	S1	12
The influence of environmental factors and defoliation on the productivity of the different components of the grazing ecosystem. This will enable the student to motivate users to manage this ecosystem with the necessary care. Management practices for sustainable animal production from natural pastures. This will enable the student to advise farmers on different management systems and practices. Prerequisite: [PPK251 #]					
WDE250	PRINCIPLES_OF_VELD_MANAGM_250				
NAS_PGW	WDE251,252	Bilingual	2 + 0.5	S1	12
The influence of biotic and abiotic factors on the productivity of different strata and components of natural pastures. This will enable the student to advise users, with the necessary motivation, on the appropriate use of these strata and components and will form a basis for further research on this system. The principles of veld management systems and the influence of management practices on sustainable animal production from natural pastures. This will enable the student to advise users on veld management and veld management principles. It will also form a basis for further research on veld management.					
WDE320	PLANTED_PAST&FODDERCROPS320				
NAS_PGW	n a	Bilingual	2 + 0.5	S2	14
The establishment and use of planted pastures species and fodder crops and the conservation of fodder. This will enable students to advise users on planted pastures species as well as farmers on the production, conservation and optimum use of fodder. This will also form a basis for further research on planted pastures. Prerequisite: [WDE210 or WDE250]					

WDE450	EVALUAT.OF_RANGE_&_FORAGES_450				
NAS_PGW	WDE421	Bilingual	3 + 0	S1	14
<p>Concentrates on baseline information (for extension and research purposes) and monitoring evaluation techniques to provide information on composition, cover, ecological status, responses to grazing gradients and management systems, as well as agronomic and animal production (the latter being an interaction between plant productivity, nutritive value of plants, nutritional requirements of animals and management systems) of both natural and planted pastures.</p> <p>Such information is essential in developing production systems based on these resources and especially to facilitate adaptive management responses in management strategies.</p>					
WDE460	PRODSYS_V1:INT/PLA&ANIMPRO_460				
NAS_PGW	WDE483	English	2 + 0.5	S2	12
<p>The role of crop rotation alley cropping and leys in marginal areas to ensure sustainable production. Integration of fodder production with other agricultural enterprises to yield wood/vegetables/fruit/nuts, cash crops and animal products. Fodder supply to commercial and communal animal production systems.</p>					
WDE461	TURFGRASS_MANAGEMENT_461				
NAS_PGW	WDE412	Bilingual	2 + 0.5	S2	14
<p>Based on a fundamental knowledge of plant structure, taxonomy and functioning with particular attention to aspects of soil profiles, soil textures, irrigation, fertilization and crop protection (control of weeds, insects and diseases) this course concentrates on the identification of suitable species, their establishment and maintenance requirements. Particular emphasis is placed on the identification and solving of problems.</p>					
WDE470	EVALUAT.OF_RANGE_&_FORAGES_470				
NAS_PGW	WDE424	English	3 + 0	S1	10
<p>Capita selecta form Evaluation of Range and Forages 450.</p>					
WKD151	ATMOSPHERIC_PROCESSES_151				
NAS_GGY	WKD151	English	4 + 0.6	K1	8
<p>Weather and climate. Origin and composition of the atmosphere. Oxygen, carbon and life. Meteorological instruments. Temperature distribution and heat capacity. Atmospheric mass and pressure. Radiation. Zenith angle of the sun. Sunshine variability. The boundary layer. Heat transfer in the boundary layer. Atmospheric heat budget. Urban and rural climates. Equation of state. Air parcel theory. Phases of water and latent heat. Vapour and saturated vapour pressure. Dew point temperature and relative humidity. Dry adiabatic, wet adiabatic and environmental temperature lapse rates. Cloud development. Sensible heat. Comfort zones. Acquisition of data from the South African Weather Bureau: Composition and submission of a report.</p>					
WKD152	ATMOSPHERIC_CIRC.&_CLIMATE_152				
NAS_GGY	WKD152	English	4 + 0.6	K2	8
<p>Hadley and Walker (ENSO) cells. Convergence, divergence, convection and subsidence. Polar stratospheric ozone. Air parcel theory. Angular velocity of the earth. Gravitational, centrifugal forces: Gravity force. Pressure gradient force. Coriolis force. Friction force. Rotation of a cyclone and anti-cyclone. Geostrophic wind. Inter-tropical convergence zone (ITCZ). Monsoon rain. Mid-latitude cyclonic frontal systems. Cut-off low. Coastal lows. Jet streams. Tropical cyclones. Föhn effect. Climate and climate change. Typical circulation patterns over South Africa: Composition and submission of a report.</p>					
WKD161	PHYSICAL_&_MESOSCALE_METEO.161				
NAS_GGY	WKD161	English	4 + 0.6	K3	8
<p>Electromagnetic spectrum. Planck's constant. Radiation energy. Irradiance and radiance. Albedo. Stefan Boltzman law. Global energy balance. First law of thermodynamics. Stability and instability. Atmospheric particles. Homogenous and heterogeneous nucleation. Droplet growth. Lightning. Phases of an air mass thunderstorm. Multi-cell storms. Orographic clouds and Lee waves. Cloud identification. Radiation- and advection fog. Case study of a local thunderstorm: Composition and submission of a report.</p>					

WKD162	DYNAM.& NUMER. METEOROLOGY 162				
NAS_GGY	WKD162	English	4 + 0.6	K4	8
Dimensions and units. Atmospheric scales of motion. Hydrostatic assumption. Hypsometric equation. Statistical seasonal assessment and the ENSO. Spatial data interpretation and grid fields. Representation of isobars and the geostrophic wind. Reduction of the height of the 500hPa pressure level. Equations for the pressure gradient and Coriolis forces.					
Introduction to finite difference methods. Vorticity and divergence. Numerical estimation of the geostrophic wind, vorticity and divergence. Advection of temperature. Development of a two-dimensional numerical temperature advection model: Composition and submission of a report.					
WKD163	WEATHER FORECASTING PRIN. 163				
NAS_GGY	WKD163	English	4 + 0	K4	8
Classification of weather types. Synoptic and METAR messages. Weather data on the Internet. Introduction to satellite images, tephigrams and synoptic charts.					
WKD250	WEATHER FORECASTING 250				
NAS_GGY	WKD251,252	English	5 + 0	S1	24
Plot all coded meteorological messages, analyse surface and upper air synoptic maps. General circulation of the Southern Hemisphere. Synoptic weather systems over South Africa. Basic principles and interpretation of satellite imagery. Interpretation of aerological diagrams, dynamic and thermodynamic variables. Integration of information to describe the current state of the atmosphere.					
WKD253	COMMUNITY PROJECT 253				
NAS_GGY	WKD253	English	3 + 0	S1	12
Identification and execution of a community project with the aim to provide meteorological information to the general South African public. A project proposal including a budget will be drawn up before the project commences and a project report will be drawn up after completion of the project.					
WKD261	PHYSICAL METEOROLOGY 261				
NAS_GGY	WKD261	English	4 + 0	K3	12
Conservative forces and conservation laws. Basic thermodynamic laws for dry and humid air. The equation of state. Adiabatic processes and temperature lapse rates. The Clausius-Clapeyron equation. Calculation of the wet adiabat.					
WKD262	CLIMATE DATA MANIPULATION 262				
NAS_GGY	n a	English	1 + 0	K4	12
Spatial representation and interpretation of weather data. Introduction to statistical and numerical methods. Obtaining and displaying weather data. Computer programming. Introduction to atmospheric models.					
WKD351	ATMOSPHERIC BALANCE LAWS 351				
NAS_GGY	WKD351	English	4 + 0.6	K1	18
Acceleration in rotating co-ordinates, fundamental forces, momentum equation, one, two and three dimensional flow balance, conservation of mass, heat equation, thermodynamic energy equation.					
WKD352	ATMOSP. VORTIC. & DIVERGENC. 352				
NAS_GGY	WKD352	English	4 + 0.6	K2	18
Scale analyses and simplification of the basic equations. The geostrophic, thermal and gradient wind. The vorticity equation and divergence.					
WKD360	RESEARCH PROJECT 360				
NAS_GGY	WKD363,364	English	5 + 2	S2	36
Literature survey, acquisition and manipulation of data, research report, presentation of research results.					
WKD361	QUASI-GEOSTROPHIC ANALYSIS 361				
NAS_GGY	WKD361	English	4 + 0	K3	18
Tendency and Omega equations. Model of a baroclinic system. Introduction to numerical models.					

WKD362	CLOUD & BOUNDARY_LAYER_DYN.362				
NAS_GGY	WKD362	English	4 + 0	K4	18
Introduction to cloud dynamics. Classification and development of clouds. Cumulonimbus clouds, super cell storms and tornadoes. Planetary boundary layer, atmospheric turbulence, Reynolds average, turbulent kinetic energy, the Ekman layer, secondary circulation.					
WKE420	WILDLIFE_SCIENCE_420				
NAS_VKU	n a	Afrikaans	2 + 0	S2	10
Introductory aspects of wildlife conservation, habitat management, wildlife nutrition and keeping wildlife in zoological gardens.					
Prerequisites: [VGE301] and [VKU361] or [TDH]					
WLK410	WOOL_SCIENCE_410				
NAS_VKU	n a	Afrikaans	1 + 0.5	S1	8
Development of follicles and growth of wool. The morphology, physical and chemical characteristics of wool fibre. The classing, marketing and processing of wool. Physical testing. Regulations with regard to the classing and packaging of wool. Class standards of the NWGA.					
Prerequisites: [TLR320] and [VGE301]					
WST111	MATHEMATICAL_STATISTICS_111				
NAS_WST	WST110	Double	4 + 1	S1	16
Introductory statistical concepts: sampling, classification of data, graphic representation, descriptive measures and exploratory data analysis. Probability theory. Introductory distribution theory and special statistical distributions. Generating functions and moments. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.					
Prerequisite: [Par 1.2]					
WST121	MATHEMATICAL_STATISTICS_121				
NAS_WST	WST120	Double	4 + 1	S2	16
Statistical inference: Point and interval estimation. Hypothesis testing with applications in one and two-sample cases. Analysis of variance. Distribution-free testing methods. Curve fitting. Correlation and regression. Introductory categorical data analysis.					
Indices. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques. Report writing.					
Prerequisite: [WST111 GS]					
WST211	MATHEMATICAL_STATISTICS_211				
NAS_WST	WST210	Double	4 + 2	S1	24
Set theory. Probability measure functions. Random variables. Distribution functions. Probability mass functions. Density functions. Expected values. Moments. Moment generating functions. Special probability distributions: Bernoulli, binomial, hypergeometric, geometric, negative binomial, Poisson, Poisson process, discrete uniform, uniform, gamma,exponential, Weibull, Pareto, normal. Joint distributions: Multinomial, extended hypergeometric, joint continuous distributions. Marginal distributions.					
Independent random variables. Conditional distributions. Covariance, correlation. Conditional expected values. Transformation of random variables: Convolution formula. Order statistics. Stochastic convergence: Convergence in distribution. Central limit theorem. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.					
Prerequisites: [WST111] and [WST121] and [WTW114 GS or GS] and [WTW126 GS or GS] and [WTW128 GS or GS]					

WST221	MATHEMATICAL_STATISTICS_221				
NAS_WST	WST220	Double	4 + 2	S2	24
<p>Stochastic convergence: asymptotic normal distributions, convergence in probability. Statistics and sampling distributions: Chi-squared distribution. Distribution of the sample mean and sample variance for random samples from a normal population. t distribution. F distribution. Beta distribution. Point estimation: Method of moments.</p> <p>Maximum likelihood estimation. Unbiased estimators. Uniform minimum variance unbiased estimators. Cramer-Rao inequality. Efficiency. Consistency. Asymptotic relative efficiency. Bayes estimators. Sufficient statistics. Completeness. The exponential class. Confidence intervals. Test of statistical hypotheses. Reliability and survival distributions. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.</p> <p>Prerequisite: [WST211 GS]</p>					
WST311	MULTIVARIATE_ANALYSIS_311				
NAS_WST	Part of WST310	Bilingual	2 + 1	S1	18
<p>Multivariate statistical distributions: Moments of a distribution, moment generating functions, independence. Multivariate normal distribution: Conditional distributions, partial and multiple correlations. Multinomial and multivariate Poisson distributions: Asymptotic normality and estimation of parameters.</p> <p>Distribution of quadratic forms in normal variables. Multivariate normal samples: Estimation of the mean vector and covariance matrix, estimation of correlation coefficients, distribution of the sample mean, sample covariance matrix and sample correlation coefficients. The linear model: Models of full rank, least squares estimators, test of hypotheses. Practical applications: Practical statistical modelling and analysis using statistical computer packages and interpretation of the output.</p> <p>Prerequisites: [WST211] and [WST221] and [WTW211 GS] and [WTW218 GS]</p>					
WST312	STOCHASTIC_PROCESSES_312				
NAS_WST	Part of WST310	Bilingual	2 + 1	S1	18
<p>Definition of a stochastic process. Stationarity. Covariance stationary. Markov property. Random walk. Brownian motion. Markov chains. Chapman-Kolmogorov equations. Recurrent and transient states. First passage times. Occupation times. Markov jump processes. Poisson process. Birth and death processes. Structures of processes.</p> <p>Structure of the time-homogeneous Markov jump process. Applications in insurance. Practical statistical modelling, analysis and simulation using statistical computer packages and the interpretation of the output.</p> <p>Prerequisites: [WST211] and [WST221] and [WTW211 GS] and [WTW218 GS]</p>					
WST321	TIME_SERIES_ANALYSIS_321				
NAS_WST	WST361	Bilingual	2 + 1	S2	18
<p>Stationary and non-stationary univariate time series. Properties of autoregressive moving average (ARMA) and outoregressive integrated moving average (ARIMA) processes. Identification, estimation and diagnostic testing of a time series model. Forecasting. Multivariate time series. Practical statistical modelling and analysis using statistical computer packages.</p> <p>Prerequisites: [WST211] and [WST221] and [WST311 GS] and [WTW211 GS] and [WTW218 GS]</p>					
WST322	ACTUARIAL_STATISTICS_322				
NAS_WST	WST362	Bilingual	2 + 1	S2	18
<p>Decision theory. Loss distributions. Reinsurance. Risk models. Ruin theory. Credibility theory. Methods to forecast future claim numbers and amounts. The generalized linear model: Exponential family, mean and variance, link functions, deviance and residual analysis, test statistics, log-linear and logit models. Practical statistical modelling and analysis using statistical computer packages.</p> <p>Prerequisites: [WST211] and [WST221] and [WTW211 GS] and [WTW218 GS]</p>					

WTW101	MATHEMATICS_101				
NAS_WTW	n a	Double	4 + 1	J1	16
This module includes the syllabus of Calculus 114, as well as enrichment. Enrichment includes computer based modules. Real numbers and the coordinate plane. Functions and their zero's. Polynomials. Exponential and logarithmic functions. Vector algebra. Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, optimisation and applications. The mean value theorem, the rule of L'Hospital. Definite and indefinite integrals, the fundamental theorem of Calculus, the mean value theorem for integrals, integration techniques. (4 lectures, 1 computer session, 1 tutor session) Prerequisite: [Par 1.2]					
WTW114	CALCULUS_114				
NAS_WTW	n a	Double	4 + 1	S1	16
Vector algebra with applications to geometry. Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Definite and indefinite integrals, the fundamental theorem of Calculus, the mean value theorem for integrals, integration techniques. This course serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218 and WTW 220). Students will not be credited for more than one of the following modules for their degree: WTW 114, WTW 158, WTW 134. (4 lectures and 1 tutorial of 3 hours) Prerequisite: [Par 1.2]					
WTW115	DISCRETE_STRUCTURES_115				
NAS_WTW	n a	Double	2 + 1	S1	8
Propositional logic: truth tables, logical equivalence, implication, arguments. Mathematical induction and well-ordering principle. Counting techniques: elementary probability, multiplication and addition rules, permutations and combinations, binomial theorem, inclusion-exclusion rule. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [Par 1.2]					
WTW123	NUMERICAL_ANALYSIS_123				
NAS_WTW	n a	Double	2 + 1	S2	8
Non-linear equations, numerical integration, initial value problems for differential equations, systems of linear equations. Algorithms for elementary numerical techniques are derived and implemented in computer programs. Error estimates and convergence results are treated. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW114 GS or WTW101 GS]					
WTW126	LINEAR_ALGEBRA_126				
NAS_WTW	n a	Double	2 + 1	S2	8
Vector algebra with applications, matrix algebra, systems of linear equations, the vector space \mathbb{R}^n , bases, determinants. Mathematical induction. Complex numbers and factorisation of polynomials. This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 211). Students will not be credited for more than one of the following modules for their degree: WTW 126, WTW 161. This module also includes a formal technique mastering programme. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [Par 1.2]					
WTW128	CALCULUS_128				
NAS_WTW	n a	Double	2 + 1	S2	8
Integration techniques, improper integrals. Applications of integration, introduction to differential equations. Elementary power series and Taylor's theorem. Vector functions, space curves and arc lengths. Quadratic surfaces and multivariable functions. This course serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218 and WTW 220). Students will not be credited for more than one of the following modules for their degree: WTW 128, WTW 168, WTW 138. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW114 GS or WTW101 GS]					

WTW134	MATHEMATICS_134					
NAS_WTW	n a	Double	4 + 1	S1	16	
<p>Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration. Discrete probability, matrices, solutions of systems of equations. Markov chains. Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 114, WTW 158. WTW 134 does not generally lead to admission to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW134 can also be taken in the second semester. (4 lectures and 1 tutorial of 1½ hours)</p> <p>Prerequisite: [Par 1.2]</p>						
WTW138	CALCULUS_138					
NAS_WTW	WTW128	Double	4 + 1	S1	8	
<p>The content of this module is identical to the syllabus of Calculus 128. This module follows WTW 101. Integration techniques, improper integrals. Applications of integration, elementary differential equations. Elementary power series and Taylor's theorem. Vector functions, space curves and arc lengths. Quadratic surfaces and multivariable functions. Students will not be credited for more than one of the following modules for their degree: WTW 138, WTW 128, WTW 168. (4 lecturers and 1 tutorial of 1 hour)</p> <p>Prerequisite: [WTW114 GS or WTW101 GS]</p>						
WTW152	MATHEMATICAL_MODELING_152					
NAS_WTW	n a	Double	2 + 1	S1	8	
<p>Introduction to the modelling of dynamic processes using difference equations. Curve fitting. Continuous dynamic systems, modelled by differential equations. Applications to real-life situations in, among others, finance, economics and ecology. (2 lectures and 1 tutorial of 1½ hours). WTW152 can also be taken in the second semester.</p> <p>Prerequisite: [Par 1.2]</p>						
WTW158	CALCULUS_158					
NAS_WTW	n a	Double	4 + 1	S1	16	
<p>Vector algebra with applications to geometry. Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Indefinite integrals, integration techniques. This module is designed for first year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 158, WTW 114, WTW 134. (4 lectures and 1 tutorial of 3 hours)</p> <p>Prerequisite: [Par 1.2]</p>						
WTW161	LINEAR_ALGEBRA_161					
NAS_WTW	n a	Double	2 + 1	S2	8	
<p>Vector algebra with applications, matrix algebra, systems of linear equations, the vector space \mathbb{R}^n, bases, determinants. Mathematical induction. Complex numbers and factorisation of polynomials. Conic sections. This module is designed for first year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 161, WTW 126. (2 lectures and 1 tutorial of 1½ hours)</p> <p>Prerequisite: [Par 1.2]</p>						
WTW162	DYNAMICAL_PROCESSES_162					
NAS_WTW	n a	English	2 + 1	S2	8	
<p>Dynamical systems for real functions, including study of orbits and bifurcation. Complex functions, dynamical systems for complex functions, fractal behaviour with examples (such as Julia sets, Mandelbrot set), fractal dimension. Iterated function systems, examples and applications. Examples of chaotic behaviour found for instance in finances, numerical methods and weather. (2 lectures and 1 tutorial of 1½ hours)</p> <p>Prerequisites: [WTW114 GS or WTW101 GS] and [WTW152 GS]</p>						

WTW168	CALCULUS_168				
NAS_WTW	n a	Double	2 + 1	S2	8
Integration techniques, improper integrals. The definite integral, fundamental theorem of Calculus. Applications of integration. Elementary power series and Taylor's theorem. Vector functions, space curves and arc lengths. Quadratic surfaces and multivariable functions. This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 168, WTW 128, WTW 138. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW114 GS or WTW101 GS or WTW158 GS]					
WTW211	LINEAR_ALGEBRA_211				
NAS_WTW	n a	Double	2 + 1	S1	12
Matrices and linear equations, linear independence, real vector spaces and subspaces, eigenvalues, eigenvectors, diagonalisation of matrices, applications of eigenvalue problems, linear transformations. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW126]					
WTW218	CALCULUS_218				
NAS_WTW	n a	Double	2 + 1	S1	12
Calculus of multivariable functions, directional derivatives. Extrema and Lagrange multipliers. Multiple integrals, polar, cylindrical and spherical coordinates. Line integrals and the theorem of Green. Surface integrals and the theorems of Gauss and Stokes. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW114 or WTW101] and [WTW128]					
WTW220	ANALYSIS_220				
NAS_WTW	n a	Double	2 + 1	S2	12
Properties of real numbers. Analysis of sequences and series of real numbers. Power series and theorems of convergence. The Bolzano-Weierstrass theorem and the intermediate value theorem. Analysis of real-valued functions on an interval. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW114 or WTW101] and [WTW128]					
WTW221	LINEAR_ALGEBRA_221				
NAS_WTW	n a	Double	2 + 1	S2	12
Change of basis, diagonalisability of linear transformations, orthogonal vectors, unitary and orthogonal transformations, canonical forms, applications. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW211]					
WTW285	DISCRETE_STRUCTURES_285				
NAS_WTW	n a	Double	2 + 1	S2	12
Counting techniques: combinations with repetition, functions. Pigeon-hole principle. Countability and computability. Setting up and solving recurrence relations. Graphs: paths, cycles, trees, isomorphism. Graph algorithms: Kruskal, Prim, Fleury, loop invariants. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW115]					
WTW286	DIFFERENTIAL_EQUATIONS_286				
NAS_WTW	n a	English	2 + 1	S2	12
Theory and solution methods for linear differential equations as well as for systems of linear differential equations. Solution methods for first order non-linear differential equations. The Laplace transform. Introduction to qualitative analysis of linear and non-linear systems. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW114 or WTW101] and [WTW126] and [WTW128]					
WTW310	ANALYSIS_310				
NAS_WTW	n a	Bilingual	2 + 1	S1	18
Topology of finite dimensional spaces: Open and closed sets, compactness, connectedness and completeness. Theorems of Bolzano-Weierstrass and Heine-Borel. Properties of continuous functions and applications. Integration theory in \mathbb{R}^1 and \mathbb{R}^n . Sequences of functions. (2 lectures and 1 tutorial of 1½ hours) Prerequisite: [WTW220]					

WTW320	ANALYSIS_320				
NAS_WTW	n a	Bilingual	2 + 1	S2	18
Series of functions, power series and Taylor series. Complex functions, Cauchy-Riemann equations, Cauchy's theorem and integral formulas. KMS states. Laurent series, residue theorem and calculation of real integrals using residues. (2 lectures and 1 tutorial of 1½ hours). Prerequisites: [WTW218] and [WTW310]					
WTW354	FINANCIAL_ENGINEERING_354				
NAS_WTW	n a	English	2 + 1	S1	18
Mean variance portfolio theory. The capital asset pricing model, factor models. Utility functions. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WST211] and [WTW211] and [WTW218]					
WTW364	FINANCIAL_ENGINEERING_364				
NAS_WTW	n a	English	2 + 1	S2	18
Discrete time financial models: Arbitrage and hedging; the binomial model. Continuous time financial models: The Black-Scholes formula; pricing of options and the other derivatives; interest rate models; numerical procedures. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WST211] and [WTW211] and [WTW218] and [WTW286]					
WTW381	ALGEBRA_381				
NAS_WTW	n a	Bilingual	2 + 1	S1	18
Group theory: Definition, examples, elementary properties, subgroups, permutation groups, isomorphism, order, cyclic groups, homomorphisms, factor groups. Ring theory: Definition, examples, elementary properties, ideals, homomorphisms, factor rings, polynomial rings, factorisation of polynomials. Field extensions, applications to straight-edge and compass constructions. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW114 or WTW101] and [WTW211]					
WTW382	DYNAMICAL_SYSTEMS_382				
NAS_WTW	n a	Bilingual	2 + 1	S1	18
Matrix exponential function: Homogeneous and non-homogeneous linear systems of partial differential equations. Qualitative analysis of systems: phase portraits, stability, linearisation, energy method and Liapunov's method. Introduction to chaotic systems. Application to real life problems. (2 lectures and 1 tutorial of 1½ hours). This module is not presented every year - please consult the Head of Department. Prerequisites: [WTW220] and [WTW286]					
WTW383	NUMERICAL_ANALYSIS_383				
NAS_WTW	n a	Bilingual	2 + 1	S2	18
Direct methods for the numerical solution of systems of linear equations, pivoting strategies. Iterative methods for solving systems of linear equations and eigenvalue problems. Iterative methods for solving systems of nonlinear equations. Introduction to optimization. Algorithms for the considered numerical methods are derived and implemented in computer programs. Complexity of computation is investigated. Error estimates and convergence results are proved. (2 lectures and 1 practical of 1½ hours) Prerequisites: [WTW114 or WTW101] and [WTW128] and [WTW211]					
WTW385	DISCRETE_STRUCTURES_385				
NAS_WTW	n a	Bilingual	2 + 1	S2	18
Basic combinatorial objects: Selections, arrangements, permutations, partitions. Algorithmic generation of combinatorial objects. Generating functions, group actions, Polya theory. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW126] and [WTW218] and [WTW285]					
WTW386	PARTIAL_DIFF_EQUATIONS_386				
NAS_WTW	n a	Bilingual	2 + 1	S1	18
Conservation laws and modelling. Fourier analysis. Heat equation, wave equation and Laplace's equation. Solution methods including Fourier series. Energy and other qualitative methods. (2 lectures and 1 tutorial of 1½ hours) Prerequisites: [WTW218] and [WTW286]					

WTW389	GEOMETRY_389				
NAS_WTW	n a	Bilingual	2 + 1	S2	18
Elementary Euclidean geometry. Axiomatic development. The parallel postulate and non-Euclidean geometry. Orthogonal circles and inversion in circles. Models of different geometries. (2 lectures and 1 tutorial of 1½ hours)					
Prerequisite: [WTW211]					
ZEN161	ANIMAL_DIVERSITY_161				
NAS_ZEN	n a	Double	2 + 0.5	S2	8
Animal classification, phylogeny, organization and terminology. Evolution of the various animal phyla, morphological characteristics and life cycles of parasitic and non-parasitic animals.					
Structure and function of reproductive, respiratory, excretory, circulatory and digestive systems.					
ZEN251	INVERTEBRATE_BIOLOGY_251				
NAS_ZEN	n a	English	4 + 1	K1	12
Origin and extent of modern invertebrate diversity; parasites of man and domestic animals; biology and medical importance of arachnids; insect life styles; the influence of the environment on insect life histories; insect phytophagy, predation and parasitism; insect chemical, visual, and auditory communication; freshwater invertebrates and their use as biological indicators.					
ZEN261	AFRICAN_VERTEBRATES_261				
NAS_ZEN	n a	English	4 + 1	K3	12
Introduction to general vertebrate diversity; African vertebrate diversity; vertebrate structure and function; vertebrate evolution; vertebrate relationships; aquatic vertebrates; terrestrial ectotherms; terrestrial endotherms; vertebrate characteristics; classification; structural adaptations; habits; habitats; conservation problems; impact of humans on other vertebrates.					
ZEN351	POPULATION_ECOLOGY_351				
NAS_ZEN	n a	English	4 + 2	K1	18
Scientific approach to ecology; evolution and ecology; the individual and its environment; population characteristics and demography; competition; predation; plant-herbivore interactions; regulation of populations; population manipulation.					
ZEN352	MAMMALOGY_352				
NAS_ZEN	n a	English	4 + 2	K1	18
Mammalian origins and their characteristics: evolution of African mammals; structure and function: integument changes; support and movement; foods and feeding; environmental adaptations; reproduction; behaviour; ecology and biogeography; social behaviour; sexual selection; parental care and mating systems; community ecology; zoogeography. Special topics: parasites and diseases; domestication and domesticated mammals; conservation.					
ZEN353	COMMUNITY_ECOLOGY_353				
NAS_ZEN	n a	English	4 + 2	K2	18
The scientific approach; characteristics of the community; the community as a super-organism; community changes; competition as a factor determining community structure; disturbance as a determinant of community structure; community stability; macroecological patterns and mechanisms.					
ZEN354	PHYSIOLOGY_354				
NAS_ZEN	n a	English	4 + 2	K2	18
The course in animal physiology is designed to promote understanding of animals as integrated systems at every level of organization. The course focuses on the function of tissues, organs and organ systems of multicellular organisms in chemical and physical terms. Animal physiology is the study of how a living animal functions.					
This course adopts a systems-based approach that covers many of the sub-disciplines of physiology, ranging from neural physiology and endocrinology to mechanoreception and osmoregulation.					

ZEN355	INSECT_DIVERSITY_355					
NAS_ZEN	n a	English	4 + 2	K1	18	
The extent and significance of insect diversity. Functional insect morphology. The basic principles of taxonomy and the classification of taxa within the Insecta. Insect orders and economically and ecologically important southern African insect families. Identification of insect orders and families using distinguishing characteristics. General biological and behavioural characteristics of each group. Grouping of insects into similar life-styles and habitats.						
ZEN361	ECOPHYSIOLOGY_361					
NAS_ZEN	n a	English	4 + 2	K3	18	
The costs of living; factors affecting metabolic rate; limitations to the acquisition of energy and nutrients; the principles of nutritional ecology; problems associated with herbivorous diets; the effects of temperature on whole organism processes and the response of species to temperature variation; ectothermic and endothermic temperature regulation; animal responses to high and low temperatures; water balance physiology of insects and vertebrates; osmoregulation in aquatic and terrestrial environments; the importance of physiological ecology for understanding geographic variation in body size, range size, and abundance.						
ZEN362	EVOLUTION_AND_PHYLOGENY_362					
NAS_ZEN	n a	English	4 + 2	K3	18	
Evolution as a process and pattern, prime movers in evolution: selection, drift, general population genetics. Population differentiation, clines, subspecies and species, adaptation as a major force in evolution and the panglossian paradigm, molecular evolution. Phylogeography, phylogenetic reconstruction. Evolutionary biogeography. Adaptation, Darwin's formulation, proximate and ultimate causation, genetic and developmental constraints, optimality. Phenotypic models, the comparative method, convergent evolution. Evolution of complex biological systems, origin of life and sex, macro-evolution, punctuated equilibrium, human evolution. Levels of selection. Species concepts.						
ZEN363	BEHAVIOURAL_ECOLOGY_363					
NAS_ZEN	n a	English	4 + 2	K4	18	
The history of behavioural ecology. A causal, developmental, evolutionary and adaptive approach. Sensory systems and communication. Sexual selection, mate choice and sperm competition. Kin selection and group living. Special reference to social insects. The behavioural ecology of humans. Phylogenetic basis of behavioural analysis. The role of behavioural ecology in conservation planning.						
ZEN364	CONSERVATION_ECOLOGY_364					
NAS_ZEN	n a	English	4 + 2	K4	18	
This course is intended to provide students with skills to undertake field surveys that are essential for research and planning in the conservation of biodiversity. The course has a large fieldwork component. A field trip will be conducted over a ten-day period during the September vacation in the Sani Pass region of the Drakensberg (including South Africa and Lesotho). The students will be actively involved in planning and executing the field surveys, and will be responsible for analysing and presenting the results. The students will gain valuable practical experience in the field by applying a number of survey techniques and focusing on several different taxa that are relevant to conservation ecology.						
ZEN365	INSECT_PEST_MANAGEMENT_365					
NAS_ZEN	n a	English	4 + 2	K4	18	
Definition, classification and characteristics of insect pests. Concepts of economic levels. Monitoring, surveys, sampling and forecasting. Yield loss assessment. Philosophy and context of integrated pest management. Alternative methods of pest control. Insecticide resistance and management. Important pests of South African agricultural crops, gardens and lawns. It is strongly recommended that students first complete ZEN 355: Insect Diversity 355.						

POSTGRADUATE STUDIES

Sc.9 HONOURS DEGREES

SC.9.1 BACCALAUREUS SCIENTIAE HONORES [BSc(Hons)]

Also consult General Regulations G.1.3; G.16 – G. 29 and G.62.

(a) Admission requirements and prerequisites

(i) For the BSc(Hons) degree

Subject to the stipulations of General Reg. G.16, a student is only admitted to the study for the honours degree if he or she holds the BSc or BSecEd(Sci) degree and provided that he or she complies with the stipulations for the particular modules as set out in the syllabi descriptions.

(ii) The curriculum is compiled in consultation with the head of department, from whom full details may be obtained except if mentioned otherwise.

(iii) In cases where the required subject or linguistic basis is lacking, additional modules may be prescribed.

(b) Examination admission and pass requirements

For preparation, evaluation and examination of essays, consult the manual of the Faculty, which is obtainable on request from the head of department. The pass mark for essays is at least 50%. The stipulations regarding pass requirements for dissertations in General Regulation G.60 apply *mutatis mutandis* to essays.

(c) Degree with distinction

The BSc(Hons) degree is awarded with distinction to a candidate who obtains a weighted average of at least 75% in all the prescribed modules and a minimum of 65% in any one module.

(d) Degrees

<u>Discipline</u>	<u>Degree code</u>
Actuarial Mathematics	02240273
Applied Mathematics	02240171
Biochemistry	03241011
Bioinformatics	03241014
Biotechnology	02240392
Botany	03241091
Chemistry	02240121
Computer Science	02240081
Engineering and Environmental Geology	02240372
Entomology	03241031
Exploration Geophysics	02240351
Financial Engineering	02240274
Food Science	03240921
Genetics	03241051
Geography	02240411
Environmental Analysis and Management	02240412
Geoinformatics	02240408
Geology	02240141
Mathematical Statistics	02240191
Mathematics of Finance	02240272
Mathematics	02240181
Meteorology	02240070
Microbiology	03240911

Nutrition and Food Sciences	02240373
Physics	02240231
Plant Pathology	03240931
Soil Science	03240901
Teaching of Mathematics	02240271
Wildlife Management	03241001
Zoology	03241021

Sc.9.2 BACCALAUREUS INSTITUTIONIS AGRARIAE HONORES [BInstAgrar(Hons)]

Also consult General Regulations G.16 to G.29

(a) Admission requirements

Subject to the stipulations of General Regulations G.1.3 and G.62, a candidate must hold the BInstAgrar degree or an appropriate bachelor's degree to be admitted to the BInstAgrar(Hons). Additional modules, other than the honours modules, in the field(s) of specialization may be prescribed by the Dean, on the recommendation of the head(s) of the department(s) concerned.

(b) Duration

Training is offered full-time, and in certain fields of specialization also on part-time basis. The module extends over at least two semesters for full-time students, while the part-time module extends over at least four semesters.

(c) Curriculum

The curriculum consists of a minimum of eight modules, which include the following:

A common core of modules, ARD 780 and 783 is compulsory for all fields of specialization, except in the case of the Extension option, for which only ARD 781 and 782 are compulsory.

Credit for equivalent modules already passed may be considered, in which case suitable alternative modules will be prescribed by the Dean in consultation with the relevant heads of the department concerned.

The prescribed module work in the student's field of specialization. Credit for equivalent modules already passed may be considered, in which case suitable alternative modules will be prescribed by the Dean in consultation with the heads of the department concerned.

Additional modules required for the particular field of specialization, as stipulated by the Dean in consultation with the head of the department concerned.

(d) Degree with distinction

A student must obtain a weighted average of at least 75 % in all the prescribed modules, with a minimum of 65 % in each of the modules to pass the degree with distinction.

(e) Degrees

<u>Discipline</u>	<u>Degree code</u>
Agricultural Economics	03242021
Crop Protection	03242062
Extension	03242011
Food Production and Processing	03242172
Rural Development	03242121
Land-use Planning	03242051
Plant Production	03242031
Plant Protection	03242061
Plant Quarantine	03242183
Rural Development and Ecotourism	03242152
Rural Development Planning	03242023
Rural Engineering Technology	03242141
Rural Household Development	03242182
Sustainable Ecological Management	03242131
Sustainable Insect Management	03242101

Sc.10	MASTER'S DEGREES
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Sc.10.1	MAGISTER SCIENTIAE (MSc)
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Also consult General Regulations G.30 – G.44.

(a) Admission requirements

MSc degree: Subject to the stipulations of General Regulations G.30, G.1.3 and G.62, an applicable honours degree is a prerequisite for admission. Additional requirements may be set by the Dean on the recommendation of the head of department. A candidate with an average mark of less than 60% for the honours degree will only be admitted to the MSc degree study with the approval of the Dean on the recommendation of the head of department.

(b) Conferment of degree

The MSc degree is conferred by virtue of a dissertation and such additional postgraduate modules as may be prescribed.

(c) Pass requirements

- (i) A pass mark of at least 50% must be obtained in both the dissertations and the additional prescribed modules, if such additional module work is prescribed.
- (ii) Preparation, evaluation and examination of dissertation are available from the head of Department on request. The passmark for dissertations is 50%. The stipulations with regard to pass requirements for dissertations in G.60.2.1.2 (a) apply *mutatis mutandis* to theses.

(d) Degree with distinction

The degree is conferred with distinction on a student who obtains a final average of at least 75%, as well as at least 75% is obtained for the dissertation/research report and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(e) General

Students should take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G. 61).

(f) Degrees

<u>Discipline</u>	<u>Degree code</u>
Actuarial Mathematics	02250395
Applied Mathematics	02250171
Applied Mineralogy	02250381
Biochemistry	03251011
Bioinformatics	03251014
Biotechnology	03251052
Botany	03251091
Chemistry	02250121
Computer Science	02250081
Conservation Ecology and Planning	03251028
Earth Science Practice and Management	02250072
Engineering and Environmental Geology	02250372
Entomology	03251031
Environment and Society	03251032
Environmental Ecology	03251033
Environmental Economy	03251034
Environmental Education	02250443
Exploration Geophysics	02250431

Food Science and Technology	03251110
Food Science	02250444
Genetics	03251051
Geography	02250411
Geo-Informatics	02250412
Geology	02250141
Integrated Pest and Disease Management	03251024
Financial Engineering	02250184
Mammology	03251027
Mathematical Statistics	02250191
Mathematics Education	02250183
Mathematics of Finance	02250182
Mathematics	02250181
Meteorology	02250070
Microbiology	03250911
Nutrition	03251106
Physics	02250231
Plant Pathology	03250881
Post Harvest Technology	03251102
Science Education	02250442
Soil Science	02250393
Systematics and Conservation Evaluation	03251026
Water Resource Management	03251035
Wildlife Management	03251001
Zoology	03251021

Sc.10.2 MAGISTER PHILOSOPHIAE [MPhil] (Code: 03250700)

Also consult General Regulation G. 62

(a) Admission requirements

Students wishing to enroll for the MPhil(Wildlife Management) should have a approved four-duration first degree at a recognized university or any qualification that is accepted by the Senate as equivalent to it in terms of Regulation G. 62.

(b) Duration

The duration of the internet-based part-time programme is two years. The theoretical component forms 40%, the research project and thesis 35% and the practical component 25% of the course.

(c) Curriculum

This course aims to educate candidates interested in this field but who come from non-biological backgrounds. It is a postgraduate course focusing on the philosophy, ethics, ecological principles and application of wildlife management.

Sc.10.3 MAGISTER SCIENTIAE AGRICULTURAE [MSc(Agric)]
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Also consult General Regulations G.30 to G.44.

(a) Requirements for admission

Subject to the stipulations of General Regulations G.1.3 and G.62, the four-year BSc(Agric) degree with an average of 60% in the final year of the major subject is a requirement for admission to the MSc(Agric) degree. Additional requirements may be stipulated by the head of department.

(b) Duration

Duration of study is at least two years of uninterrupted full-time study (or the part-time equivalent) at this University.

(c) Residence

The Dean may on the recommendation of the head of the department concerned, set particular requirements concerning residence during master's degree studies.

(d) Curricula

The curriculum for the MSc(Agric) degree consists of:

- (i) a dissertation; and
further study in the major subject, supplemented by ancillary module/s as may be required by the Dean, on the recommendation of the head of department. Students who hold the BSc(Agric)(Hons) degree may be exempted from further ancillary modules.
- (ii) A total of 240 credits is required for the MSc(Agric) degree, of which 120 are for the dissertation.
- (iii) A student who has been registered for at least two semesters and who has obtained at least half of the credits for the MSc(Agric) degree, including the research project, may apply to have a BSc(Agric)(Hons) degree conferred on him or her *pro forma*.

(e) Examinations and pass requirements

- (i) The final examinations for the MSc(Agric) may only be taken at the end of the second year of study.
- (ii) The examinations in the ancillary modules, if required, must be passed before or concurrent with the examinations in the major subject, unless the Board of the Faculty decides differently.
- (iii) General Regulation G.12.2, as well as paragraph 4 of the Faculty regulations pertaining to examination admission and pass requirements, are applicable to the calculation of marks.
- (iv) A student must pass all prescribed modules as well as the dissertation to obtain the MSc(Agric) degree.
- (ii) The degree is conferred with distinction on a student who obtains a final mark of at least 75%, as well as at least 75% for the dissertation/research report and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(f) General

Students should take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G.61).

(g) Degrees

<u>Discipline</u>	<u>Degree code</u>
Agricultural Economics	03250041
Agricultural Extension	03251030
Agronomy	03250454
Animal Science: Production Management	03250441
Animal Science: Animal Breeding and Genetics	03250457
Animal Science: Livestock Nutrition	03250341
Animal Science: Meat Science	03250122
Animal Science: Production Physiology	03250391
Food Science and Technology	03250261
Horticulture	03250091
Mechanized Agriculture	03250453
Pasture Science	03250455
Plant Breeding	03250452
Soil Science	03250456

Sc.10.4 MAGISTER INSTITUTIONIS AGRARIAE [MInstAgrar]

Also consult General Regulations G. 30 to G. 44.

(a) Admission requirements

Subject to the stipulations of General Requirements G.1.3 and G. 62, a candidate must hold the BInstAgrar, an appropriate four-year degree or an appropriate honours degree for admission to the MInstAgrar degree study. Additional modules may be prescribed by the Dean on the recommendation of the head of department. A candidate with an average mark of less than 60 % for the honours degree will only be admitted to MInstAgrar study with the approval of the Dean, on the recommendation of the head of the department.

(b) Curriculum

The curriculum consists of further study in the field of specialization and a dissertation, or alternatively an essay, which encompasses research conducted by the student under supervision of a member of the academic staff.

(a) Degree with distinction

The degree is conferred with distinction on a student who obtains a final mark of at least 75%, as well as at least 75% for the dissertation/research report and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(d) General

Students must take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G. 61).

(e) Degrees

<u>Discipline</u>	<u>Degree code</u>
Agricultural Economics	03252021
Agronomy	03252072
Animal Production Management	03252093
Crop Protection	03252062
Environmental Management (Taught)	03252132
Extension	03252011
Food Production and Processing	03252112
Horticulture	03252082
Rural Development and Ecotourism	03252152
Rural Development Planning	03252023
Rural Development	03252121
Land-use Planning	03252051
Pasture Science	03252092
Plant Protection	03252061
Plant Quarantine	03252141
Rural Development Planning	03252023
Rural Engineering Technology	03252191
Rural Household Development (Taught)	03252162
Rural Household Development	03252163
Sustainable Ecological Management	03252131
Sustainable Insect Management	03252101

Sc.10.5 MASTER'S IN CONSUMER SCIENCE [MConsSc]

(a) Admission requirements

A four-year BConsumer Science or other applicable degree.

(b) Duration

A minimum of two years full-time and a maximum of four years part-time study

(c) Programme options

There are four disciplines with two further options to choose from, each with a minimum of 240 credits:

(i) Dissertation option

Interior Merchandise Management	02253004
Clothing Management	02253006
General	02253009
Food Management	02253008

(ii) Coursework option with essay

Interior Merchandise Management	02253003
Clothing Management	02253005
General	02253010
Food Management	02253007

(d) Curriculum (a minimum of 240 credits)

(i) Dissertation option

Research Methodology 814 (30 credits)
 Theoretical Orientation (30 credits)*
 Electives (a minimum of 60 credits)
 HHK890 (Dissertation) (120 credits)

(ii) Coursework option

Research Methodology 814 (30 credits)
 Theoretical Orientation (30 credits)*
 Electives (4x30=120 credits)
 HHK892 (Dissertation) (60 credits)

*To earn credits for the Theoretical Orientation, at least one of the following options must be taken:

- HSK 810: Social-cultural studies (Cultural orientation) (15 credits)
- HSK 812: Social-cultural studies (Consumer orientation) (15 credits)
- HSK 813: Social-cultural studies (Social and cognitive orientation) (15 credits)
- HSK 811: Social-cultural studies (Alternative orientation. Other applicable orientations offered in and outside the Department can be taken additionally) (15-30 credits).

Students choose electives on 800-level from the following four electives groupings:

- Clothing and Textiles
- Foods, Nutrition and Foodservice Management
- Interior Merchandising and Consumer Facilitation
- Resource Management, Development and Education

Depending on the field of study, a maximum of two postgraduate modules may be selected from disciplines from other departments.

Students who already have an honours degree related to one of the chosen areas of study, may apply for exemption of certain modules.

Depending on the academic background of the student and the chosen area of study, it may be required of the student to take additional modules.

Work on the dissertation/essay consists of three parts, namely the research proposal, project execution and an oral presentation of the research results.

A basic module in Statistics is compulsory when a quantitative approach is used for a research project.

- (e) **Prerequisites for the dissertation/essay**
The Department can be consulted for more information on the structuring of programmes, the content of the theoretical orientations, and electives including their prerequisites.

(f) **Degrees**

Discipline	Degree code
Interior Merchandise Management	02253004
Interior Merchandise Management (Taught)	02253003
Clothing Management	02253006
Clothing Management (Taught)	02253005
General	02253009
General (Taught)	02253010
Food Management	02253008
Food Management (Taught)	02253007

DOCTORATES

Sc.11 PHILOSOPHIAE DOCTOR [PhD]

Also consult General Regulations G.45 to G.55.

- (a) **Admission requirements**
- (i) **PhD degree**
Subject to the stipulations of General Regulations G.1.3, G.45 and G.62, no student will be admitted to the study for a doctor's degree unless he or she holds a master's degree or has been admitted to the status thereof. Further requirements for admission, if any, are set out in the syllabi of the various departments.
- (ii) **PhD in Consumer Science**
M Consumer Science or applicable Master's degree with a pass mark of at least 60%. To proceed with the thesis, a student should have fulfilled the requirements for the Master's degree regarding:
- Theoretical Orientation
 - Research Methodology (NME 814)
 - The student should also have published at least one article in a research journal during the two years prior to registration for the PhD degree or have proof that one has been accepted for publication in a refereed journal.
 - Furthermore, it should also be evident from the master's thesis or publications that research can be undertaken independently.
 - **NB!** The student may be required to do additional modulework.
- (b) **Duration**
A minimum of two years full-time study.
- (c) **Residence**
Doctoral students may be required to reside at the University for further study on the recommendation of the head of department and with the approval of the Dean.
- (d) **Curriculum**
The curriculum for the PhD degree consists of:
- (i) theoretical knowledge of the major subject and such ancillary modules as may be required; and
- (ii) a thesis.

(e) **Conferring of degree**

- (i) A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.
- (ii) The doctoral examination, either written and/or oral, is compulsory and covers the content of the thesis as well as the subdivisions of the field of study on which the thesis is based.

(f) **General**

Students must take particular note of the maximum period of registration (General Regulation G. 47), as well as of the requirements regarding the submission of a draft article/articles for publication (General Regulation G. 61).

(g) **Degrees**

<u>Discipline</u>	<u>Degree code</u>
Agrarian Extension	03262002
Agricultural Economics	03260042
Agronomy	03262164
Animal Production Management	02260545
Animal Science	03260141
Biochemistry	03260012
Bioinformatics	03260014
Biotechnology	03262162
Botany	03261091
Chemistry	02260451
Computer Science	02260591
Consumer Science: Development	02263003
Consumer Science: Food Management	02263004
Consumer Science: Interior Merchandise Management	02263001
Consumer Science: Clothing Management	02263002
Crop Protection	03262021
Engineering and Environmental Geology	02260542
Entomology	03260121
Environmental Studies	03260127
Exploration Geophysics	02260531
Food Science	02260546
Genetics	03260292
Geography	02260511
Geo-Informatics	02260512
Geology	02260521
Horticulture	02260544
Land Development	03262121
Land-Use Planning	03262012
Mathematical Science	02260761
Mechanized Agriculture	03262163
Meteorology	02260630
Microbiology	03260072
Nutrition	03261006
Pasture Science	03262165
Physics	02260481
Plant Breeding	02260543
Plant Pathology	03260302
Plant Protection	03262151
Plant Quarantine	03262141
Rural Development and Ecotourism	03262152
Rural Development Planning	03262023
Rural Engineering Technology	03262191

Science and Mathematics Education	02260753
Soil Science	03262166
Sustainable Ecological Management	03262131
Sustainable Insect Management	03262132
Wildlife Management	03261001
Zoology	03261021

Sc.12 DOCTOR SCIENTIAE DSc [Code 03260001]

Consult General Regulation G.56.

This degree usually follows on the PhD degree and is conferred by virtue of publications emanating from independent research. The publication must represent a meaningful contribution to a specific subdiscipline.

(a) Guidelines for evaluation

(i) Disciplines

The DSc degree in the Faculty of Natural and Agricultural Sciences is conferred by virtue of published research work in one of the disciplines in the faculty.

(ii) Criteria

The work submitted for the DSc must constitute an original and important contribution to scientific knowledge and insight in that it is

- regarded as a substantial and coherent contribution to the advancement of the frontiers of knowledge and insight into the specific subdiscipline, and
- proof of the candidate's achievement with regard to international leadership in the specific field of scientific research.

The emphasis in the assessment of the work of a DSc candidate must be placed on originality, substance and excellence.

(iii) Presentation

The document submitted for examination must consist of a selection of published articles as well as a substantiated representation in which the grounds for submission and coherency of the work presented is evident.

MEDALS AND PRIZES AWARDED IN THE FACULTY

Name	Donor	Award
A.M. Bosman Medal	Farmers' Weekly	To the most deserving postgraduate student in Animal Science
ABSA Consultants & Actuaries	ABSA	Best performance in Actuarial Science IAS 282
AEASA Prize	Agricultural Economics Association of South Africa	To the best undergraduate student in Agricultural Economics, BSc(Agric), or BCom, who achieves an average mark of at least 70% in Agricultural Economics throughout the years of study
Bruker Prize	Bruker AXS South Africa	For the best performance in Physical Chemistry at BSc(Hons) level
Capespan Prize	Capespan International	To the best student in Plant Pathology or Microbiology in the final year of the BSc(Agric) or BSc degree
Department of Chemistry Prize	Department of Chemistry, UP	Best achievement in Chemistry at 100 level. Best achievement in Chemistry at 200 level.
Department of Physics Prize	Department of Physics, UP	Best achievement in Physics at first-year level. Best achievement in Physics at second-year level. Best achievement in Physics at third-year level Best achievement in Physics at BSc(Hons) level.
Dewald Hattingh Book Prize	Mrs ASJ Hattingh	For the best third-year student in Mathematics.
Dr and Mrs Geyer Floating Trophy	Dr and Mrs J W Geyer	Awarded to a student in the Faculty of Natural and Agricultural Sciences for academic excellence as well as other achievement
Financial Planning Institute	FPI	Best performance in Insurance Science IAS361 & Insurance Science IAS362
Financial Planning Institute	FPI	Best performance in IAS261 & IAS262
Genetics Honours Achievement Award	Genetics Department	To the best honours student in Genetics
GENSEC Prize	GENSEC	Most outstanding honours student in the Financial Mathematics study programme.
H.B. Davel Medal	Farmers' Weekly	To the student who completes the BSc(Agric) degree most successfully
Hannover Reinsurance	Hannover Reinsurance	Best performance in Actuarial Science IAS 382
Hollard Insurance	Hollard Insurance	Best performance in Actuarial Science WST 322
J J Veenstra Floating Trophy	Mr J J Veenstra	To the Animal Science student who displays the most zeal in both the theoretical as well as the practical training of the degree

Name	Donor	Award
Jan F Celliers Book Prize	Dr IB Celliers	Awarded to the best student in Geology on 100-level in the study programmes Geology, Exploration Geophysics or Environmental and Engineering Geology.
Johan and Sophie van Heerden Floating Trophy	Johan and Sophie van Heerden	A student that achieves the highest average mark for Meteorology modules at second and third year level and who passes the third year level modules in a period of one year.
Johan J Theron Trophy	Prof Johan J Theron	The best BSc student with Human Physiology as a major subject (average of second- and third-year modules)
Junior Captain Scott Commemorative Medal	South African Biological Society	To the student who submits the best MSc dissertation in a biological field and on a subject to be dequarterned by the donor
Koos van der Merwe/ AFMA Prize	Animal Feed and Manufacture Association	To a student in the final year of study for the best achievement in Animal Nutrition at any South African university
Margaretha Mes Medal	Botany Department	For the best BSc(Hons) student who obtains the degree with a pass mark of at least 70% and whose essay is based on an aspect of Plant Physiology
Margaretha Mes Memorial Prize	Botany Department	For a female Botany student with the best average (minimum 70%) over four third year modules in Botany.
Medal of the South African Society of Crop Production	South African Society of Crop Production	To the best BSc(Agric) student in Crop Production
Medal: Vice-Chancellor and Principal	UP	Best achievement in all the undergraduate study years in any scientific field at the University of Pretoria
Meiring Naudé Medal	Dr S M Naudé	For the best student who obtained at least 75% in all the theoretical and practical modules for the BSc(Hons) with specialization in Physics.
Merck Merit Award for Biochemistry (Hons)	Merck Chemicals (South Africa)	To the best student who obtains the Honours degree in Biochemistry with distinction
Merck Prize	Merck (Pty) Ltd	Best achievement in Chemistry at 300 level. Best achievement in Analytical Chemistry at 300 level.
Munich Reinsurance	Munich Reinsurance	Best performance in IAS351 & IAS352
Novartis Prize	Novartis	To the best student in Plant Pathology in the final year of the BSc, BSc(Agric) or BInstAgrar degree module
Omnia Fertilizer Award	Omnia Fertilizer Incorporated	To the best final year student in Plant Production and Soil Science
Pierre du Plessis Prize	A group of friends and family of the late Pierre du Plessis.	Student in Physics at 300 level, on condition that the student passes with distinction.
Rentmeester Insurers	Rentmeester	Best performance in IAS211 & IAS221
Richards Bay Minerals Junior Prestige Award	Richards Bay Minerals	For best Honours student in Zoology

Name	Donor	Award
Richards Bay Minerals Senior Prestige Award	Richards Bay Minerals	For best achievement in Zoology at Master's level
Richards Bay Minerals Senior Prestige Award	Richards Bay Minerals	For best achievement in Zoology at doctoral level
Rüsch and Van Biljon-Price	Pieter Rüsch and Gert van Biljon	For the final year project by a B Eng or BSc(Agric) student which shows the best economic potential
Ryan Warren Award	Ryan Warren	Best performance in Financial Mathematics
SA Genetics Society Hofmeyer-Van Schaik Prize	South African Genetics Society	To the best BSc(Agric) or BSc(Hons) student in the fourth year of study who achieves a final mark of at least 75% in Genetics
SA Mathematical Society Bronze Medal	SA Mathematical Society	Best honours student in Mathematics or Applied Mathematics.
SAAB Junior Medal for Botany	South African Association for Botany	For the best doctoral thesis submitted at a South African university by a person not older than 35 years
SAAFoSt Academic Merit Award	South African Association for Food Science and Technology	To the most outstanding student in the final year of the BSc(Agric) degree with specialization in Food Science
Sanlam Financial Advisory Service	Sanlam	Best performance on first-year level in all modules in the Insurance & Actuarial Sciences
SAPBA Prize	South African Plant Breeders Association	To the best final-year student in Plant Breeding
SASAS Prize	South African Society of Animal Science	To the most outstanding undergraduate student in Animal Science
SASAS Prize	South African Society of Animal Science	To the most outstanding post-graduate student(s) in Animal Science at Master's and Doctoral level at any South African university
SASAS Transvaal Branch Award	South African Society of Animal Science	To the most outstanding student in the third year of study in Animal Science
SASDT Meritorious Award	South African Society of Dairy Technology	To a student in the department of Food Science who achieves outstanding academic results, and who displays exceptional enthusiasm for the dairy component of the syllabus
Sasol Prize	Sasol Ltd	Best achievement in Chemistry at 100 level, on condition that the student continues studies in Chemistry. Best achievement in Chemistry at 200 level, on condition that the student continues studies in Chemistry. Best achievement in Chemistry

Name	Donor	Award
		at 300 level. Best achievement in Chemistry at BSc(Hons) level.
Schutte & Associates	Schutte & Associates	Best performance on second-year level in compulsory modules in the Insurance & Actuarial Sciences
Schweickerdt Medal for Botany	The late Prof H G W J Schweickerdt	To the best BSc(Hons) student who obtained the degree with a pass mark of at least 70% and whose essay is based on an aspect of Botany other than Plant Physiology
The ISIS Software Engineering Prize	ISIS	For the best BSc(IT) group project in Software Engineering
The Microsoft Prize	Microsoft	For the best female student in Computer Science at 300 level
The Microsoft Prize	Microsoft	For the best student in the module Operating Systems at 200 level
The Microsoft Prize	Microsoft	For the best student in Computer Science at 100 level
Zoological Society of Southern Africa Prize	Zoological Society of Southern Africa	To the Honours student who obtains the BSc(Hons) degree with the highest average mark.
Zoological Society of Southern Africa Prize	Zoological Society of Southern Africa	To the best student in Zoology at 300 level
Department of Consumer Science		
Annique Theron Achievement Prize	Annique Theron	Top achiever in Home Economics General
Benjamin Woollens Achievement Prize	Benjamin Woollens	Top achiever in Clothing Construction 310 (theory and practice).
Bernina Achievement Prize	Bernina Saskor, JHB	Achievement in Garment Construction 310 (Theory and Practice).
Bernina Achievement Prize	Bernina Saskor, JHB	Best achievement in Clothing Construction 310 (design and creativity).
Bernina Achievement Prize	Bernina Saskor, JHB	Best achievement in Garment Construction 310 (practice).
Husqvarna Achievement Prize	Nordic Sewing Machines	Best achievement in VLG 310, 320 concurrently.
Rees Mann Achievement Prize	Mannettes, JHB	Best student in the commercial production component of Clothing Construction 310.
Award in Agrarian Extension		
Bronze Medal of Honour from the South African Society for Agri-cultural Extension	South African Society for Agricultural Extension	To the best honours student in Agricultural Extension
Wildlife Management		
Van Schaik Prize in Wildlife Management	J L van Schaik Publishers	For the best achievement by a BSc(Hons) student in the final examination with specialization in Wildlife Management
Welder Wildlife Foundation Texas Merit Award	Centre for Wildlife Research	To the best BSc(Hons) student with specialization in Wildlife

Name	Donor	Award
		Management who achieved a final mark of at least 70%, provided that this student is a South African citizen and is registered for a Master's degree at the Centre for Wildlife Management
Not limited to the Faculty		
SRC Honorary Medal	Student Representative Council	Student who delivered the best service to the community.
S ₂ A ₃ Bronze Medal	South African Society for the advancement of science (donor: Sentrachem Ltd)	To a student who completed an extremely good master's study in the field which is traditionally part of the activities of the South African Society for the Advancement of Science (S ₂ A ₃) members of the Convocation of the University of Pretoria.

The Afrikaans text of this publication is the official version and will be given precedence in the interpretation of the content.