University of Pretoria Yearbook 2019

BSc Microbiology (02133404)

Minimum duration of study	3 years
Total credits	428

Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement, a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution, and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded in the calculation of the Admission Point Score (APS).
- Grade 11 results are used for the conditional admission of prospective students. Final admission is based on the Grade 12 results.

Minimum requirements Achievement level English Home Language or English First Additional Language		**Mathematics**		**Physical Science**		**APS**
NSC/IEB	AS Level	NSC/IEB	AS Level	NSC/IEB	AS Level	
5	C	5	C	5	C	**30**

* Cambridge A level candidates who obtained at least a D in the required subjects, will be considered for admission. International Baccalaureate (IB) HL candidates who obtained at least a 4 in the required subjects, will be considered for admission.

Candidates who do not comply with the minimum admission requirements for BSc (Microbiology), may be considered for admission to the BSc – Extended programme for the Biological and Agricultural Sciences. The BSc – Extended programme takes place over a period of four years instead of the normal three years.

BSc Extended Programme for the Biological and Agricultural Sciences

Minimum requirements Achievement level English Home Language or English First Additional Language		**Mathematics**		**Physical Science**		**APS**
NSC/IEB	AS Level	NSC/IEB	AS Level	NSC/IEB	AS Level	
4	D	4	D	4	D	**24**

Other programme-specific information

A student must pass all the minimum prescribed and elective module credits as set out at the end of each year within a programme as well as the total required credits to comply with the particular degree programme. Please refer to the curricula of the respective programmes. At least 144 credits must be obtained at 300-/400-level, or otherwise as indicated by curriculum. The minimum module credits needed to comply with degree requirements is set out at the end of each study programme. Subject to the programmes as indicated a maximum of 150 credits will be recognised at 100-level. A student may, in consultation with the relevant head of department and subject to the permission by the Dean, select or replace prescribed module credits not indicated in BSc three-year study programmes to the equivalent of a maximum of 36 module credits.

It is important that the total number of prescribed module credits is completed during the course of the study programme. The Dean may, on the recommendation of the relevant head of department, approve deviations in this regard. Subject to the programmes as indicated in the respective curricula, a student may not register for more than 75 module credits per semester at first-year level subject to permission by the Dean. A student may be permitted to register for up to 80 module credits in a the first semester during the first year provided that he or she obtained a final mark of no less than 70% for grade 12 Mathematics and achieved an APS of 34 or more in the NSC.

Students who are already in possession of a bachelor’s degree, will not receive credit for modules of which the content overlap with modules from the degree that was already conferred. Credits will not be considered for more than half the credits passed previously for an uncompleted degree. No credits at the final-year or 300- and 400-level will be granted.

The Dean may, on the recommendation of the programme manager, approve deviations with regard to the composition of the study programme.

Please note: Where elective modules are not specified, these may be chosen from any modules appearing in the list of modules.

It remains the student’s responsibility to acertain, prior to registration, whether they comply with the prerequisites of the modules they want to register for.

The prerequisites are listed in the Alphabetical list of modules.

Promotion to next study year

A student will be promoted to the following year of study if he or she passed 100 credits of the prescribed credits for a year of study, unless the Dean on the recommendation of the relevant head of department decides otherwise. A student who does not comply with the requirements for promotion to the following year of study, retains the credit for the modules already passed and may be admitted by the Dean, on recommendation of the relevant head of department, to modules of the following year of study to a maximum of 48 credits, provided that it will fit in with both the lecture and examination timetable.

General promotion requirements in the faculty
All students whose academic progress is not acceptable can be suspended from further studies.

- A student who is excluded from further studies in terms of the stipulations of the abovementioned regulations,

will be notified in writing by the Dean or Admissions Committee at the end of the relevant semester.
- A student who has been excluded from further studies may apply in writing to the Admissions Committee of the Faculty of Natural and Agricultural Sciences for re-admission.
- Should the student be re-admitted by the Admissions Committee, strict conditions will be set which the student must comply with in order to proceed with his/her studies.
- Should the student not be re-admitted to further studies by the Admissions Committee, he/she will be informed in writing.
- Students who are not re-admitted by the Admissions Committee have the right to appeal to the Senior Appeals Committee.
- Any decision taken by the Senior Appeals Committee is final.

Pass with distinction

A student obtains his or her degree with distinction if all prescribed modules at 300-level (or higher) are passed in one academic year with a weighted average of at least 75%, and obtain at least a subminimum of 65% in each of the relevant modules.

Curriculum: Year 1

Minimum credits: 140

Minimum credits: 140
Fundamental = 12
Core = 128

Additional information: Students who do not qualify for AIM 102 must register for AIM 111 and AIM 121.

Students intend applying for **MBChB**, or **BChD** selection, have to enrol for FIL 155(6), MGW 112(6) and MTL 180(12) with the understanding that:

- they defer doing WTW 134 in the first semester, however, should they not be selected and want to continue with a BSc programme, WTW 165 must be taken in the **second** semester of the first year.

Fundamental modules

Academic information management 102 (AIM 102)

Module credits	6.00
Service modules	Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities Faculty of Law Faculty of Health Sciences Faculty of Natural and Agricultural Sciences Faculty of Theology and Religion Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Information Science
Period of presentation	Semester 2

Module content

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology. Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

Academic information management 111 (AIM 111)

Module credits	4.00

Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities Faculty of Law Faculty of Health Sciences Faculty of Natural and Agricultural Sciences Faculty of Theology and Religion
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Information Science
Period of presentation	Semester 1

Module content

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology.

Academic information management 121 (AIM 121)

Module credits	4.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities Faculty of Law Faculty of Health Sciences Faculty of Natural and Agricultural Sciences Faculty of Theology and Religion Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

Module content

Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

Language and study skills 110 (LST 110)

Module credits	6.00
Service modules	Faculty of Natural and Agricultural Sciences Faculty of Veterinary Science

Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Unit for Academic Literacy
Period of presentation	Semester 1

Module content

The module aims to equip students with the ability to cope with the reading and writing demands of scientific disciplines.

Academic orientation 102 (UPO 102)

Module credits	0.00
Language of tuition	Module is presented in English
Department	Natural and Agricultural Sciences Deans Office
Period of presentation	Year

Core modules

Biometry 120 (BME 120)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences Faculty of Veterinary Science
Prerequisites	At least 4 (50-59%) in Mathematics in the Grade 12 examination, or at least 50% in both Statistics 113, 123
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Statistics
Period of presentation	Semester 2

Module content

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 twoway designs, randomised blocks. 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. Computer literacy: Use of computer packages in data analysis and report writing.

Plant biology 161 (BOT 161)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	MLB 111 GS
Contact time	2 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Basic plant structure and function; introductory plant taxonomy and plant systematics; principles of plant molecular biology and biotechnology; adaptation of plants to stress; medicinal compounds from plants; basic principles of plant ecology and their application in natural resource management.

General chemistry 117 (CMY 117)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	A candidate must have Mathematics for at least 60% and 60% for Physical Sciences.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Semester 1

Module content

General introduction to inorganic, analytical and physical chemistry. Atomic structure and periodicity. Molecular structure and chemical bonding using the VSEOR model. Nomenclature of inorganic ions and compounds. Classification of reactions: precipitation, acid-base, redox reactions and gas-forming reactions. Mole concept and stoichiometric calculations concerning chemical formulas and chemical reactions. Principles of reactivity: energy and chemical reactions. Physical behaviour gases, liquids, solids and solutions and the role of intermolecular forces. Rate of reactions: Introduction to chemical kinetics.

General chemistry 127 (CMY 127)

Module credits	16.00

Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	Natural and Agricultural Sciences students: CMY 117 GS or CMY 154 GS Health Sciences students: none
Contact time	4 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Semester 2

Module content

Theory: General physical-analytical chemistry: Chemical equilibrium, acids and bases, buffers, solubility equilibrium, 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 and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds.

Introductory genetics 161 (GTS 161)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Veterinary Science
Prerequisites	MLB 111 GS
Contact time	2 lectures per week, fortnightly tutorials
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Chromosomes and cell division. Principles of Mendelian inheritance: locus and alleles, dominance interactions, extensions and modifications of basic principles.. Probability studies. Sex determination and sex linked traits. Pedigree analysis. Genetic linkage and chromosome mapping. Chromosome variation.

Introduction to microbiology 161 (MBY 161)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MLB 111 GS
Contact time	2 lectures per week, fortnightly tutorials
Language of tuition	Module is presented in English

Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

The module will introduce the student to the field of Microbiology. Basic Microbiological aspects that will be covered include introduction into the diversity of the microbial world (bacteria, archaea, eukaryotic microorganisms and viruses), basic principles of cell structure and function, microbial nutrition and microbial growth and growth control. Applications in Microbiology will be illustrated by specific examples i.e. bioremediation, animal-microbial symbiosis, plant-microbial symbiosis and the use of microorganisms in industrial microbiology. Wastewater treatment, microbial diseases and food will be introduced using specific examples.

Molecular and cell biology 111 (MLB 111)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	A candidate who has passed Mathematics with at least 60% in the Grade 12 examination
Contact time	1 practical/tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Introduction to the molecular structure and function of the cell. Basic chemistry of the cell. Structure and composition of prokaryotic and eukaryotic cells. Ultrastructure and function of cellular organelles, membranes and the cytoskeleton. General principles of energy, enzymes and cell metabolism. Selected processes, e.g. glycolysis, respiration and/or photosynthesis. Introduction to molecular genetics: DNA structure and replication, transcription, translation. Cell growth and cell division.

Physics for biology students 131 (PHY 131)

Module credits	16.00
Service modules	Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	A candidate must have passed Mathematics with at least 60% in the Grade 12 examination
Contact time	1 discussion class per week, 1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Physics

Period of presentation	Semester 1

Module content

Units, vectors, one dimensional kinematics, dynamics, work, equilibrium, sound, liquids, heat, thermodynamic processes, electric potential and capacitance, direct current and alternating current, optics, modern physics, radio activity.

Mathematics 134 (WTW 134)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Veterinary Science
Prerequisites	50% for Mathematics in Grade 12
Contact time	4 lectures per week, 1 tutorial per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

**Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 165, WTW 114, WTW 158. WTW 134 does not lead to admission to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW 134 is offered as WTW 165 in the second semester only to students who have applied in the first semester of the current year for the approximately 65 MBChB, or the 5-6 BChD places becoming available in the second semester and who were therefore enrolled for MGW 112 in the first semester of the current year.*
Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration. Matrices, solutions of systems of equations. All topics are studied in the context of applications.

Mathematics 165 (WTW 165)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Veterinary Science
Prerequisites	50% for Mathematics in Grade 12 and MGW 112# or registered for BVSc
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

Module content

*Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 165, WTW 114, WTW 158. WTW 165 does not lead to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW 165 is offered in English in the second semester only to students who have applied in the first semester of the current year for the approximately 65 MBChB, or the 5-6 BChD places becoming available in the second semester and who were therefore enrolled for MGW 112 in the first semester of the current year.

Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration, matrices, solutions of systems of equations. All topics are studied in the context of applications.

Animal diversity 161 (ZEN 161)

Module credits	8.00
Service modules	Faculty of Education Faculty of Veterinary Science
Prerequisites	MLB 111 GS or permission from the HOD.
Contact time	2 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 2

Module content

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.

Curriculum: Year 2

Minimum credits: 144

Minimum credits:
Core = 144

Additional information:
Single major track:

- **Applied Microbiology option:** ZEN 251 may be replaced with FST 250. Students may replace ZEN 261 and/or BOT 261 with either PLG 262 or FST 260 or BCM 262.
- **Medical Microbiology option:** Students must replace ZEN 251 and BOT 251 with FLG 211 and FLG 212. Students must replace ZEN 261 and BOT 261 with FLG 221 and FLG 222.

Dual major track:

- **Microbiology and Biochemistry combination:** Students must replace ZEN 251 and BOT 251 with CMY 282 and CMY 284. Students must replace ZEN 261 and BOT 261 with CMY 283 and BCM 262.
- **Microbiology and Genetics combination:** Students may replace ZEN 261 with PLG 262.
- **Microbiology and Plant Science option:** Students may replace ZEN 261 with PLG 262.

Core modules

Introduction to proteins and enzymes 251 (BCM 251)

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	CMY 117 GS and CMY 127 GS and MLB 111 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Structural and ionic properties of amino acids. Peptides, the peptide bond, primary, secondary, tertiary and quaternary structure of proteins. Interactions that stabilise protein structure, denaturation and renaturation of proteins. Introduction to methods for the purification of proteins, amino acid composition, and sequence determinations. Enzyme kinetics and enzyme inhibition. Allosteric enzymes, regulation of enzyme activity, active centres and mechanisms of enzyme catalysis. Examples of industrial applications of enzymes and in clinical pathology as biomarkers of diseases. Introduction to practical laboratory techniques and Good Laboratory Practice. Techniques for the quantitative and qualitative analysis of biological molecules, enzyme activity measurements . Processing and presentation of scientific data.

Carbohydrate metabolism 252 (BCM 252)

Module credits	12.00
Service modules	Faculty of Education Faculty of Health Sciences

Prerequisites	CMY 117 GS and CMY 127 GS and MLB 111 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Carbohydrate structure and function. Blood glucose measurement in the diagnosis and treatment of diabetes. Bioenergetics and biochemical reaction types. Glycolysis, gluconeogenesis, glycogen metabolism, pentose phosphate pathway, citric acid cycle and electron transport. Total ATP yield from the complete oxidation of glucose. A comparison of cellular respiration and photosynthesis. Practical techniques for the study and analysis of metabolic pathways and enzymes. PO ratio of mitochondria, electrophoresis, extraction, solubility and gel permeation techniques. Scientific method and design.

Lipid and nitrogen metabolism 261 (BCM 261)

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	CMY 117 GS and CMY 127 GS and MLB 111 GS
Contact time	2 lectures per week, 1 tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Biochemistry of lipids, membrane structure, anabolism and catabolism of lipids. Total ATP yield from the complete catabolism of lipids. Nitrogen metabolism, amino acid biosynthesis and catabolism. Biosynthesis of neurotransmitters, pigments, hormones and nucleotides from amino acids. Catabolism of pureness and pyrimidines. Therapeutic agents directed against nucleotide metabolism. Examples of inborn errors of metabolism of nitrogen containing compounds. The urea cycle, nitrogen excretion. Practical training in scientific reading skills: evaluation of a scientific report. Techniques for separation analysis and visualisation of biological molecules. Hypothesis design and testing, method design and scientific controls.

South African flora and vegetation 251 (BOT 251)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	BOT 161 or permission from head of department
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Origin and affinity of South African flora and vegetation types; principles of plant geography; plant diversity in southern Africa; characteristics, environments and vegetation of South African biomes and associated key ecological processes; centra of plant endemism; rare and threatened plant species; biodiversity conservation and ecosystem management; invasion biology; conservation status of South African vegetation types.

Plant physiology and biotechnology 261 (BOT 261)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	BOT 161, CMY 117, CMY 127 or permission from head of department
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Separate classes for Afrikaans and English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Nitrogen metabolism in plants; nitrogen fixation in Agriculture; plant secondary metabolism and natural products; photosynthesis and carbohydrate metabolism in plants; applications in solar energy; plant growth regulation and the Green Revolution; plant responses to the environment; developing drought tolerant and disease resistant plants.

Molecular genetics 251 (GTS 251)

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	GTS 161 GS
Contact time	fortnightly tutorials, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

The chemical nature of DNA. The processes of DNA replication, transcription, RNA processing, translation. Control of gene expression in prokaryotes and eukaryotes. Recombinant DNA technology and its applications in gene analysis and manipulation.

Genetic diversity and evolution 261 (GTS 261)

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education

Prerequisites	GTS 251 GS
Contact time	2 lectures per week, fortnightly tutorials
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Chromosome structure and transposable elements. Mutation and DNA repair. Genomics and proteomics. Organelle genomes. Introduction to genetic analysis of populations: allele and genotypic frequencies, Hardy Weinberg Law, its extensions and implications for different mating systems. Introduction to quantitative and evolutionary genetics.

Bacteriology 251 (MBY 251)

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MBY 161 GS
Contact time	fortnightly practicals, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Growth, replication and survival of bacteria, Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Bacterial evolution, systematic and genomics. 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.

Mycology 261 (MBY 261)

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MBY 161 GS
Contact time	Fortnightly practicals/tutorials, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Chemical and physiological requirements for growth and nutrient acquisition. Mating and meiosis; spore development; spore dormancy, dispersal and germination. 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 mycotoxicoses; fungi as symbionts of plants, insects and animals. Applications of fungi in biotechnology.

Food microbiology 262 (MBY 262)

Module credits	12.00
Prerequisites	MBY 251 or permission from HOD.
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Primary sources of migroorganisims in food. Factors affecting the growth and survival of microorganisms in food. Microbial quality, spoilage and safety of food. Different organisms involved, their isolation, screening and detection. Conventional approaches, alternative methods rapid methods. Food fermentations: fermentation types, principles and organisms involved.

Invertebrate biology 251 (ZEN 251)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	ZEN 161 GS or permission from the HOD.
Contact time	4 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 1

Module content

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.

African vertebrates 261 (ZEN 261)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	ZEN 161 GS or permission from the HOD.

Contact time	4 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 3

Module content

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.

Elective modules

Physical chemistry 282 (CMY 282)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	CMY 117 and CMY 127
Contact time	4 lectures per week, 2 practicals per week, 1 tutorial per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Quarter 2

Module content

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.

Analytical chemistry 283 (CMY 283)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	CMY 117 and CMY 127
Contact time	2 practicals per week, 4 lectures per week, 1 tutorial per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Quarter 3

Module content

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.

Organic chemistry 284 (CMY 284)

Module credits	12.00
Service modules	Faculty of Education
Prerequisites	CMY 117 and CMY 127
Contact time	2 practicals per week, 4 lectures per week, 1 tutorial per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Quarter 1

Module content

Theory: Resonance, conjugation and aromaticity. Acidity and basicity. Introduction to ^{13}C NMR spectroscopy. Electrophilic addition: alkenes. Nucleophilic substitution, elimination, addition: alkyl halides, alcohols, ethers, epoxides, carbonyl compounds: ketones, aldehydes, carboxylic acids and their derivatives.

Introductory and neurophysiology 211 (FLG 211)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	CMY 117, CMY 127, MLB 111 and PHY 131
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Physiology
Period of presentation	Semester 1

Module content

Orientation in physiology, homeostasis, cells and tissue, muscle and neurophysiology, cerebrospinal fluid and the special senses.
Practical work: Practical exercises to complement the theory.

Circulatory physiology 212 (FLG 212)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	CMY 117, CMY 127, MLB 111 and PHY 131
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Physiology
Period of presentation	Semester 1

Module content

Body fluids; haematology; cardiovascular physiology and the lymphatic system. Practical work: Practical exercises to complement the theory.

Lung and renal physiology, acid-base balance and temperature 221 (FLG 221)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	FLG 211 and FLG 212
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Physiology
Period of presentation	Semester 2

Module content

Structure, gas exchange and non-respiratory functions of the lungs; structure, excretory and non-urinary functions of the kidneys, acid-base balance, as well as the skin and body temperature control.
Practical work: Practical exercises to complement the theory.

Digestion, endocrinology and reproductive systems 222 (FLG 222)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	FLG 211 and FLG 212
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Physiology
Period of presentation	Semester 2

Module content

Nutrition, digestion and metabolism; hormonal control of the body functions and the reproductive systems.
Practical work: Practical exercises to complement the theory.

Introduction to food science and technology 250 (FST 250)

Module credits	12.00
Prerequisites	CMY 117 and CMY 127 and PHY 131 and WTW 134 or WTW 165 or permission from the HOD.
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Consumer and Food Sciences
Period of presentation	Semester 1

Module content

Lectures: Food Science as a discipline. Activities of Food Scientists and Nutritionists. How food is produced, processed and distributed (food pipeline). World food problem. Human nutrition and human food requirements. Constituents of foods: Functional properties. Food quality. Food deterioration and control (food preservation). Unit operations in food processing. Food safety, risks and hazards. 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 and nutritionists; factory visit/videos of food processing.

Principles of food processing and preservation 260 (FST 260)

Module credits	12.00
Prerequisites	CMY 117, CMY 127, MBY 161, PHY 131 and WTW 134 or WTW 165 or permission from the HOD.
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Consumer and Food Sciences
Period of presentation	Semester 1 and Semester 2

Module content

Lectures: Food preservation technologies: concept of hurdle technology; heat (blanching, pasteurisation and sterilisation); cold (refrigeration and freezing); concentration and dehydration; food irradiation; fermentation; preservatives; new methods of food preservation. Effect of various food preservation technologies on the microbiological (shelf-life and safety issues), sensory and nutritional quality of foods. 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.

Principles of plant pathology 262 (PLG 262)

Module credits	12.00
Prerequisites	MBY 161
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Afrikaans and English are used in one class
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Fundamental principles of plant pathology. The concept of disease in plants. Causes of plant diseases. Stages in development of plant diseases. Disease cycles. Diagnosis of plant diseases.

Curriculum: Final year

Minimum credits: 144

Minimum credits: 144
Core = 72
Elective = 72

Additional information:
Single major track:

- **Applied Microbiology option:** Students may select electives from BCM 356, BCM 357, BOT 356, BOT 358, GTS 351, GTS 354, PLG 351, ZEN 355, BCM 367, BCM 368, BOT 365, BTC 361, FST 362, GTS 367 or ZEN 365.
- **Medical Microbiology option:** Students may select electives from BCM 356, BCM 357, BCM 367, BCM 368, GTS 351, GTS 354, GTS 367 or GTS 368.
- Students can only take a module if they comply with all the prerequisites.

Dual major track:

- **Microbiology and Biochemistry combination:** Students must take BCM 356, BCM 357, BCM 367 and BCM 368.
- **Microbiology and Genetics combination:** Students must take GTS 351, GTS 354, GTS 367 and either GTS 368 or BTC 361.
- **Microbiology and Plant Science option:** Students must take BOT 356, BOT 358, BOT 365 and BTC 361.

Core modules

Virology 351 (MBY 351)

Module credits	18.00
Prerequisites	GTS 251 GS and MBY 161 or permission from the HOD.
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

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.

Bacterial genetics 355 (MBY 355)

Module credits	18.00
Prerequisites	GTS 251 GS, GTS 261 GS, MBY 161, MBY 251 GS and MBY 262 GS or permission from the HOD.
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English

Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

DNA replication and replication control. DNA recombination. DNA damage and repair. Genetics of bacteriophages, plasmids and transposons. Bacterial gene expression control at the transcriptional, translational and post-translational levels. Global regulation and compartmentalisation.

Genetic manipulation of microbes 364 (MBY 364)

Module credits	18.00
Prerequisites	BCM 251, GTS 251 and MBY 251 or permission from the HOD.
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

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 mutagenisis 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.

Microbe interactions 365 (MBY 365)

Module credits	18.00
Prerequisites	GTS 251, MBY 251, MBY 261 GS, MBY 262 GS, and MBY 355 GS or permission from the HOD.
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Interactions between microbes and their abiotic environment; microbial interaction with other strains of the same and other species; microbial interactions across kingdoms; pathogenic interactions between microbes and plant or animal hosts; mutualistic interactions between microbes and their hosts; introduction to systems biology.

Elective modules

Macromolecules of life: Structure-function and Bioinformatics 356 (BCM 356)

Module credits	18.00
Prerequisites	BCM 251 or permission from HOD
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Structure, function, bioinformatics and biochemical analyses of nucleotides, oligonucleotides, amino acids, proteins and ligands and their organisation into hierarchial, higher order structures and interdependent systems. Principles of structure-function relationships. Protein folding, sequence motifs and domains, higher order and supramolecular structure, self-assembly, conjugated proteins, post-translational modifications. Principles of molecular recognition in protein-ligand, protein-protein, protein-DNA, protein-RNA, DNA-DNA, DNA-ligand, DNA-RNA and RNA-RNA interactions. The RNA structural world, RNAi, miRNA and ribosomes. Cellular functions of coding and non-coding nucleic acids. Population-specific mutations in disease. Global analysis of proteins through proteomics. Basic principles of nuclear magnetic resonance spectroscopy, mass spectrometry and X-ray crystallography. Protein purification and characterization including, pI, molecular mass, amino acid composition and sequence. Mechanistic aspects and regulation of information flow from DNA via RNA to proteins and back. Lectures incorporate the latest insights into the central dogma of biochemistry and viral polymerases which reverse the information flow ensuring students are prepared for a competitive job market. Practical training include hands-on practical sessions for nucleic acid purification, sequencing and structure characterisation, protein production purification (including SDS-PAGE) and sequence analysis including mass spectrometry, protein structure analysis by 3D protein modelling and protein folding (Bioinformatics).

Biocatalysis and integration of metabolism 357 (BCM 357)

Module credits	18.00
Prerequisites	BCM 251 and BCM 252 and BCM 261 or permission from the HOD
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Enzyme nomenclature and classification. Specificity and mechanisms: the active site, mechanisms of catalysis and examples of specific enzyme mechanisms, e.g. lysozyme and carboxypeptidase A. Advanced enzyme kinetics, Cleland nomenclature and multi-substrate reactions. Allosteric enzymes: models by Koshland, Hill and Monod. Ligands binding to proteins. Inhibitors of angiotensin converting enzyme (ACE). RNA as enzymes. Applications of enzymes in food and cosmetics industries and in clinical pathology assays as biomarkers of diseases and toxic responses. Elucidation of metabolic pathways. Antibiotic resistance mechanisms and development of new drugs. Hormonal regulation and integration of mammalian metabolism. Regulation of fuel metabolism after a meal, period between meals and starvation. Metabolic adaptions during diabetes. Obesity and the regulation of body mass. Obesity, matabolic syndrom and Type 2 diabetes (T2D). Management of T2D with diet, exercise and medication. Practical sessions cover tutorials on calculations, isolation of an enzyme, determination of pH and temperature optimum, determination of Km and Vmax, enzyme activation and enzyme inhibition. Computer simulations of drug design and protein docking to improve efficacy and lower toxicity.

Cell structure and function 367 (BCM 367)

Module credits	18.00
Prerequisites	BCM 251 and BCM 261 or permission from the HOD
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Visualising cell structure and localising proteins within cells. Cell ultrastructure. Purification of subcellular organelles. Culturing of cells. Biomembrane structure. Transmembrane transport of ions and small molecules and the role of these processes in disease. Moving proteins into membranes and organelles. Vesicular traffic, secretion, exocytosis and endocytosis. Cell organisation and movement motility based on the three types of cytoskeletal structures including microfilaments, microtubules and intermediate filaments as well as their associated motor proteins. Cell-cell and cell-matrix adhesion through corresponding proteins and morphological structures. Practical training includes tutorials on cytometry and mircoscopy, mini-research projects where students are introduced and guided through aspects of research methodology, experimental planning techniques associated with cellular assays, buffer preparation, active transport studies in yeast cells, structure-function analyses of actin and binding partners.

Molecular basis of disease 368 (BCM 368)

Module credits	18.00
Prerequisites	BCM 251 and BCM 252 and BCM 261 or permission from the HOD.
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Molecular mechanisms behind exogenous and endogenous diseases. Foundational knowledge of the immune system, with innate-, adaptive- and auto-immunity (molecular mechanisms of the maintenance and failure of the recognition of foreign in the context of self in the mammalian body) being some of the key concepts. Molecular pathology and immunobiochemistry of exogenous diseases against viral, bacterial and parasitic pathogens with a focus on the human immunodeficiency virus (HIV), tuberculosis (TB) and malaria. Endogenous disease will describe the biochemistry of normal cell cycle proliferation, quiescence, senescence, differentiation and apoptosis, and abnormal events as illustrated by cancer. Tutorials will focus on immunoassays, vaccines, diagnostic tests for diseases and drug discovery towards therapeuticals.

Plant ecophysiology 356 (BOT 356)

Module credits	18.00
Service modules	Faculty of Education
Prerequisites	BOT 161 or permission from head of department
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Separate classes for Afrikaans and English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

The emphasis is on the efficiency of the mechanisms whereby C3-, C4 and CAM-plants bind CO2 and how it 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, water flow in the soil-plant air continuum and long distance transport of assimilates will be discussed. Various important techniques will be used in the practicals to investigate aspects such as water-use efficiency, photosynthesis and respiration of plants.

Plant ecology 358 (BOT 358)

Module credits	18.00
Prerequisites	BOT 161 and BOT 251 or permission from head of department
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Separate classes for Afrikaans and English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Theory of plant community concepts, floristic and structural composition, plant diversity, ecological succession, landscape ecology. Data processing techniques. Species interactions and an evaluation of their effects on interacting species. Fundamentals of plant population biology: life tables; plant breeding systems and pollination; population dynamics; life history strategies; intraspecific competition; interspecific competition and co-existence.

Phytomedicine 365 (BOT 365)

Module credits	18.00
Service modules	Faculty of Education
Prerequisites	BOT 161 or permission from head of department
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

The module 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, ecological role and toxicity of the three main classes of secondary compounds; terpenoids, phenolics, and alkaloids are discussed. An introduction to the principles and applications of metabolomics is presented. The role of these natural products in defense against microorganisms and herbivores is reviewed during the module. The importance of ethnobotany and phylogenetics in modern drug discovery from biodiversity will presented along with legal and ethical considerations surrounding bioprospecting. This will follow on with modern theories and practices regarding sustainable utilisation and conservation of medicinal plants. The basics of alternative medicines, with an emphasis on traditional African and Chinese medicines, are also discussed as well as current evidence-based research and product development derived from these. Biotechnological approaches to medicinal natural product production, ‘farmer to pharma’, will be covered, including plant cell culture and bioreactors. Practical sessions on drug discovery approaches using chromatographic techniques for phytochemical analysis of secondary metabolites such as tannins, alkaloids, and saponins are conducted. Bioassays on micro-organisms are also done during the practical sessions in order to develop the skills for the potential discovery of new antibiotics.

Plant genetics and crop biotechnology 361 (BTC 361)

Module credits	18.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GTS 251 and {GTS 261 GS or BOT 261}
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Plant genetics and genomics: gene control in plants, epigenetics, co-suppression, forward and reverse genetics, structural and functional genomics. Plant development: flowering, genetics imprinting. Plant-environment interactions. Crop genetic modification: food security, GMO regulation, plant transformation, whole-chromosome transformation, synthetic biology, homologous recombination. Crop molecular markers: marker types, genotyping, QTL mapping, marker-assisted breeding. Future of crop biotechnology: applications of genomics, biopharming, genetical genomics, systems biology

Advanced animal and plant foods microbiology 362 (FST 362)

Module credits	18.00
Prerequisites	FST 260, MBY 251, MBY 261, MBY 262
Contact time	2 lectures per week, 180 minute practical per week
Language of tuition	Module is presented in English
Department	Consumer and Food Sciences
Period of presentation	Semester 1

Module content

With an integrated focus on animal and plant food commodities, this module considers food properties and processing operations that impact on the growth, survival and biochemical activity of microorganisms as they relate to spoilage, safety and fermentation. Temperature effects on microbial growth and survival including thermal destruction and cell and spore injury. Microbial stress response (adaptation) during processing. Selection for stress resistant and more virulent pathogenic variants and virulence mechanisms (toxin structure/function) of food-borne pathogens during food processing. Theory and practice of new advances in microbial detection and identification methods. Tools for the production of safe foods including food safety objectives (FSOs) and risk analysis. Practicals will include advanced microbial detection and identification methods applied to animal and plant foods as well as the food supply chain.

Eukaryotic gene control and development 351 (GTS 351)

Module credits	18.00
Prerequisites	GTS 251 GS and GTS 261 GS
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Regulation of gene expression in eukaryotes: regulation at the genome, transcription, RNA processing and translation levels. DNA elements and protein factors involved in gene control. The role of chromatin structure and epigenetic changes. Technology and experimental approaches used in studying eukaryotic gene control. Applications of the principles of gene control in eg cell signaling pathways, development cancer and other diseases in humans.

Genome evolution and phylogenetics 354 (GTS 354)

Module credits	18.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GTS 251 GS and GTS 261 GS
Contact time	1 practical/tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Mechanisms involved in the evolution of genes, genomes and phenotypes. Comparison of the molecular organisation of viral, archaea, bacterial and eukaryotic genomes. Genome project design, DNA sequencing methods and annotation. Molecular evolution. Phylogenetic inference. Applications of phylogenetics and evolutionary genomics research, including relevance to sustainable development goals for food security, good health and the biosphere.

Population and evolutionary genetics 367 (GTS 367)

Module credits	18.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GTS 251 and GTS 261 or permission from HOD.
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Genetic and phenotypic variation. Organisation of genetic variation. Random genetic drift. Mutation and the neutral theory. Darwinian selection. Inbreeding, population subdivision and migration. Evolutionary quantitative genetics. Population genomics. Human population genetics. Levels of selection and individuality. Arms races and irreversibility. Complexity. Applied evolution.

Genetics in human health 368 (GTS 368)

Module credits	18.00
Prerequisites	GTS 251 and GTS 261 GS
Contact time	2 lectures per week, 1 practical/tutorial per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content
Application of modern genetics to human variability, health and disease. Molecular origin of Mendelian and multifactorial diseases. The use of polymorphisms, gene mapping, linkage and association studies in medical genetics. Genetic diagnosis: application of cytogenetic, molecular and genomic techniques. Congenital abnormalities, risk assessment and genetic consultation. Prenatal testing, population screening, treatment of genetic diseases and gene-based therapy. Pharmacogenetics and cancer genetics. Ethical aspects in medical genetics.

General plant pathology 351 (PLG 351)

Module credits	18.00
Prerequisites	MBY161, MBY261 and PLG262
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content
Principles and examples of plant diseases and their socio-economic importance. Current trends in plant pathology such as biosecurity, sanitory and phytosanitary issues of trade. Risk assesment and international food safety standards. The use of global information systems to assess disease spread and impact of global warming. Supply chain analysis, postharvest technology and food trade aspects.

Insect diversity 355 (ZEN 355)

Module credits	18.00
Service modules	Faculty of Education
Prerequisites	ZEN 251 GS or permission from the HOD.
Contact time	4 lectures per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 1

Module content
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.

Applied entomology 365 (ZEN 365)

Module credits	18.00
Service modules	Faculty of Education

Prerequisites	No prerequisites.
Contact time	4 lectures per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 4

Module content

*It is strongly recommended that students first complete ZEN 355: Insect diversity 355
Impact of insects on economies, human health and well-being. Protection of corps from insect herbivores through monitoring, forecasting and application of the principles of integrated pest management; epidemiology and modern developments in the control of insect vectors of human and animal diseases; insects as a tool in forensic investigations; ecological and economic significance of insect pollinators and current threats to their survival and health. Lecturers will be complemented by practical experiences that provide students with skills in the design, conduct, analysis, interpretation and reporting of applied entomological research.

The information published here is subject to change and may be amended after the publication of this information. The General Regulations (G Regulations) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the General Rules section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.