University of Pretoria Yearbook 2017

BSc Medical Sciences (02133407)

Duration of study	3 years
Total credits	466

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 provisional admission of prospective students. Final admission is based on the Grade 12 results.

Minimum requirements												
Achievement level												
Afrikaans or English				**Mathematics**				**Physical Science**				**APS**
NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	
5	3	C	C	5	3	C	C	5	3	C	C	30

Candidates who do not comply with the minimum admission requirements for BSc (Medical Sciences), 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												
	Afrikaans or English				**Mathematics**				**Physical Science**				**APS**
	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	
BSc – Extended programme for the Biological and Agricultural Sciences	4	3	D	D	4	3	D	D	4	3	D	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 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 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 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 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: 142

Minimum credits:

Fundamental = 12

Core = 128

Additional information:

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

Please note: Students who have not passed all the first-year, first-semester modules in BScMedSci are excluded from continuing with BScMedSci in the second semester and need to deregister and reregister for another BSc programme, eg BSc in Biological Sciences (or a completely different degree programme).

Students intending to apply for the 65 MBChB, or the 5 BChD places that become available in the second semester, may only enrol for FIL 155(6), MGW 112(6) and MTL 180(12) with the understanding that:

- they obtained an APS of at least 34 and passed grade 12 Mathematics with at least 70%; and
- they may 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.

Please note: ANA modules can only be taken by BSc (Medical Science) students.

Fundamental modules

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
Prerequisites	No prerequisites.
Contact time	MAMELODI, 2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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 Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week, MAMELODI
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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
Academic organisation	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	Afrikaans and English is used in one class
Academic organisation	Natural + Agric Sciences Dean
Period of presentation	Year

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 Faculty of Veterinary Science
Contact time	2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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.

Core modules

Introduction: Human anatomy and embryology 121 (ANA 121)

Module credits	4.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	MLB 111 and CMY 117; Only for BSc Medical Sciences students.
Contact time	1 practical per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

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.

Human osteology 122 (ANA 122)

Module credits	4.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	Only for BSc Medical Sciences students.

Contact time	1 practical per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

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.

Basic human histology 126 (ANA 126)

Module credits	4.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	CMY 117 and MLB 111; Only for BSc Medical Sciences students.
Contact time	1 practical per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

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.

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	Separate classes for Afrikaans and English
Academic organisation	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.

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	Final Grade 12 marks of at least 60% for Mathematics and 60% for Physical Sciences.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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	1 practical per week, 4 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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.

Science and world views 155 (FIL 155)

Module credits	6.00
Service modules	Faculty of Health Sciences Faculty of Natural and Agricultural Sciences
Prerequisites	No prerequisites.
Contact time	1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Philosophy
Period of presentation	Semester 1

Module content

This is a broad introduction to the philosophy and history of science. Examples of themes and historical periods which are covered include: world views in ancient Greece; Socrates; Plato – the founder of Western thought; Aristotle – the foundation of a new tradition; Leonardo da Vinci; the foundation of modern science; the wonder years of the seventeenth century – the flourishing of the sciences and philosophy; the rising of mechanization; a drastic turn in man's vision – the rise of psychology; how the theory of relativity changed our view of the cosmos; quantum theory and its implications for the modern world view; the biological sciences and the secrets of life; the rise and role of psychology; the neuro-sciences; the place, role and benefit of philosophical thought in the sciences.

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	fortnightly practicals, 2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	Genetics
Period of presentation	Semester 2

Module content

Chromosomes and cell division. Principles of Mendelian inheritance: locus and alleles, dominance interactions and epistasis. Probability studies. Sex determination and sex linked traits. Pedigree analysis. Extranuclear inheritance. 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, 1 practical per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	Microbiology and Plant Path
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	Refer to Regulation 1.2: A candidate who has passed Mathematics with at least 50% in the Grade 12 examination
Contact time	4 lectures per week, 1 practical per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	Genetics
Period of presentation	Semester 1

Module content

Introductory study of the ultra structure, function and composition of representative cells and cell components. General principles of cell metabolism, molecular genetics, cell growth, cell division and differentiation.

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	Refer to Regulation 1.2: A candidate must have passed Mathematics with at least 50% in the Grade 12 examination
Contact time	1 practical per week, 4 lectures per week, 1 discussion class per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	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	Refer to Regulation 1.2: At least 50% for Mathematics in the Grade 12 examination .
Contact time	4 lectures per week, 1 tutorial per week
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	Mathematics and Applied Maths
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.

Curriculum: Year 2

Minimum credits: 144

Minimum credits:

Core = 96

Elective = 48

Additional information:

Elective credits:

FLG option: 48 credits, GTS option: 48 credits, FAR option: same as FLG option

ANA + FLG option: First semester FLG 211 (12) and FLG 212 (12) second semester FLG 221 (12) and FLG 222 (12)

ANA + GTS option: First semester GTS 251 (12) and MBY 251 (12), second semester GTS 261 (12) and MBY 261 (12)

ANA + FLG/FAR option only in Final year: Same as FLG option

Core modules

Human cell and developmental biology 214 (ANA 214)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA121 and ANA126 and CMY127
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 1

Module content

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. NOTE: This module is not open to all students and may only be taken by BSc: Medical Sciences students.

Paleoanthropology 215 (ANA 215)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	No prerequisites.
Contact time	2 lectures per week, 1 practical per week

Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 1

Module content

Introduction to paleoanthropology, focusing on hominid fossil record, principles of evolution, principles of heredity, human variation, introduction to primatology, hominid taxonomy, time-frames and dating methods, fossilisation and taphonomy, trends in hominid evolution, hominid sites. Australopithecus, homo habilis, homo erectus, homo sapiens neanderthalensis, the origin of anatomically modern human beings, DNA studies, palaeo-environments, hominid diets, introduction to the development of culture, South African populations, human adaptation and modernisation.

Human histology 226 (ANA 226)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 126
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

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, male and female reproductive systems, endocrine system.
NOTE: This module is not open to all students and may only be taken by BSc: Medical Sciences students.

Introduction to proteins and enzymes 251 (BCM 251)

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	[CMY117 GS] and [CMY127 GS] and [MLB111 GS]
Contact time	2 lectures per week, 90 minute practical per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Biochemistry
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. 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. Practical training in laboratory techniques and Good Laboratory Practice. Techniques for the quantitative and qualitative analysis of biological molecules. 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	[CMY117 GS] and [CMY127 GS] and [MLB111 GS]
Contact time	90 minute practical per week, 2 lectures per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Biochemistry
Period of presentation	Semester 1

Module content

Biochemistry of carbohydrates. Thermodynamics and bioenergetics. Glycolysis, citric acid cycle and electron transport. Glycogen metabolism, pentose-phosphate pathway, gluconeogenesis and photosynthesis. Practical training in study and analysis of metabolic pathways and enzymes. Scientific method and design: Hypothesis design and testing, method design and scientific controls.

Lipid and nitrogen metabolism 261 (BCM 261)

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	[CMY117 GS] and [CMY127 GS] and [MLB111 GS]
Contact time	2 lectures per week, 90 minute practical per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Biochemistry
Period of presentation	Semester 2

Module content

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 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 writing skills: evaluation of a scientific report. Techniques for separation and analysis of biological molecules

Biochemical principles of nutrition and toxicology 262 (BCM 262)

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	[CMY117 GS] and [CMY127 GS] and [MLB111 GS]
Contact time	2 lectures per week, 90 minute practical per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Biochemistry
Period of presentation	Semester 2

Module content

Biochemistry of nutrition and toxicology. Proximate analysis of nutrients. Review of energy requirements and expenditure. Respiratory quotient. 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. Interactions between nutrients. Comparison of monogastric and ruminant metabolism. Cholesterol, polyunsaturated, essential fatty acids and dietary anti-oxidants. Oxidation of fats. Biochemical mechanisms of water- and fat-soluble vitamins and assessment of vitamin status. Mineral requirements, biochemical mechanisms, imbalances and diarrhoea. Biochemistry of xenobiotics: absorption, distribution, metabolism and excretion (ADME); detoxification reactions: 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. Examples of toxins: biochemical mechanisms of common toxins and their antidotes. Antibiotics and resistance. Natural toxins from fungi, plants and animals: goitrogens, cyanogens, cholineesterase inhibitors, ergotoxin, aflatoxins Practical training in analyses of nutrients, fatty acids separations, antioxidant determination, and enzyme activity measurements, PO ratio of mitochondria, electrophoresis, extraction, solubility and gel permeation techniques.

Human anatomy Part 1 247 (ANA 247)

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 121, ANA 122 and CMY 127
Contact time	2 practicals per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

Regional approach to human anatomy. Cadaver dissection of the head, neck as well as neuro-anatomy. Anatomical techniques.

NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

Elective modules

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
Academic organisation	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
Academic organisation	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
Academic organisation	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
Academic organisation	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.

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 practicals, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Genetics
Period of presentation	Semester 1

Module content

Chemical nature of DNA. Replication transcription, RNA processing and 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 practicals
Language of tuition	Module is presented in English

Academic organisation	Genetics
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	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Academic organisation	Microbiology and Plant Path
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
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Microbiology and Plant Path
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.

Curriculum: Final year

Minimum credits: 144

Minimum credits:

Core = 72

Elective = 72

Additional information:

Elective credits:

FLG option: 72 credits, GTS option: 72 credits, FLG/FAR option: 72 credits

ANA + FLG option: First semester FLG 330 (18) and FLG 327 (18), second semester FLG 331 (18) and FLG 332 (18)

ANA+ GTS option: First semester GTS 351 (18) and GTS 354 (18), second semester GTS 367 (18) and GTS 368 (18).

ANA+ FLG/FAR option: First semester FLG 330 (18) and FAR 381 (18), second semester FLG 331 (18) or FLG 332 (18) and FAR 382 (18)

Core modules

Forensic anthropology 315 (ANA 315)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 122, ANA 215
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 1

Module content

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 to face mapping and skull-photo superimposition, legal aspects. NOTE: This module is not open to all students and may only be taken by BSc: Medical Sciences students.

Cell and tissue techniques 316 (ANA 316)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 226
Contact time	2 lectures per week, 1 practical per week

Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 1

Module content

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.

Human cell and developmental biology 324 (ANA 324)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 214, ANA 226
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

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; neurilation, 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.
NOTE: This module is not open to all students and may only be taken by BSc: Medical Sciences students.

Human anatomy Part 2 347 (ANA 347)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 247 GS
Contact time	2 lectures per week, 2 practicals per week
Language of tuition	Module is presented in English
Academic organisation	Anatomy
Period of presentation	Semester 2

Module content

Regional approach to human anatomy.
Cadaver dissection of the head, neck as well as neuro-anatomy. Anatomical techniques.
NOTE: This module is not open to all students and may only be taken by BSc: Medical Sciences students.

Elective modules

Pharmacology 381 (FAR 381)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	FLG 211, FLG 212, FLG 221, FLG 222 GS
Contact time	2 lectures per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Pharmacology
Period of presentation	Semester 1

Module content

Introduction, receptors, antagonism, kinetic principles, drugs that impact upon the autonomic and central 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.

Pharmacology 382 (FAR 382)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	FAR 381, FLG 211, FLG 212, FLG 221, FLG 222 GS
Contact time	2 lectures per week
Language of tuition	Afrikaans and English is used in one class
Academic organisation	Pharmacology
Period of presentation	Semester 2

Module content

Hormones, drugs that act on the histaminergic, serotonergic, and dopaminergic receptors. Pharmacotherapy of diabetes mellitus, schizophrenia, depression, obesity, anxiety, insomnia, gastro-intestinal diseases. Anticoagulants, antimicrobial drugs.

Higher neurological functions 327 (FLG 327)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, BCM 262 GS, FLG 221 and FLG 222
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Academic organisation	Physiology
Period of presentation	Semester 1

Module content

Overview of higher cognitive functions and the relationship between psyche, brain and immune system. Practical work: Applied practical work.

Eukaryotic gene control and development 351 (GTS 351)

Module credits	18.00
Prerequisites	GTS 251 GS and GTS 261 GS
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Genetics
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 controlin embryonic development and differentiation, 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 per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Genetics
Period of presentation	Semester 1

Module content

Mechanisms involved in the evolutions of genomes. Comparison of the molecular organisation of viral, archaea, eubacterial and eukarytotic genomes. Genome project design, DNA sequencing methods and annotation. Molecular evolution. Phylogenetic inference methods. Applications of phylogenetics and contemporary genome research.

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
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English

Academic organisation	Genetics
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	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Genetics
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.

Applied and pathophysiology 332 (FLG 332)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, BCM 262 GS, FLG 221 and FLG 222
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Academic organisation	Physiology
Period of presentation	Semester 2

Module content

Integration of all the human physiological systems. Practical work: Applied practical work.

Cellular and developmental physiology 330 (FLG 330)

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences

Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, BCM 262 GS, FLG 221 and FLG 222
Contact time	2 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Academic organisation	Physiology
Period of presentation	Semester 1

Module content

During this module the biology of cellular processes such as the cell cycle, cell death, migration and their related cellular signalling pathways will be discussed as well as their role in early stage embryology and age-related pathologies. Practical work: Exposure to applied molecular biology techniques.

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.