



University of Pretoria Yearbook 2020

BSc Medical Sciences (02133407)

NQF level	07
Minimum duration of study	3 years
Total credits	430

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	32

* 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 (Medical Sciences), may be considered for admission to the BSc – Extended programme -- Biological and Agricultural Sciences. The BSc – Extended programme takes a year longer than the normal programme to complete.

BSc - Extended Programme - 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	



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 ascertain, 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 Senate Appeals Committee.
- Any decision taken by the Senate 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

Fundamental = 12

Core = 130

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 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.
- **Please note:** Students who have not passed all the first year, first-semester modules in BSc MedSci are excluded from continuing with BSc MedSci in the second semester and need to change to another BSc programme.

Fundamental modules

Academic information management 102 (AIM 102)

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.

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

Academic information management 111 (AIM 111)

Module content:

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



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

Academic information management 121 (AIM 121)

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.

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

Language and study skills 110 (LST 110)

Module content:

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



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

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

Introduction: Human anatomy and embryology 121 (ANA 121)

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.

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 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Anatomy
Period of presentation	Semester 2

Human osteology 122 (ANA 122)

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.

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

Basic human histology 126 (ANA 126)

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.

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 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Anatomy
Period of presentation	Semester 2

Biometry 120 (BME 120)

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.

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

General chemistry 117 (CMY 117)

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.

Module credits	16.00
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Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
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Prerequisites	A candidate must have Mathematics for at least 60% and 60% for Physical Sciences.
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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

General chemistry 127 (CMY 127)

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.

Module credits	16.00
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Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
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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	Module is presented in English
Department	Chemistry
Period of presentation	Semester 2

Science and world views 155 (FIL 155)

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.

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
Department	Philosophy
Period of presentation	Semester 1

Introductory genetics 161 (GTS 161)

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.

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

Introduction to microbiology 161 (MBY 161)

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.

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	No prerequisites.
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

Molecular and cell biology 111 (MLB 111)

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.

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

Physics for biology students 131 (PHY 131)

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.

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

Mathematics 134 (WTW 134)

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.

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 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 1

Mathematics 165 (WTW 165)

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.

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



Curriculum: Year 2

Minimum credits: 144

Core modules = 96

Elective modules = 48

Additional information:

- **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 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.

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	ANA 121 and ANA 126 and CMY 127
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anatomy
Period of presentation	Semester 1

Paleoanthropology 215 (ANA 215)

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.

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences



Prerequisites	ANA 122 and GTS 161
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anatomy
Period of presentation	Semester 1

Human histology 226 (ANA 226)

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.

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
Department	Anatomy
Period of presentation	Semester 2

Human anatomy Part 1 247 (ANA 247)

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.

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



Introduction to proteins and enzymes 251 (BCM 251)

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.

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

Carbohydrate metabolism 252 (BCM 252)

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.

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

Lipid and nitrogen metabolism 261 (BCM 261)

Module content:



Biochemistry of lipids, membrane structure, anabolism and catabolism of lipids. Total ATP yield from the complete catabolism of lipids. Electron transport chain and energy production through oxidative phosphorylation. Nitrogen metabolism, amino acid biosynthesis and catabolism. Biosynthesis of neurotransmitters, pigments, hormones and nucleotides from amino acids. Catabolism of purines and pyrimidines. Therapeutic agents directed against nucleotide metabolism. Examples of inborn errors of metabolism of nitrogen containing compounds. The urea cycle, nitrogen excretion. 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.

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	BCM 251 GS and BCM 252 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 2

Biochemical principles of nutrition and toxicology 262 (BCM 262)

Module content:

Biochemistry of nutrition and toxicology. Proximate analysis of nutrients. Review of energy requirements and expenditure, starvation, marasmus and kwashiorkor. 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. 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. Examples of genetic abnormalities, phenotypes and frequencies. Examples of toxins: biochemical mechanisms of common toxins and their antidotes. Natural toxins from fungi, plants and animals: goitrogens, cyanogens, cholineesterase inhibitors, ergotoxin, aflatoxins Practical training in scientific writing skills: evaluating scientific findings. Introduction to practical techniques in nutrition and toxicology. Experimental design and calculations in experiments: determining nutritional value of metabolites and studying the ADME of toxins.

Module credits	12.00
Service modules	Faculty of Health Sciences
Prerequisites	BCM 251 GS and BCM 252 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 2



Elective modules

Introductory and neurophysiology 211 (FLG 211)

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.

Module credits 12.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites CMY 127 GS and MLB 111 GS

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

Circulatory physiology 212 (FLG 212)

Module content:

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

Module credits 12.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites CMY 127 GS and MLB 111 GS

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

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

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.

Module credits 12.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites FLG 211 GS and FLG 212 GS



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

Digestion, endocrinology and reproductive systems 222 (FLG 222)

Module content:

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

Module credits	12.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	FLG 211 GS and FLG 212 GS
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

Molecular genetics 251 (GTS 251)

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.

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	GTS 161 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 1

Genetic diversity and evolution 261 (GTS 261)

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.

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

Bacteriology 251 (MBY 251)

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.

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

Mycology 261 (MBY 261)

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.

Module credits	12.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MBY 161 GS



Contact time	2 lectures per week, Fortnightly practicals/tutorials
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2



Curriculum: Final year

Minimum credits: 144

Core modules = 72

Elective modules = 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 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.

Module credits 18.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites ANA 122, ANA 215

Contact time 1 practical per week, 2 lectures per week

Language of tuition Module is presented in English

Department Anatomy

Period of presentation Semester 1

Cell and tissue techniques 316 (ANA 316)

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.



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

Human cell and developmental biology 324 (ANA 324)

Module content:

Practical aspects of cell biology. Cell, tissue, organ, and organism culture. The biology of the culture environment. Cellular basis of morphogenesis, cleavage patterns and gastrulation. The early vertebrate development; neurulation, ecto-, meso- and endoderm derivatives. Cell destiny and embryonic axis including malformations. Development of the tetrapod limb and cell death. Cell interactions at a distance through hormones and metamorphosis.

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

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
Department	Anatomy
Period of presentation	Semester 2

Human anatomy Part 2 347 (ANA 347)

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.

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



Period of presentation Semester 2

Elective modules

Pharmacology 381 (FAR 381)

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.

Module credits 18.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites FSG 161, 162, 251, 252.

Contact time 2 lectures per week

Language of tuition Module is presented in English

Department Pharmacology

Period of presentation Semester 1

Pharmacology 382 (FAR 382)

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.

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 Module is presented in English

Department Pharmacology

Period of presentation Semester 2

Higher neurological functions 327 (FLG 327)

Module content:

Overview of higher cognitive functions and the relations between psyche, brain and the immune system. Practical work: Applied practical work with specific examples drawn from South African case studies taught within the framework of the UN Sustainable Development Goal 3 (Good Health and Well-being).



Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, FLG 221 GS and FLG 222 GS
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

Cellular and developmental physiology 330 (FLG 330)

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 with specific examples drawn from South African case studies taught within the framework of the UN Sustainable Development Goal of Good Health and Well-being (Sustainable Development Goal 3).

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, FLG 221 GS and FLG 222 GS
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

Exercise and nutrition science 331 (FLG 331)

Module content:

Mechanisms of muscle contraction and energy sources. Cardio-respiratory changes, thermo-regulation and other adjustments during exercise. Use and misuse of substances to improve performance. Practical work: Applied practical work with exercise descriptions for the South African context taught within the framework of the UN Sustainable Development Goal 3 (Good Health and Well-being).

Module credits	18.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BCM 251 GS, BCM 252 GS, BCM 261 GS, FLG 221 GS and FLG 222 GS
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

Applied and pathophysiology 332 (FLG 332)

Module content:

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

Module credits 18.00

Service modules Faculty of Natural and Agricultural Sciences

Prerequisites BCM 251 GS, BCM 252 GS, BCM 261 GS, FLG 221 GS and FLG 222 GS

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

Eukaryotic gene control and development 351 (GTS 351)

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.

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

Genome evolution and phylogenetics 354 (GTS 354)

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.

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

Population and evolutionary genetics 367 (GTS 367)

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.

Module credits 18.00

Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GTS 251 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 2

Genetics in human health 368 (GTS 368)

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.

Module credits 18.00

Prerequisites	GTS 251 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 2



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 each student to familiarise himself or herself 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.