University of Pretoria Yearbook 2018

BSc Extended programme - Physical Sciences (02130015)

Minimum duration of study	4 years
Total credits	136

Admission requirements

Candidates who do not comply with the minimum admission requirements of programmes in the Department of Physical Sciences, may be considered for admission to the BSc – Extended programme for the Physical Sciences. The BSc – Extended programme takes place over a period of four years instead of the normal three years.

Minimum requirements for 2017												
Achievement level												
Afrikaans or English				Mathematics				Physical Sciences				APS
NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	
4	3	D	D	4	3	D	D	4	3	D	D	26

Additional requirements

a. Students who are admitted to one of the BSc four-year programmes register for one specific programme. Three extended programmes are available:

- BSc (Four-year programme) – Mathematical Sciences
- BSc (Four-year programme) – Biological and Agricultural Sciences
- BSc (Four-year programme) – Physical Sciences

b. These programmes are followed by students who, as a result of exceptional circumstances, will benefit from an extended programme.

c. Students who do not comply with the normal three-year BSc entrance requirements for study in the Faculty of Natural and Agricultural Sciences, may nevertheless be admitted to the Faculty by being placed on the BSc (Four-year programme). Generally the BSc (Four-year programme) means that the first study year in Mathematics, Physics, Biology and Chemistry is extended to take two years. After completing the BSc (Four-year programme) successfully, students join the second year of the normal BSc programme to complete their degrees. The possibility of switching over to other faculties such as Engineering, Built Environment and Information Technology, Veterinary Science and Health Sciences, after one or two years in the four-year programme, exists. This depends on selection rules and other conditions stipulated by the other faculties.

d. Students who wish to follow one of the BSc four-year programmes will be subjected to an Institutional Proficiency Test and will be considered for admission by the Admissions Committee. Information in this regard is available at the Client Services Centre.
e. Applications for admission to the BSc (Four-year programme) should be submitted before 30 September each year. Details are obtainable from the Student Administration at the Faculty of Natural and Agricultural Sciences.
f. The rules and regulations applicable to the normal study programmes apply mutatis mutandis to the BSc (Four-year programme), with exceptions as indicated in the regulations pertaining to the BSc (Four-year programme). For instance, students placed in the BSc (Four-year programme) must have a National Senior Certificate with admission for degree purposes.
g. An admissions committee considers applications for the BSc (Four-year programme) annually. Regarding subject choices, admitted students are individually placed on the BSc (Four-year programme) according to their prospective field of study. Students may NOT change this placement without the permission of the Chairperson of the admissions committee.

Other programme-specific information

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

Academic promotion requirements
It is expected of students who register for the first year of the BSc (Four-year programme) to pass all the prescribed modules of the first year.
It is expected of students accepted into the BSc (Four-year programme) to finish a complete corresponding BSc first year within the two years of enrolment in the BSc (Four-year programme). Students who do not show progress during the first semester of the first year will be referred to the Admissions Committee of the Faculty.

Curriculum: Year 1

Minimum credits: 88

Minimum credits:

Fundamental =   24

Core   = 48

Elective   = 16

Additional information:

Students register for either one of the following elective combinations

- First semester MLB 133 and second semester MLB 143 143
- First semester WST 133 and second semester WST 143

NB Students may register for an extended module only once.

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 and Religion
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Department	Information Science
Period of presentation	Semester 1

Module content

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

Academic information management 121 (AIM 121)

Module credits	4.00

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

Module content

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

Language, life and study skills 133 (LST 133)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Economic and Management Sciences
Prerequisites	As for BSc Four-year programme and BCom Four-year programme
Contact time	4 discussion classes per week, Foundation Course
Language of tuition	Module is presented in English
Department	Natural and Agricultural Sciences Deans Office
Period of presentation	Semester 1

Module content

In this module students use different information and time management strategies, build academic vocabulary, revise basic grammar concepts and dictionary skills, examine learning styles, memory and note-taking techniques, practise academic reading skills and explore basic research and referencing techniques, learn how to use discourse markers and construct definitions, and are introduced to paragraph writing. The work is set in the context of the students' field of study.

Language, life and study skills 143 (LST 143)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Economic and Management Sciences
Prerequisites	LST 133

Contact time	4 discussion classes per week, Foundation Course
Language of tuition	Module is presented in English
Department	Natural and Agricultural Sciences Deans Office
Period of presentation	Semester 2

Module content

In this module students learn how to interpret and use visual literacy conventions. Students write more advance paragraphs, and also learn how to structure academic writing, how to refine their use of discourse markers and referencing techniques and how to structure their own academic arguments. Students' writing is expected to be rational, clear and concise. As a final assignment all aspects of the LST 133 and LST 143 modules are combined in a research assignment. In this project, students work in writing teams to produce a chapter on a career and to present an oral presentation of aspects of the chapter. The work is set in the context of the students' field of study.

Academic orientation 120 (UPO 120)

Module credits	0.00
Language of tuition	Afrikaans and English are used in one class
Department	Humanities Deans Office
Period of presentation	Year

Core modules

Chemistry 133 (CMY 133)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	As for BSc Four-year programme
Contact time	2 lectures per week, 3 discussion classes per week, Fortnightly practicals, Foundation Course
Language of tuition	Separate classes for Afrikaans and English
Department	Chemistry
Period of presentation	Semester 1

Module content

The field of Chemistry – an overview; Mathematics in Chemistry; atomic theory: historical overview; atoms, molecules and ions; relative atomic mass; electronic structure of atoms; the periodic table; periodicity; chemical bonding.

Chemistry 143 (CMY 143)

Module credits	8.00

Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	CMY 133
Contact time	2 lectures per week, 3 discussion classes per week, Fortnightly practicals, Foundation Course
Language of tuition	Separate classes for Afrikaans and English
Department	Chemistry
Period of presentation	Semester 1

Module content

Bonding and molecular geometry: VSEPR theory; bonding and organic compounds (structural formulas, classification and nomenclature); matter and its properties; mole concept; reaction stoichiometry; reactions in aqueous solutions: precipitation, acid base and redox.

Physics 133 (PHY 133)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	As for BSc Four-year programme
Contact time	2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course
Language of tuition	Module is presented in English
Department	Physics
Period of presentation	Semester 1

Module content

Heat: temperature and scales, work, energy and heat, calorimetry, specific heat, expansion, heat transfer. Measurements: SI-units, measuring error and uncertainty, (graphs), significant figures, mathematical modelling.One-dimensional kinematics. Geometrical optics: reflection, refraction, dispersion, mirrors, thin lenses.

Physics 143 (PHY 143)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	PHY 133
Contact time	2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course
Language of tuition	Module is presented in English
Department	Physics
Period of presentation	Semester 2

Module content

Vectors. Kinematics of a point: relative motion, projectile, circular motion. Dynamics: Newton's laws, friction. Work: point masses, ideal gas law, springs, power. Energy: kinetic energy, potential energy, conservative forces, spring, conservation of mechanical energy. Hydrostatics and dynamics: density, pressure, Archimedes' law, continuity, Bernouli.

Precalculus 133 (WTW 133)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Health Sciences
Prerequisites	BSc and BCom students: At least 3 (40-49%) in Mathematics in the Grade 12 examination and must be taken concurrently with WTW133
Contact time	1 practical per week, 3 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

Real numbers, elementary set notation, exponents and radicals. Algebraic expressions, fractional expressions, linear and quadratic equations, inequalities. Coordinate geometry: lines, circles. Functions: definition, notation, piecewise defined functions, domain and range, graphs, transformations of functions, symmetry, even and odd functions, combining functions, one-to-one functions and inverses, polynomial functions and zeros. Sequences, summation notation, arithmetic, geometric sequences, infinite geometric series, annuities and instalments. Degrees and radians, unit circle, trigonometric functions, fundamental identities, trigonometric graphs, trigonometric identities, double-angle, half-angle formulae, trigonometric equations, applications.

This module is only offered in English at the Mamelodi Campus for the BSc Extended programme. At the Hatfield and Groenkloof campuses it is offered in English and Afrikaans.

Calculus 143 (WTW 143)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Health Sciences
Prerequisites	BSc and BCom students: WTW 133 and WST133 and must be taken concurrently with WTW143
Contact time	1 tutorial per week, 3 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics

| **Period of presentation** | Semester 2 |

Module content

Functions: exponential and logarithmic functions, natural exponential and logarithmic functions, exponential and logarithmic laws, exponential and logarithmic equations, compound interest. Limits: concept of a limit, finding limits numerically and graphically, finding limits algebraically, limit laws without proofs, squeeze theorem without proof, one-sided limits, infinite limits, limits at infinity, vertical, horizontal and slant asymptotes, substitution rule, continuity, laws for continuity without proofs. Differentiation: average and instantaneous change, definition of derivative, differentiation rules without proofs, derivatives of polynomials, chain rule for differentiation, derivatives of trigonometric, exponential and logarithmic functions, applications of differentiation: extreme values, critical numbers, monotone functions, first derivative test, optimisation.

Elective modules

Molecular and cell biology 133 (MLB 133)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	As for BSc Four-year programme
Contact time	2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

The scientific method, the meaning of life, principles of microscopy, introduction to taxonomy and systematics, introductory study of the structure, function and composition of akaryotes, HIV/ Aids, the immune system and other health issues, ecosystems and human interference.

Molecular and cell biology 143 (MLB 143)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MLB 133
Contact time	2 discussion classes per week, 2 lectures per week, 2 practicals per week, Foundation Course
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Chemistry of the cell, introduction to the structure, function and composition of prokaryotic and eukaryotic cells, energy and cellular metabolism, photosynthesis.

Mathematical statistics 133 (WST 133)

Module credits	8.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	At least 4 (50-59%) in Mathematics in the Grade 12 examination; BSc and BCom numeric stream students must be take WTW 133 concurrently.
Contact time	1 practical per week, 2 tutorials per week, 4 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Statistics
Period of presentation	Semester 1

Module content

Descriptive statistics – Univariate:
The role of Statistics, various types of data. Sampling, probability and non-probability sampling techniques and the collection of data. Frequency, relative and cumulative distributions and graphical representations. Additional concepts relating to data processing: sigma notation, factorial notation. Descriptive measures of location,dispersion and symmetry. Exploratory data analysis.
Probability:
Introductory probability theory and applications. Set theory and probability laws. Introduction to random variables. Assigning probabilities, probability distributions, expected value and variance in general. Specific discrete probability distributions (Uniform, Binomial). Report writing and presentation. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

Mathematical statistics 143 (WST 143)

Module credits	8.00
Service modules	Faculty of Natural and Agricultural Sciences
Prerequisites	BSc and BCom numeric students: WST 133 and WTW 133 and must be taken concurrently with WTW 143.
Contact time	1 practical per week, 2 tutorials per week, 4 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Statistics
Period of presentation	Semester 2

Module content

Probability and inference:
Probability theory and theoretical distributions for continuous random variables (Uniform, Normal and t). Sampling distributions (means and proportions). Estimation theory and hypothesis testing of sampling averages and proportions (one- and two-sample cases).
Optimisation techniques with economic applications:
Applications of differentiation in statistic and economic related problems. Integration. Applications of integration in statistic and economic related problems. Systems of equations in equilibrium. The area under a curve and applications of definite integrals in Statistics and Economics. Report writing and presentation. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

Curriculum: Year 2

Minimum credits: 24

Minimum credits:

Core = 24

Elective = According to BSc programme of choice

Additional information:

Possible third semester electives: MLB 153, WST 153

NB Students may register for an extended module only once.

With regard to the rest of the third-semester modules(second year, first semester) and the second-semester, prescribed modules must be selected from the normal BSc programme of the student's choice.

Equivelent modules:

Chemistry extended modules: CMY 133, CMY 143 and CMY 154: Equivelent to BSc module CMY 117

Molecular and cell biology extended modules: MLB 133, MLB 143 and MLB 153: Equivelent to BSc module MLB 111

Physics extended modules: PHY 133, PHY 143 and PHY 153: Equivelent to BSc module PHY 114

Mathematics extended modules: WTW 133, WTW 143 and WTW 153: Equivelent to BSc module WTW 114

Mathematical Statistics extended modules: WST 133, WST 143 and WST 153: Equivelent to BSc module WST 111

Core modules

Chemistry 154 (CMY 154)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	CMY 133 and CMY 143
Contact time	2 tutorials per week, 3 lectures per week, Foundation Course, fortnightly practicals
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Semester 1

Module content

Principles of reactivity: energy and chemical reactions. Physical behaviour of gasses, liquids, solids and solutions and the role of intermolecular forces. Rate of reactions: Introduction to Chemical kinetics. Introduction to chemical equilibrium. Introduction to organic chemistry: hybridisation, isomers (structural, geometrical and conformational), additions reactions and reaction mechanisms.

Physics 153 (PHY 153)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	PHY 143

Contact time	2 discussion classes per week, 2 practicals per week, 3 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Physics
Period of presentation	Semester 1

Module content

System of particles: centre of mass, Newton's laws. Rotation: torque, conservation of momentum, impulse and collision, conservation of angular momentum, equilibrium, centre of gravity. Oscillations. Waves: sound, intensity, superposition, interference, standing waves, resonance, beats, Doppler effect. Physical optics: Young-interference, coherence, thin layers, diffraction, gratings, polarisation.

Calculus 153 (WTW 153)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	WTW 143
Contact time	1 tutorial per week, 3 lectures per week, Foundation Course
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

Differential calculus of a single variable with proofs and applications. The mean value theorem, the rule of L'Hospital. Upper and lower sums, definite and indefinite integrals, the Fundamental theorem of Calculus, the mean value theorem for integrals, integration techniques, with some proofs.

Elective modules

Biometry 120 (BME 120)

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

Module content

Simple statistical analysis: Data collection and analysis: Samples, tabulation, graphical representation, describing location, spread and skewness. Introductory probability and distribution theory. Sampling distributions and the central limit theorem. Statistical inference: Basic principles, estimation and testing in the one- and two-sample cases (parametric and non-parametric). Introduction to experimental design. One- and twoway designs, randomised blocks. Multiple statistical analysis: Bivariate data sets: Curve fitting (linear and non-linear), growth curves. Statistical inference in the simple regression case. Categorical analysis: Testing goodness of fit and contingency tables. Multiple regression and correlation: Fitting and testing of models. Residual analysis. Computer literacy: Use of computer packages in data analysis and report writing.

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
Department	Chemistry
Period of presentation	Semester 2

Module content

Theory: General physical-analytical chemistry: Chemical equilibrium, acids and bases, buffers, solubility equilibrium, entropy and free energy, electrochemistry. Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds.

Introduction to environmental sciences 101 (ENV 101)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities
Prerequisites	No prerequisites.
Contact time	3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 1

Module content

Introducing the basic concepts and interrelationships required to understand the complexity of natural environmental problems, physical and human environment, human induced environmental problems, the ways in which the natural environment affects human society and biodiversity, an introduction to major environmental issues in Southern Africa and sustainable development in the context of environmental issues.

Aspects of human geography 156 (GGY 156)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

Module content

This module begins by fostering an understanding of human geography. Then follows with the political ordering of space; cultural diversity as well as ethnic geography globally and locally; population geography of the world and South Africa: and four economic levels of development. The purpose is to place South Africa in a world setting and to understand the future of the country.

Southern African geomorphology 166 (GGY 166)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences
Prerequisites	No prerequisites.
Contact time	4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

Investigating southern African landscapes and placing them in a theoretical and global context. The geomorphological evolution of southern Africa. Introduction to the concepts of Geomorphology and its relationships with other physical sciences (e.g. meteorology, climatology, geology, hydrology and biology). The processes and controls of landform and landscape evolution. Tutorial exercises cover basic techniques of geomorphological analysis, and topical issues in Geomorphology.

Introduction to geology 155 (GLY 155)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	A candidate must have passed Mathematics with at least 60% in the Grade 12 examination.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geology
Period of presentation	Semester 1

Module content

Solar system; structure of solid matter; minerals and rocks; introduction to symmetry and crystallography; important minerals and solid solutions; rock cycle; classification of rocks. External geological processes (gravity, water, wind, sea, ice) and their products (including geomorphology). Internal structure of the earth. The dynamic earth – volcanism, earthquakes, mountain building – the theory of plate tectonics. Geological processes (magmatism, metamorphism, sedimentology, structural geology) in a plate tectonic context. Geological maps and mineral and rock specimens.

Earth history 163 (GLY 163)

Module credits	16.00
Prerequisites	GLY155; a special exemption is given to 2nd-year students registered for degrees in Plant Sciences, Entomology, Ecology and Zoology
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geology
Period of presentation	Semester 2

Module content

This module will give an overview of earth history, from the Archaean to the present. Important concepts such as the principles of stratigraphy and stratigraphic nomenclature, geological dating and international and South African time scales will be introduced. A brief introduction to the principles of palaeontology will be given, along with short descriptions of major fossil groups, fossil forms, ecology and geological meaning. In the South African context, the major stratigraphic units, intrusions and tectonic/metamorphic events will be detailed, along with related rock types, fossil contents, genesis and economic commodities. Practical work will focus on the interpretation of geological maps and profiles.

Cartography 110 (GMC 110)

Module credits	10.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	No prerequisites.

Contact time	1 practical per week, 3 lectures per week
Language of tuition	Afrikaans and English are used in one class
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

Module content

Spherical trigonometry. Geometrical geodesy: Datum surfaces and coordinate systems in Geodesy, Calculations on the ellipsoid, Datum transformations. Map projections: Projection principles, distortion determination, and construction of conformal, equivalent and equidistant projections, the Transverse Mercator projection and UTM projection of an ellipsoidal earth, projection transformations. Space geodesy: Time systems, Celestial and observer coordinate systems, Global Navigation Satellite Systems (GNSS), Satellite orbits and orbital parameters, 3-D positioning. A project or assignments of at least 64 notional hours.

Informatics 112 (INF 112)

Module credits	10.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; or STK 113 60%, STK 123 60% or STK 110
Contact time	2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Department	Informatics
Period of presentation	Semester 2

Module content

Introduction to information systems, information systems in organisations, hardware: input, processing, output, software: systems and application software, organisation of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.

Informatics 154 (INF 154)

Module credits	10.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination
Contact time	1 lecture per week, 2 practicals per week
Language of tuition	Separate classes for Afrikaans and English
Department	Informatics

| **Period of presentation** | Semester 1 |

Module content

Introduction to programming.

Informatics 164 (INF 164)

Module credits	10.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	INF 154; A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; AIM 101 or AIM 102 or AIM 111 and AIM 121
Contact time	1 lecture per week, 2 practicals per week
Language of tuition	Separate classes for Afrikaans and English
Department	Informatics
Period of presentation	Semester 2

Module content

Advanced programming, use of a computer-aided software engineering tool.

Informatics 171 (INF 171)

Module credits	20.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination
Contact time	2 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Department	Informatics
Period of presentation	Year

Module content

General systems theory, creative problem solving, soft systems methodology. The systems analyst, systems development building blocks, systems development, systems analysis methods, process modelling.

Molecular and cell biology 153 (MLB 153)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MLB 143
Contact time	2 lectures per week, 2 practicals per week, 2 tutorials per week, Foundation Course

Language of tuition	Module is presented in English
Department	Genetics
Period of presentation	Semester 1

Module content

Cell growth and cell division, Mendelian and human genetics, principles of molecular genetics, principles of recombinant DNA technology and its application.

First course in physics 124 (PHY 124)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	WTW 114 GS and PHY 114 GS
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 2

Module content

Simple harmonic motion and pendulums. Coulomb's law. Electric field: dipoles, Gauss' law.Electric potential. Capacitance. Electric currents: resistance, resistivity, Ohm's law, energy, power, emf, RC-circuits. Magnetic Field: Hall-effect, Bio-Savart. Faraday's and Lenz's laws. Oscillations: LR-circuits. Alternating current: RLC-circuits, power, transformers. Introductory concepts to modern physics. Nuclear physics: Radioactivity.

Exploring the universe 154 (SCI 154)

Module credits	16.00
Prerequisites	Prohibited combination SCI 164
Contact time	4 lectures per week
Language of tuition	Module is presented in English
Department	Physics
Period of presentation	Semester 1

Module content

Students from all faculties are welcome to join us in our exploration of the universe from an earth-bound perspective. We reflect on the whole universe from the sub microscopic to the vast macroscopic and mankind's modest position therein. To what degree is our happiness determined by stars? Echoes from ancient firmaments - the astronomy of old civilisations. The universe is born with a bang. Stars, milky ways and planets are formed. Life is breathed into the landscape on earth, but is there life elsewhere? The architecture of the universe – distance measurements, structure of our solar system and systems of stars. How does it look like on neighbouring planets? Comets and meteorites. Life cycles of stars. Spectacular exploding stars! Exotica like pulsars and black holes.

Atmospheric structure and processes 155 (WKD 155)

Module credits	16.00
Prerequisites	At least 50% for mathematics in grade 12.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

*Students are not allowed to earn credits for WKD 155 and WKD 164

Introduction to weather and climate. Climate of South Africa. Urban and rural climate. Meteorological instruments. Motion of the earth. Atmospheric mass and pressure. Energy and heat budget. Moisture in the atmosphere. Cloud development. Climate change. ENSO. Electromagnetic spectrum and remote sensing in meteorology. Synoptic weather systems of South Africa.

Numerical analysis 123 (WTW 123)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	WTW 114 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

Module content

Non-linear equations, numerical integration, initial value problems for differential equations, systems of linear equations. Algorithms for elementary numerical techniques are derived and implemented in computer programmes. Error estimates and convergence results are treated.

Mathematical modelling 152 (WTW 152)

Module credits	8.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	Refer to Regulation 1.2
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content
Introduction to the modelling of dynamical processes using difference equations. Curve fitting. Introduction to linear programming. Matlab programming. Applications to real-life situations in, among others, finance, economics and ecology.

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.