BSc Biochemistry (02133398)

Duration of study 3 years
Total credits 428

Admission requirements

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

<table>
<thead>
<tr>
<th>Minimum requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement level</td>
</tr>
<tr>
<td>Afrikaans or English</td>
</tr>
<tr>
<td>NSC/IEB</td>
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<tr>
<td>5</td>
</tr>
</tbody>
</table>

Candidates who do not comply with the minimum admission requirements for BSc (Biochemistry), 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:

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<thead>
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<tr>
<td>NSC/IEB</td>
</tr>
<tr>
<td>BSc – Extended programme for the Biological and Agricultural Sciences</td>
</tr>
</tbody>
</table>

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 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 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: 140

Minimum credits:
Fundamental = 12 credits
Core = 128 credits

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

Fundamental modules

Academic information management 111 (AIM 111)

<table>
<thead>
<tr>
<th>Module credits</th>
<th>4.00</th>
</tr>
</thead>
</table>
| 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)

<table>
<thead>
<tr>
<th>Module credits</th>
<th>4.00</th>
</tr>
</thead>
</table>
| 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  
<p>| | Faculty of Veterinary Science |</p>
<table>
<thead>
<tr>
<th><strong>Prerequisites</strong></th>
<th>No prerequisites.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, MAMELODI</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Separate classes for Afrikaans and English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Informatics</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**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)**

<table>
<thead>
<tr>
<th><strong>Module credits</strong></th>
<th>6.00</th>
</tr>
</thead>
</table>
|**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)**

<table>
<thead>
<tr>
<th><strong>Module credits</strong></th>
<th>0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Afrikaans and English is used in one class</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Natural + Agric Sciences Dean</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Year</td>
</tr>
</tbody>
</table>

**Academic information management 102 (AIM 102)**

<table>
<thead>
<tr>
<th><strong>Module credits</strong></th>
<th>6.00</th>
</tr>
</thead>
</table>
|**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 |
### Core modules

**Biometry 120 (BME 120)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>16.00</th>
</tr>
</thead>
</table>

**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**


**Plant biology 161 (BOT 161)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>8.00</th>
</tr>
</thead>
</table>

**Service modules**

- Faculty of Engineering, Built Environment and Information Technology
- Faculty of Education

**Prerequisites**

MLB 111 GS

**Contact time**

Fortnightly practicals, 2 lectures per week

**Language of tuition**

Separate classes for Afrikaans and English
Academic organisation  Plant and Soil Sciences

Period of presentation  Semester 2

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

General chemistry 117 (CMY 117)

Module credits  16.00

Service modules  Faculty of Engineering, Built Environment and Information Technology
Faculty of Education
Faculty of Health Sciences
Faculty of Veterinary Science

Prerequisites  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 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.

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

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.

**Animal diversity 161 (ZEN 161)**

**Module credits**  
8.00

**Service modules**  
Faculty of Education  
Faculty of Veterinary Science

**Prerequisites**  
MLB 111 GS or TDH

**Contact time**  
2 lectures per week, fortnightly practicals

**Language of tuition**  
Separate classes for Afrikaans and English

**Academic organisation**  
Zoology and Entomology

**Period of presentation**  
Semester 2

**Module content**

Animal classification, phylogeny, organization and terminology. Evolution of the various animal phyla, morphological characteristics and life cycles of parasitic and non-parasitic animals. Structure and function of reproductive, respiratory, excretory, circulatory and digestive systems.
Curriculum: Year 2

Minimum credits: 144

Minimum credits:
Core = 120 credits
Elective = 24 credits

Additional information:
- Students interested in combining Biochemistry in a dual major with Microbiology should take MBY 251 and MBY 261 and have to replace CMY 285 with PLG 262.
- Students interested in combining Biochemistry in a dual major with Genetics should select MBY 251 and MBY 261.
- Students interested in combining Biochemistry in a dual major with Human Physiology should replace [CMY 282 + CMY 284] with [FLG 211 + FLG 212] and [CMY 283 + CMY 285] with [FLG 221 + FLG 222] as core modules and elect MBY 251 and MBY 261.
- Students interested in combining Biochemistry in a dual major with Plant Science should select BOT 251 and BOT 261.

Core modules

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]
<table>
<thead>
<tr>
<th><strong>Contact time</strong></th>
<th>90 minute practical per week, 2 lectures per week</th>
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<tbody>
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<tr>
<td><strong>Academic organisation</strong></td>
<td>Biochemistry</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 1</td>
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</table>

**Module content**

**Lipid and nitrogen metabolism 261 (BCM 261)**

<table>
<thead>
<tr>
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<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Health Sciences</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>[CMY117 GS] and [CMY127 GS] and [MLB111 GS]</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, 90 minute practical per week</td>
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<td><strong>Language of tuition</strong></td>
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<td>Biochemistry</td>
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<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
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</table>

**Module content**

**Biochemical principles of nutrition and toxicology 262 (BCM 262)**

<table>
<thead>
<tr>
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<th>12.00</th>
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<tbody>
<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Health Sciences</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>[CMY117 GS] and [CMY127 GS] and [MLB111 GS]</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, 90 minute practical per week</td>
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<tr>
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<td>Biochemistry</td>
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<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Module content

South African flora and vegetation 251 (BOT 251)
Module credits 12.00
Service modules Faculty of Education
Prerequisites BOT 161 or TDH
Contact time 1 practical per week, 2 lectures per week
Language of tuition Separate classes for Afrikaans and English
Academic organisation Plant and Soil Sciences
Period of presentation Semester 1

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

Plant physiology and biotechnology 261 (BOT 261)
Module credits 12.00
Service modules Faculty of Education
Prerequisites BOT 161, CMY 117, CMY 127 or TDH
Contact time 2 lectures per week, 1 practical per week
Language of tuition Separate classes for Afrikaans and English
Academic organisation Plant and Soil Sciences
Period of presentation Semester 2
Module content
Nitrogen metabolism in plants; nitrogen fixation in Agriculture; plant secondary metabolism and natural products; photosynthesis and carbohydrate metabolism in plants; applications in solar energy; plant growth regulation and the Green Revolution; plant responses to the environment; developing drought tolerant and disease resistant plants.

Physical chemistry 282 (CMY 282)
Module credits 12.00
Service modules Faculty of Education
Prerequisites CMY 117 and CMY 127
Contact time 4 lectures per week, 1 tutorial per week, 2 practicals per week
Language of tuition Module is presented in English
Academic organisation Chemistry
Period of presentation Quarter 2

Module content
Theory: Classical chemical thermodynamics, gases, first and second law and applications, physical changes of pure materials and simple compounds. Phase rule: Chemical reactions, chemical kinetics, rates of reactions.

Analytical chemistry 283 (CMY 283)
Module credits 12.00
Service modules Faculty of Education
Prerequisites CMY 117 and CMY 127
Contact time 2 practicals per week, 4 lectures per week, 1 tutorial per week
Language of tuition Module is presented in English
Academic organisation Chemistry
Period of presentation Quarter 3

Module content
Theory: Statistical evaluation of data, gravimetric analysis, aqueous solution chemistry, chemical equilibrium, precipitation-, neutralisation- and complex formation titrations, redox titrations, potentiometric methods, introduction to electrochemistry.

Organic chemistry 284 (CMY 284)
Module credits 12.00
Service modules Faculty of Education
Prerequisites CMY 117 and CMY 127
Contact time 4 lectures per week, 2 practicals per week, 1 tutorial per week
Language of tuition Module is presented in English
<table>
<thead>
<tr>
<th>Academic organisation</th>
<th>Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of presentation</td>
<td>Quarter 1</td>
</tr>
<tr>
<td>Module content</td>
<td></td>
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</tbody>
</table>

**Inorganic chemistry 285 (CMY 285)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Education</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>CMY 117 and CMY 127</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 practicals per week, 1 tutorial per week, 4 lectures per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Module is presented in English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Period of presentation</td>
<td>Quarter 4</td>
</tr>
<tr>
<td>Module content</td>
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</tbody>
</table>

**Introductory and neurophysiology 211 (FLG 211)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Natural and Agricultural Sciences</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>CMY 117, CMY 127, MLB 111 and PHY 131</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Module is presented in English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Physiology</td>
</tr>
<tr>
<td>Period of presentation</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Module content</td>
<td></td>
</tr>
<tr>
<td>Orientation in physiology, homeostasis, cells and tissue, muscle and neurophysiology, cerebrospinal fluid and the special senses. Practical work: Practical exercises to complement the theory.</td>
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</table>

**Circulatory physiology 212 (FLG 212)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Natural and Agricultural Sciences</td>
</tr>
</tbody>
</table>
### 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)

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Natural and Agricultural Sciences</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>FLG 211 and FLG 212</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Module is presented in English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Physiology</td>
</tr>
<tr>
<td>Period of presentation</td>
<td>Semester 2</td>
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</tbody>
</table>

### 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)

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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<tr>
<td>Service modules</td>
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<tr>
<td>Prerequisites</td>
<td>FLG 211 and FLG 212</td>
</tr>
<tr>
<td>Contact time</td>
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</tr>
<tr>
<td>Language of tuition</td>
<td>Module is presented in English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Physiology</td>
</tr>
<tr>
<td>Period of presentation</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### 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)

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Engineering, Built Environment and Information Technology</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Faculty of Education</td>
<td></td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>GTS 161 GS</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>fortnightly practicals, 2 lectures per week</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Module is presented in English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Genetics</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>Module content</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Genetic diversity and evolution 261 (GTS 261)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Engineering, Built Environment and Information Technology</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>GTS 251 GS</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, fortnightly practicals</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Module is presented in English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Genetics</td>
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<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>Module content</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Bacteriology 251 (MBY 251)**

<table>
<thead>
<tr>
<th>Module credits</th>
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</thead>
<tbody>
<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Engineering, Built Environment and Information Technology</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>MBY 161 GS</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Module is presented in English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Microbiology and Plant Path</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
Module content

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.

Elective modules
Introduction to crop protection 251 (PLG 251)
Module credits 12.00
Prerequisites No prerequisites.
Contact time 2 lectures per week, 1 practical per week
Language of tuition Module is presented in English
Academic organisation Plant and Soil Sciences
Period of presentation Semester 1

Module content
Development and importance of crop protection. Basic principles in crop protection i.e. epidemic development of disease and insect pest populations, ecology of plant diseases and abiotic factors that affect plant health i.e. environmental pollution and pesticides, nutrient deficiencies and extreme environmental conditions. Ecological aspects of plant diseases, pest outbreaks and weed invasion. Important agricultural pests and weeds. Life cycles of typical disease causing organisms. Basic principles of integrated pest and disease management.

Principles of plant pathology 262 (PLG 262)
Module credits 12.00
Prerequisites MBY 161
Contact time 2 lectures per week, 1 practical per week
Language of tuition Afrikaans and English is used in one class
Academic organisation Plant and Soil Sciences
Period of presentation Semester 2

Module content

Invertebrate biology 251 (ZEN 251)
Module credits 12.00
Service modules Faculty of Education
Prerequisites ZEN 161 GS or TDH
Contact time 4 lectures per week, 1 practical per week
Language of tuition Module is presented in English
Academic organisation Zoology and Entomology
Period of presentation Quarter 1

Module content
Origin and extent of modern invertebrate diversity; parasites of man and domestic animals; biology and medical importance of arachnids; insect life styles; the influence of the environment on insect life histories; insect phytophagy, predation and parasitism; insect chemical, visual, and auditory communication; freshwater invertebrates and their use as biological indicators.

African vertebrates 261 (ZEN 261)
Module credits 12.00
Service modules Faculty of Education
Prerequisites ZEN 161 GS or TDH
Contact time 1 practical per week, 4 lectures per week
Language of tuition Module is presented in English
Academic organisation Zoology and Entomology
Period of presentation Quarter 3

Module content
Introduction to general vertebrate diversity; African vertebrate diversity; vertebrate structure and function; vertebrate evolution; vertebrate relationships; aquatic vertebrates; terrestrial ectotherms; terrestrial endotherms; vertebrate characteristics; classification; structural adaptations; habits; habitats; conservation problems; impact of humans on other vertebrates.
### Food microbiology 262 (MBY 262)

<table>
<thead>
<tr>
<th><strong>Module credits</strong></th>
<th>12.00</th>
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</thead>
<tbody>
<tr>
<td><strong>Prerequisites</strong></td>
<td>MBY 251</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Module is presented in English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Microbiology and Plant Path</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Module content**

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

Minimum credits: 144

Minimum credits:
Core = 72 credits
Elective = 72 credits

Additional information:
- Students interested in combining Biochemistry in a dual major with Chemistry should select CMY 383, CMY 385, CMY 382 and CMY 384.
- Students interested in combining Biochemistry in a dual major with Microbiology should select MBY 351, MBY 355, MBY 364 and MBY 365.
- Students interested in combining Biochemistry in a dual major with Genetics should select GTS 351, GTS 354, GTS 367 and either GTS 368 or BTC 361.
- Students interested in combining Biochemistry in a dual major with Human Physiology should select FLG 330, FLG 327, FLG 331 and FLG 332.
- Students interested in combining Biochemistry in a dual major with Plant Science should select BOT 356, BOT 358, BOT 365 and BOT 366.

Core modules

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

<table>
<thead>
<tr>
<th>Module credits</th>
<th>18.00</th>
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</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>BCM 251 and BCM 252</td>
</tr>
<tr>
<td>Contact time</td>
<td>180 minute practical per week, 2 lectures per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Afrikaans and English is used in one class</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Biochemistry</td>
</tr>
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<td>Semester 1</td>
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</table>
Module content

Biocatalysis and integration of metabolism 357 (BCM 357)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>BCM 251 and BCM 252 and BCM 261</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 lectures per week, 180 minute practical per week</td>
</tr>
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<tr>
<td>Academic organisation</td>
<td>Biochemistry</td>
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<tr>
<td>Period of presentation</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Module content
Nomenclature: enzyme nomenclature and classification. Specificity and mechanisms: the active site, mechanisms of catalysis and examples of specific enzyme mechanisms, e.g. lysozyme and carboxypeptidase A. Advanced enzyme kinetics, Cleland nomenclature and multi-substrate reactions. Allosteric enzymes: models by Koshland, Hill and Monod. Ligands binding to proteins. Problems and answers: tutorials of problems and answers based on above concepts. Integration of metabolism; hormones and second messengers; cell signalling; a case study in connectivity among metabolic pathways and their regulation, in for example diabetes and starvation. Inhibitors of angiotensin converting enzyme (ACE). RNA as enzymes. Applications of enzymes in food and cosmetics industries and in clinical pathology assays as biomarkers of diseases and toxic responses. Elucidation of metabolic pathways. Practical sessions cover tutorials on calculations, isolation of an enzyme, determination of pH and temperature optimum, determination of Km and Vmax, enzyme activation, enzyme inhibition, purification table and final report, oral defense of report.
Cell structure and function 367 (BCM 367)

Module credits: 18.00
Prerequisites: BCM 251 and BCM 252 and BCM 261
Contact time: 2 lectures per week, 180 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:

Molecular basis of disease 368 (BCM 368)

Module credits: 18.00
Prerequisites: BCM 251 and BCM 252 and BCM 261
Contact time: 180 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 2

Module content:
Normal and abnormal regulation of the cell cycle: The biochemistry of proliferation, quiescence, senescence, differentiation and apoptosis, illustrated by cancer. Host-Pathogen co-evolution: How adaptive immunity emerged from innate immunity. Infection: Molecular and cellular immunobiochemistry of protection against viral, bacterial and parasitic pathogens. Auto-immunity: Molecular mechanisms of the maintenance and failure of the recognition of foreign in the context of self in the mammalian body. Practical training includes debate on ethics of research on animal and human diseases, experimental design and execution of an immunoassay to test for a biomarker antibody of an infectious disease, tutorials to determine the performance of a diagnostic test for disease, including the principle of ROC curve analysis, positive and negative predictiveness, sensitivity, specificity and accuracy, applications of polyclonal and monoclonal antibodies for characterisation of disease with fluorescence, confocal and electron microscopy, flow cytometry and biosensors.

Elective modules

Plant ecophysiology 356 (BOT 356)
Module credits: 18.00
Service modules: Faculty of Education
<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>BOT 161 or TDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact time</td>
<td>1 practical per week, 2 lectures per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Separate classes for Afrikaans and English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Plant and Soil Sciences</td>
</tr>
<tr>
<td>Period of presentation</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Module content**
The emphasis is on the efficiency of the mechanisms whereby C3-, C4 and CAM-plants bind CO2 and how it impacted upon by environmental factors. The mechanisms and factors which determine the respiratory conversion of carbon skeletons and how production is affected thereby will be discussed. Insight into the ecological distribution and manipulation of plants for increased production is gained by discussing the internal mechanisms whereby carbon allocation, hormone production, growth, flowering and fruitset are influenced by external factors. To understand the functioning of plants in diverse environments, the relevant structural properties of plants, and the impact of soil composition, water flow in the soil-plant air continuum and long distance transport of assimilates will be discussed. Various important techniques will be used in the practicals to investigate aspects such as water-use efficiency, photosynthesis and respiration of plants.

**Plant ecology 358 (BOT 358)**

<table>
<thead>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>BOT 161 and BOT 251 or TDH</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td>Language of tuition</td>
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<tr>
<td>Academic organisation</td>
<td>Plant and Soil Sciences</td>
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<tr>
<td>Period of presentation</td>
<td>Semester 1</td>
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</tbody>
</table>

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

**Phytomedicine 365 (BOT 365)**

<table>
<thead>
<tr>
<th>Module credits</th>
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<tbody>
<tr>
<td>Service modules</td>
<td>Faculty of Education</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>BOT 161 or TDH</td>
</tr>
<tr>
<td>Contact time</td>
<td>2 lectures per week, 1 practical per week</td>
</tr>
<tr>
<td>Language of tuition</td>
<td>Module is presented in English</td>
</tr>
<tr>
<td>Academic organisation</td>
<td>Plant and Soil Sciences</td>
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<tr>
<td>Period of presentation</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Module content

The module will include a review on the discovery and use of plant medicines and phyto-therapeutically important molecules obtained from plants. Certain aspects of natural product chemistry i.e. the biosynthesis, ecological role and toxicity of the three main classes of secondary compounds; terpenoids, phenolics, and alkaloids are discussed. An introduction to the principles and applications of metabolomics are presented. The role of these natural products in defence against microorganisms and herbivores is reviewed during the module. The basics of alternative medicines such as homeopathy, ayurvedic medicine, acupuncture etc. are also discussed. Practical sessions on drug discovery approaches using chromatographic techniques for phytochemical analysis of secondary metabolites such as tannins, alkaloids, sterols and saponins are conducted. Bioassays on micro-organisms are also done during the practical sessions in order to develop the skills for the potential discovery of new antibiotics. Visits to several pharmaceutical laboratories are arranged.

**Plant diversity 366 (BOT 366)**

<table>
<thead>
<tr>
<th>Module credits</th>
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<tbody>
<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Education</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>BOT 161 or TDH</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>1 practical per week, 2 lectures per week</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Separate classes for Afrikaans and English</td>
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<tr>
<td><strong>Academic organisation</strong></td>
<td>Plant and Soil Sciences</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Semester 2</td>
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</table>

**Module content**


**Physical chemistry 382 (CMY 382)**

<table>
<thead>
<tr>
<th>Module credits</th>
<th>18.00</th>
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<tbody>
<tr>
<td><strong>Service modules</strong></td>
<td>Faculty of Education</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>CMY 282, CMY 283, CMY 284 and CMY 285</td>
</tr>
<tr>
<td><strong>Contact time</strong></td>
<td>2 practicals per week, 4 lectures per week, 1 discussion class per week</td>
</tr>
<tr>
<td><strong>Language of tuition</strong></td>
<td>Module is presented in English</td>
</tr>
<tr>
<td><strong>Academic organisation</strong></td>
<td>Chemistry</td>
</tr>
<tr>
<td><strong>Period of presentation</strong></td>
<td>Quarter 4</td>
</tr>
</tbody>
</table>
Module content

Analytical chemistry 383 (CMY 383)
Module credits 18.00
Service modules Faculty of Education
Prerequisites CMY 282, CMY 283, CMY 284 and CMY 285
Contact time 1 discussion class per week, 2 practicals per week, 4 lectures per week
Language of tuition Module is presented in English
Academic organisation Chemistry
Period of presentation Quarter 1

Module content

Organic chemistry 384 (CMY 384)
Module credits 18.00
Service modules Faculty of Education
Prerequisites CMY 282, CMY 283, CMY 284 and CMY 285
Contact time 2 practicals per week, 1 discussion class per week, 4 lectures per week
Language of tuition Module is presented in English
Academic organisation Chemistry
Period of presentation Quarter 3

Module content

Inorganic chemistry 385 (CMY 385)
Module credits 18.00
Service modules Faculty of Education
Prerequisites CMY 282, CMY 283, CMY 284 and CMY 285
Contact time
2 practicals per week, 4 lectures per week, 1 discussion class per week

Language of tuition
Module is presented in English

Academic organisation
Chemistry

Period of presentation
Quarter 2

Module content
Theory: Structure and bonding in inorganic chemistry. Molecular orbital approach, diatomic and polyatomic molecules, three-centre bonds, metal-metal bonds, transition metal complexes, magnetic properties, electronic spectra, reactivity and reaction mechanisms, reaction types, acid-base concepts, non-aqueous solvents, special topics.

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 control in embryonic development and differentiation, cancer and other diseases in humans.

Virology 351 (MBY 351)
**Module credits**
18.00

**Prerequisites**
BCM 251, CMY 127, GTS 251, GTS 261 and MBY 161

**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**
Introduction to the viruses as a unique kingdom inclusive of their different hosts, especially bacteria, animals and plants; RNA and DNA viruses; viroids, tumour viruses and oncogenes, mechanisms of replication, transcription and protein synthesis; effect on hosts; viral immunology; evolution of viruses.

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**Genetic manipulation of microbes 364 (MBY 364)**

**Module credits**
18.00

**Prerequisites**
BCM 251, CMY 127, GTS 251, GTS 261 and MBY 251

**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 2

**Module content**
Isolation of clonable DNA (genomic libraries, cDNA synthesis) cloning vectors (plasmids, bacteriophages, cosmids) plasmid incompatibility and control of copy number. Ligation of DNA fragments, modification of DNA end and different ligation strategies. Direct and indirect methods for the identification of recombinant organisms. Characterization (polymerase chain reaction, nucleic acid sequencing) and mutagenesis of cloned DNA fragments. Gene expression in Gram negative (E.coli) Gram positive (B.subtilis) and yeast cells (S.cerevisiae). Use of Agrobacterium and baculoviruses for gene expression in plant and insect cells respectively. Applications in protein engineering, diagnostics and synthesis of useful products.

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**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

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

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

Plant genetics and crop biotechnology 361 (BTC 361)
Module credits 18.00

Service modules Faculty of Engineering, Built Environment and Information Technology
### Prerequisites
- GTS 251 and {GTS 261 GS or BOT 261} and {GTS 351 and GTS 352 are recommended}

### Contact time
- 2 lectures per week, 1 practical per week

### Language of tuition
- Module is presented in English

### Academic organisation
- Genetics

### Period of presentation
- Semester 2

### Module content

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**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.
**Microbe interactions 365 (MBY 365)**

**Module credits** 18.00

**Prerequisites** MBY 251, MBY261, MBY 351 and MBY 355

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

**Bacterial genetics 355 (MBY 355)**

**Module credits** 18.00

**Prerequisites** BCM 251, CMY 127, GTS 251, GTS 261 and MBY 251

**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 1

**Module content**

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.