

# University of Pretoria Yearbook 2021

## BScAgric Plant Pathology (02133433)

**Department** Plant Science

**Minimum duration of study** 4 years

**Total credits** 570

**NQF level** 08

### Admission requirements

- The closing date is an administrative admission guideline for non-selection programmes. Once a non-selection programme is full and has reached the institutional targets, then that programme will be closed for further admissions, irrespective of the closing date. However, if the institutional targets have not been met by the closing date, then that programme will remain open for admissions until the institutional targets are met.
- The following persons will be considered for admission: candidates who are in possession of a certificate that is deemed by the University to be equivalent to the required National Senior Certificate with university endorsement, candidates who are graduates from another tertiary institution or have been granted the status of a graduate of such an institution, and candidates who are graduates of another faculty at the University of Pretoria.
- Life Orientation is excluded from the calculation of the Admission Point Score (APS).
- Grade 11 results are used for the conditional admission of prospective students. Final admission is based on Grade 12 results.
- Please note that the Faculty does not accept GED and School of Tomorrow qualifications for entry into our programmes.

### **Transferring students**

#### **Candidates previously registered at UP or at another university**

The faculty's Admissions Committee considers applications of candidates who have already completed the final NSC or equivalent qualification examination and/or were previously registered at UP or another university, on grounds of their final NSC or equivalent qualification results as well as academic merit.

#### **Candidates previously registered at a FET college or a university of technology**

The faculty's Admissions Committee considers the application of these candidates on the grounds of their final NSC or equivalent qualification results as well as academic merit.

### **Qualifications from countries other than South Africa**

- Citizens from countries other than South Africa and South African citizens with foreign qualifications must comply with all the other admission requirements and the prerequisites for subjects/modules.
- In addition to meeting the admission requirements, admission is based on the performance in the **TOEFL, IELTS or SAT**, if required.
- Candidates must have completed the National Senior Certificate with admission to degree studies or a certificate of conditional exemption on the basis of a candidate's foreign qualifications, the so-called "Immigrant" or "Foreign Conditional Exemption". The only condition for the "Foreign Conditional Exemption"

that is accepted is: 'completion of the degree course'. The exemption certificate is obtainable from Universities South Africa (USAf). Detailed information is available on the website at [click here](#).

**University of Pretoria website:** [click here](#)

### Minimum requirements

#### Achievement level

#### English Home

#### Language or

#### English First

#### Additional

#### Language

|         |          | Mathematics |          | Physical Sciences |          | APS       |
|---------|----------|-------------|----------|-------------------|----------|-----------|
| NSC/IEB | AS Level | NSC/IEB     | AS Level | NSC/IEB           | AS Level |           |
| 5       | C        | 5           | C        | 5                 | C        | <b>32</b> |

\* Cambridge A level candidates who obtained at least a D in the required subjects, will be considered for admission. Students in the Cambridge system must offer both Physics AND Chemistry with performance at the level specified for NSC Physical Sciences in the table above.

\* International Baccalaureate (IB) HL candidates who obtained at least a 4 in the required subjects, will be considered for admission. Students in the IB system must offer both Physics AND Chemistry with performance at the level specified for NSC Physical Sciences in the table above.

Candidates who do not comply with the minimum admission requirements for BScAgric (Plant Pathology), may be considered for admission to the BSc - Extended programme - Biological and Agricultural Sciences. This programme takes a year longer than the normal programmes to complete.

### BSc - Extended Programme - Biological and Agricultural Sciences

#### Minimum requirements

#### Achievement level

#### English Home

#### Language or

#### English First

#### Additional

#### Language

|         |          | Mathematics |          | Physical Sciences |          | APS       |
|---------|----------|-------------|----------|-------------------|----------|-----------|
| NSC/IEB | AS Level | NSC/IEB     | AS Level | NSC/IEB           | AS Level |           |
| 4       | D        | 4           | D        | 4                 | D        | <b>26</b> |

## Other programme-specific information

Electives are chosen as follows:

Third year - 12 credits

### Compilation of curriculum

Students must register for elective modules in consultation with the head of department who must ensure that the modules do not clash on the set timetable.

The Dean may, in exceptional cases and on recommendation of the relevant head of department, approve deviations from the prescribed curriculum.



## Promotion to next study year

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

## Pass with distinction

The BScAgric degree is conferred with distinction if a student obtains a weighted average of at least 75% in the modules of the major subjects in the third and the fourth year of study, with a weighted average of at least 65% in the other modules of the third and the fourth year of study.

## Curriculum: Year 1

**Minimum credits: 142**

Fundamental = 14

Core modules = 128

### Fundamental modules

#### Academic information management 111 (AIM 111)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 4.00   |
| <b>NQF Level</b>              | 05   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion |
| <b>Prerequisites</b>          | No prerequisites.  |
| <b>Contact time</b>           | 2 lectures per week  |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Information Science  |
| <b>Period of presentation</b> | Semester 1   |

#### Module content

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

#### Academic information management 121 (AIM 121)

|                        |   |
|------------------------|---|
| <b>Module credits</b>  | 4.00  |
| <b>NQF Level</b>       | 05  |
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Economic and Management Sciences<br>Faculty of Humanities<br>Faculty of Law<br>Faculty of Health Sciences<br>Faculty of Natural and Agricultural Sciences<br>Faculty of Theology and Religion<br>Faculty of Veterinary Science |
| <b>Prerequisites</b>   | No prerequisites.   |
| <b>Contact time</b>    | 2 lectures per week   |



**Language of tuition** Module is presented in English

**Department** Informatics

**Period of presentation** Semester 2

### Module content

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

## Language and study skills 110 (LST 110)

**Module credits** 6.00

**NQF Level** 05

**Service modules** Faculty of Natural and Agricultural Sciences  
Faculty of Veterinary Science

**Prerequisites** No prerequisites.

**Contact time** 2 lectures per week

**Language of tuition** Module is presented in English

**Department** Unit for Academic Literacy

**Period of presentation** Semester 1

### Module content

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

## Academic orientation 102 (UPO 102)

**Module credits** 0.00

**NQF Level** 00

**Language of tuition** Module is presented in English

**Department** Natural and Agricultural Sciences Deans Office

**Period of presentation** Year

## Core modules

### Biometry 120 (BME 120)

**Module credits** 16.00

**NQF Level** 05

**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

|                               |   |
|-------------------------------|---|
| <b>Contact time</b>           | 1 practical per week, 4 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Statistics                                |
| <b>Period of presentation</b> | 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.

### Plants and society 161 (BOT 161)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 8.00   |
| <b>NQF Level</b>              | 05   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| <b>Prerequisites</b>          | MLB 111 GS   |
| <b>Contact time</b>           | 2 lectures per week, fortnightly practicals  |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Department of Plant and Soil Sciences  |
| <b>Period of presentation</b> | Semester 2   |

#### Module content

Botanical principles of structure and function; diversity of plants; introductory plant systematics and evolution; role of plants in agriculture and food security; principles and applications of plant biotechnology; economical and valuable medicinal products derived from plants; basic principles of plant ecology and their application in conservation and biodiversity management.

This content aligns with the United Nation's Sustainable Development Goals of No Poverty, Good Health and Well-being, Climate Action, Responsible Consumption and Production, and Life on Land.

### General chemistry 117 (CMY 117)

|                        |   |
|------------------------|---|
| <b>Module credits</b>  | 16.00   |
| <b>NQF Level</b>       | 05  |
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |



|                      |   |
|----------------------|---|
| <b>Prerequisites</b> | A candidate must have Mathematics for at least 60% and 60% for Physical Sciences. |
|----------------------|---|

|                     |   |
|---------------------|---|
| <b>Contact time</b> | 1 practical per week, 4 lectures per week |
|---------------------|---|

|                            |                                |
|----------------------------|--------------------------------|
| <b>Language of tuition</b> | Module is presented in English |
|----------------------------|--------------------------------|

|                   |           |
|-------------------|-----------|
| <b>Department</b> | Chemistry |
|-------------------|-----------|

|                               |            |
|-------------------------------|------------|
| <b>Period of presentation</b> | Semester 1 |
|-------------------------------|------------|

### Module content

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

## General chemistry 127 (CMY 127)

|                       |       |
|-----------------------|-------|
| <b>Module credits</b> | 16.00 |
|-----------------------|-------|

|                  |    |
|------------------|----|
| <b>NQF Level</b> | 05 |
|------------------|----|

|                        |   |
|------------------------|---|
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |
|------------------------|---|

|                      |   |
|----------------------|---|
| <b>Prerequisites</b> | Natural and Agricultural Sciences students: CMY 117 GS or CMY 154 GS Health Sciences students: none |
|----------------------|---|

|                     |   |
|---------------------|---|
| <b>Contact time</b> | 1 practical per week, 4 lectures per week |
|---------------------|---|

|                            |                                |
|----------------------------|--------------------------------|
| <b>Language of tuition</b> | Module is presented in English |
|----------------------------|--------------------------------|

|                   |           |
|-------------------|-----------|
| <b>Department</b> | Chemistry |
|-------------------|-----------|

|                               |            |
|-------------------------------|------------|
| <b>Period of presentation</b> | 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)

|                       |      |
|-----------------------|------|
| <b>Module credits</b> | 8.00 |
|-----------------------|------|

|                  |    |
|------------------|----|
| <b>NQF Level</b> | 05 |
|------------------|----|

|                        |   |
|------------------------|---|
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Veterinary Science |
|------------------------|---|

|                      |            |
|----------------------|------------|
| <b>Prerequisites</b> | MLB 111 GS |
|----------------------|------------|

|                     |  |
|---------------------|--|
| <b>Contact time</b> | 2 lectures per week, fortnightly tutorials |
|---------------------|--|

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|----------------------------|--------------------------------|
| <b>Language of tuition</b> | Module is presented in English |
|----------------------------|--------------------------------|

|                   |   |
|-------------------|---|
| <b>Department</b> | Biochemistry, Genetics and Microbiology |
|-------------------|---|

|                               |            |
|-------------------------------|------------|
| <b>Period of presentation</b> | Semester 2 |
|-------------------------------|------------|

#### Module content

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

### Introduction to microbiology 161 (MBY 161)

|                       |      |
|-----------------------|------|
| <b>Module credits</b> | 8.00 |
|-----------------------|------|

|                  |    |
|------------------|----|
| <b>NQF Level</b> | 05 |
|------------------|----|

|                        |  |
|------------------------|--|
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology |
|------------------------|--|

|                      |                   |
|----------------------|-------------------|
| <b>Prerequisites</b> | No prerequisites. |
|----------------------|-------------------|

|                     |  |
|---------------------|--|
| <b>Contact time</b> | 2 lectures per week, fortnightly tutorials |
|---------------------|--|

|                            |                                |
|----------------------------|--------------------------------|
| <b>Language of tuition</b> | Module is presented in English |
|----------------------------|--------------------------------|

|                   |   |
|-------------------|---|
| <b>Department</b> | Biochemistry, Genetics and Microbiology |
|-------------------|---|

|                               |            |
|-------------------------------|------------|
| <b>Period of presentation</b> | 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)

|                       |       |
|-----------------------|-------|
| <b>Module credits</b> | 16.00 |
|-----------------------|-------|

|                  |    |
|------------------|----|
| <b>NQF Level</b> | 05 |
|------------------|----|

|                        |   |
|------------------------|---|
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science |
|------------------------|---|





|                               |  |
|-------------------------------|--|
| <b>Prerequisites</b>          | A candidate who has passed Mathematics with at least 60% in the Grade 12 examination |
| <b>Contact time</b>           | 1 practical/tutorial per week, 4 lectures per week                                   |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology  |
| <b>Period of presentation</b> | Semester 1   |

#### Module content

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

### Physics for biology students 131 (PHY 131)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 16.00  |
| <b>NQF Level</b>              | 05   |
| <b>Service modules</b>        | Faculty of Education<br>Faculty of Health Sciences<br>Faculty of Veterinary Science    |
| <b>Prerequisites</b>          | A candidate must have passed Mathematics with at least 60% in the Grade 12 examination |
| <b>Contact time</b>           | 1 discussion class per week, 1 practical per week, 4 lectures per week                 |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Physics  |
| <b>Period of presentation</b> | 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)

|                        |   |
|------------------------|---|
| <b>Module credits</b>  | 16.00   |
| <b>NQF Level</b>       | 05  |
| <b>Service modules</b> | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education<br>Faculty of Veterinary Science |
| <b>Prerequisites</b>   | 50% for Mathematics in Grade 12   |
| <b>Contact time</b>    | 1 tutorial per week, 4 lectures per week  |

|                               |                                     |
|-------------------------------|-------------------------------------|
| <b>Language of tuition</b>    | Module is presented in English      |
| <b>Department</b>             | Mathematics and Applied Mathematics |
| <b>Period of presentation</b> | 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)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 8.00  |
| <b>NQF Level</b>              | 05  |
| <b>Service modules</b>        | Faculty of Education<br>Faculty of Veterinary Science |
| <b>Prerequisites</b>          | No prerequisites.                                     |
| <b>Contact time</b>           | 2 lectures per week, fortnightly practicals           |
| <b>Language of tuition</b>    | Module is presented in English                        |
| <b>Department</b>             | Zoology and Entomology                                |
| <b>Period of presentation</b> | Semester 2  |

### Module content

Animal classification, phylogeny organisation 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 in various animal phyla. In-class discussion will address the sustainable development goals #3, 12, 13, 14 and 15 (Good Health and Well-being. Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land).

## Curriculum: Year 2

Minimum credits: 147

### Core modules

#### Introduction to proteins and enzymes 251 (BCM 251)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 12.00                                    |
| <b>NQF Level</b>              | 06                                       |
| <b>Service modules</b>        | Faculty of Health Sciences               |
| <b>Prerequisites</b>          | CMY 117 GS and CMY 127 GS and MLB 111 GS |
| <b>Contact time</b>           | 1 tutorial per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English           |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology  |
| <b>Period of presentation</b> | Semester 1                               |

#### Module content

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

#### Plant physiology and biotechnology 261 (BOT 261)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 12.00                                     |
| <b>NQF Level</b>              | 06  |
| <b>Service modules</b>        | Faculty of Education                      |
| <b>Prerequisites</b>          | BOT 161 and CMY 127.                      |
| <b>Contact time</b>           | 1 practical per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Department of Plant and Soil Sciences     |
| <b>Period of presentation</b> | 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 abiotic stress tolerant and disease resistant plants. Practicals: Basic laboratory skills in plant physiology; techniques used to investigate nitrogen metabolism, carbohydrate metabolism, pigment analysis, water transport in plant tissue and response of plants to hormone treatments.

## Introductory soil science 250 (GKD 250)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 12.00  |
| <b>NQF Level</b>              | 06   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology |
| <b>Prerequisites</b>          | CMY 117 GS   |
| <b>Contact time</b>           | 1 practical per week, 3 lectures per week                            |
| <b>Language of tuition</b>    | Module is presented in English                                       |
| <b>Department</b>             | Department of Plant and Soil Sciences                                |
| <b>Period of presentation</b> | Semester 1   |

## Module content

Origin and development of soil, weathering and soil formation processes. Profile differentiation and morphology. Physical characteristics: texture, structure, soil water, atmosphere and temperature. Chemical characteristics: clay minerals, ion exchange, pH, buffer action, soil acidification and salinisation of soil. Soil fertility and fertilisation. Soil classification. Practical work: Laboratory evaluation of simple soil characteristics. Field practicals on soil formation in the Pretoria area.

## Molecular genetics 251 (GTS 251)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 12.00  |
| <b>NQF Level</b>              | 06   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| <b>Prerequisites</b>          | GTS 161 GS   |
| <b>Contact time</b>           | 2 lectures per week, fortnightly tutorials   |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology  |
| <b>Period of presentation</b> | Semester 1   |

## Module content

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

## Genetic diversity and evolution 261 (GTS 261)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 12.00  |
| <b>NQF Level</b>              | 06   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology<br>Faculty of Education |
| <b>Prerequisites</b>          | GTS 251 GS   |
| <b>Contact time</b>           | 2 lectures per week, fortnightly tutorials   |
| <b>Language of tuition</b>    | Module is presented in English   |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology  |
| <b>Period of presentation</b> | Semester 2   |

### Module content

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

## Introduction to agricultural economics 210 (LEK 210)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 12.00   |
| <b>NQF Level</b>              | 06  |
| <b>Service modules</b>        | Faculty of Economic and Management Sciences       |
| <b>Prerequisites</b>          | No prerequisites.                                 |
| <b>Contact time</b>           | 3 lectures per week                               |
| <b>Language of tuition</b>    | Module is presented in English                    |
| <b>Department</b>             | Agricultural Economics Extension and Rural Develo |
| <b>Period of presentation</b> | Semester 1  |

### Module content

Introduction to financial management in agriculture: Farm management and agricultural finance, farm management information; analysis and interpretation of farm financial statements; risk and farm planning. Budgets: partial, break-even, enterprise, total, cash flow and capital budgets. Time value of money. Introduction to production and resource use: the agricultural production function, total physical product curve, marginal physical product curve, average physical product curve, stages of production. Assessing short-term business costs; Economics of short-term decisions. Economics of input substitution: Least-cost use of inputs for a given output, short-term least-cost input use, effects of input price changes. Least-cost input use for a given budget. Economics of product substitution. Product combinations for maximum profit. Economics of crop and animal production.

## Agricultural economics 220 (LEK 220)

|                       |       |
|-----------------------|-------|
| <b>Module credits</b> | 12.00 |
|-----------------------|-------|

|                               |   |
|-------------------------------|---|
| <b>NQF Level</b>              | 06  |
| <b>Service modules</b>        | Faculty of Economic and Management Sciences       |
| <b>Prerequisites</b>          | No prerequisites.                                 |
| <b>Contact time</b>           | 3 lectures per week                               |
| <b>Language of tuition</b>    | Module is presented in English                    |
| <b>Department</b>             | Agricultural Economics Extension and Rural Develo |
| <b>Period of presentation</b> | Semester 2  |

### Module content

The agribusiness system; the unique characteristics of agricultural products; marketing functions and costs; market structure; historical evolution of agricultural marketing in South Africa. Marketing environment and price analysis in agriculture: Introduction to supply and demand analysis. Marketing plan and strategies for agricultural commodities; market analysis; product management; distribution channels for agricultural commodities, the agricultural supply chain, the agricultural futures market.

## Bacteriology 251 (MBY 251)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 12.00  |
| <b>NQF Level</b>              | 06   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology |
| <b>Prerequisites</b>          | MBY 161 GS   |
| <b>Contact time</b>           | 2 lectures per week, fortnightly practicals                          |
| <b>Language of tuition</b>    | Module is presented in English                                       |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology                              |
| <b>Period of presentation</b> | Semester 1   |

### Module content

Growth, replication and survival of bacteria, Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Bacterial evolution, systematic and genomics. Biodiversity; bacteria occurring in the natural environment (soil, water and air), associated with humans, animals, plants, and those of importance in foods and in the water industry.

## Mycology 261 (MBY 261)

|                            |  |
|----------------------------|--|
| <b>Module credits</b>      | 12.00  |
| <b>NQF Level</b>           | 06   |
| <b>Service modules</b>     | Faculty of Engineering, Built Environment and Information Technology |
| <b>Prerequisites</b>       | MBY 161 GS   |
| <b>Contact time</b>        | 2 lectures per week, Fortnightly practicals/tutorials                |
| <b>Language of tuition</b> | Module is presented in English                                       |

**Department** Biochemistry, Genetics and Microbiology

**Period of presentation** Semester 2

### Module content

Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Chemical and physiological requirements for growth and nutrient acquisition. Mating and meiosis; spore development; spore dormancy, dispersal and germination. Fungi as saprobes in soil, air, plant, aquatic and marine ecosystems; role of fungi as decomposers and in the deterioration of materials; fungi as predators and parasites; mycoses, mycetisms and mycotoxicoses; fungi as symbionts of plants, insects and animals. Applications of fungi in biotechnology.

## Introduction to crop protection 251 (PLG 251)

**Module credits** 12.00

**NQF Level** 06

**Prerequisites** No prerequisites.

**Contact time** 1 practical per week, 2 lectures per week

**Language of tuition** Module is presented in English

**Department** Department of Plant and Soil Sciences

**Period of presentation** Semester 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, globally as well as in African context. Life cycles of typical disease causing organisms. Basic principles of integrated pest and disease management. The importance of crop protection in the context of sustainable development will be highlighted.

## Principles of plant pathology 262 (PLG 262)

**Module credits** 12.00

**NQF Level** 06

**Prerequisites** MBY 161

**Contact time** 1 practical per week, 2 lectures per week

**Language of tuition** Module is presented in English

**Department** Department of Plant and Soil Sciences

**Period of presentation** Semester 2

### Module content

Fundamental principles of plant pathology. The concept of disease in plants. Causes of plant diseases. Stages in development of plant diseases. Disease cycles and selected examples relevant to Africa. Diagnosis of plant diseases and the sustainable development goals that articulate with plant pathology.

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## Sustainable crop production and agroclimatology 251 (PPK 251)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 15.00                                       |
| <b>NQF Level</b>              | 06  |
| <b>Prerequisites</b>          | BOT 161                                     |
| <b>Contact time</b>           | 3 lectures per week, fortnightly practicals |
| <b>Language of tuition</b>    | Module is presented in English              |
| <b>Department</b>             | Department of Plant and Soil Sciences       |
| <b>Period of presentation</b> | Semester 2                                  |

### Module content

Influence of climate on cropping systems in South Africa. The surface energy balance. Hydrological cycles and the soil water balance. Sustainable crop production. Simple radiation and water limited models. Potential yield, target yield and maximum economic yield. Crop nutrition and fertiliser management. Principles of soil cultivation and conservation. Climate change and crop production – mitigation and adaptation.



## Curriculum: Year 3

Minimum credits: 136

### Core modules

#### Field crops 361 (AGR 361)

|                        |   |
|------------------------|---|
| Module credits         | 14.00                                       |
| NQF Level              | 07  |
| Prerequisites          | PPK 251                                     |
| Contact time           | 2 lectures per week, fortnightly practicals |
| Language of tuition    | Module is presented in English              |
| Department             | Department of Plant and Soil Sciences       |
| Period of presentation | Semester 2                                  |

#### Module content

Botanical characteristics, classification, growth requirements, production practices and utilization of crops rich in starch, oil, sugar and protein, fibre crops, narcotic and medicinal plants. The use of conservation agriculture (CA) in field crop production is becoming ever increasingly important, especially since it is directly related to Sustainable Development Goals (SDGs) 2 (food), 6 (water), 7 (energy) 13 (climate) and 15 (soil). During the semester applicable AC and SDG examples will be highlighted. Practical will consist out of a trial on the experimental farm and visits to research institutions and producers.

#### Plant ecophysiology 356 (BOT 356)

|                        |   |
|------------------------|---|
| Module credits         | 18.00                                     |
| NQF Level              | 07  |
| Service modules        | Faculty of Education                      |
| Prerequisites          | BOT 161                                   |
| Contact time           | 1 practical per week, 2 lectures per week |
| Language of tuition    | Module is presented in English            |
| Department             | Department of Plant and Soil Sciences     |
| Period of presentation | Semester 1                                |

## Module content

The emphasis is on the efficiency of the mechanisms whereby C3-, C4 and CAM-plants bind CO<sub>2</sub> 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 genetics and crop biotechnology 361 (BTC 361)

|                               |  |
|-------------------------------|--|
| <b>Module credits</b>         | 18.00  |
| <b>NQF Level</b>              | 07   |
| <b>Service modules</b>        | Faculty of Engineering, Built Environment and Information Technology |
| <b>Prerequisites</b>          | GTS 251 and {GTS 261 GS or BOT 261}                                  |
| <b>Contact time</b>           | 1 practical/tutorial per week, 2 lectures per week                   |
| <b>Language of tuition</b>    | Module is presented in English                                       |
| <b>Department</b>             | Biochemistry, Genetics and Microbiology                              |
| <b>Period of presentation</b> | Semester 2   |

## Module content

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

## Principles and practices 351 (HSC 351)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 14.00                                       |
| <b>NQF Level</b>              | 07  |
| <b>Prerequisites</b>          | No prerequisites.                           |
| <b>Contact time</b>           | 2 lectures per week, fortnightly practicals |
| <b>Language of tuition</b>    | Module is presented in English              |
| <b>Department</b>             | Department of Plant and Soil Sciences       |
| <b>Period of presentation</b> | Semester 1                                  |

## Module content

The organised nursery industry in South Africa. Principles: seed production; seed germination; rooting of cuttings; budding and grafting; propagation using specialised organs; micro propagation (tissue culturing). Practices: Greenhouse construction, lighting in the nursery; cooling and heating; soil-based and soil-less growing media; container types; irrigation and fertilisation; growth manipulation; pest and disease management. Management, economic and marketing aspects of a typical nursery operation. Students will get hands-on experience and will visit nurseries.

## Virology 351 (MBY 351)

**Module credits** 18.00

**NQF Level** 07

**Prerequisites** MBY 251 GS

**Contact time** 1 practical/tutorial per week, 2 lectures per week

**Language of tuition** Module is presented in English

**Department** Biochemistry, Genetics and Microbiology

**Period of presentation** Semester 1

## Module content

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.

## Genetic manipulation of microbes 364 (MBY 364)

**Module credits** 18.00

**NQF Level** 07

**Prerequisites** MBY 251 and GTS 251

**Contact time** 1 practical per week, 2 lectures per week

**Language of tuition** Module is presented in English

**Department** Biochemistry, Genetics and Microbiology

**Period of presentation** Semester 2

## Module content

Isolation of clonable DNA (genomic libraries, cDNA synthesis) cloning vectors (plasmids, bacteriophages, cosmids) plasmid incompatibility and control of copy number. Ligation of DNA fragments, modification of DNA end and different ligation strategies. Direct and indirect methods for the identification of recombinant organisms. Characterization (polymerase chain reaction, nucleic acid sequencing) and 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.

## General plant pathology 351 (PLG 351)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 18.00                                     |
| <b>NQF Level</b>              | 07  |
| <b>Prerequisites</b>          | MBY 161 and PLG 262                       |
| <b>Contact time</b>           | 1 practical per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Department of Plant and Soil Sciences     |
| <b>Period of presentation</b> | Semester 1                                |

### Module content

Principles and examples of plant diseases and their socio-economic importance particularly in the context of Africa and South Africa. Pathogens causing disease of seeds, seedlings, foliage, roots, stems, grains and fruit. Diagnosis, symptom expression and selected disease cycle examples caused by fungi, bacteria, viruses and nematodes.

## Plant disease control 363 (PLG 363)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 18.00                                     |
| <b>NQF Level</b>              | 07  |
| <b>Prerequisites</b>          | PLG 251 or PLG 262.                       |
| <b>Contact time</b>           | 1 practical per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Department of Plant and Soil Sciences     |
| <b>Period of presentation</b> | Semester 2                                |

### Module content

Principles of plant disease control and how it resonates with the sustainable development goals. Non-chemical control including biological control, disease resistance, regulatory measures, cultivation practices, physical methods. Modern chemo-therapy: characteristics, mode of action and application of bioproducts, fungicides, bactericides and nematicides. Principles of integrated disease management. The module will also cover applicable South African legislation, the local crop protection industries and the procedure of registering new chemicals.

## Curriculum: Final year

Minimum credits: 145

### Core modules

#### Statistics for biological sciences 410 (BME 410)

|                        |                                |
|------------------------|--------------------------------|
| Module credits         | 15.00                          |
| NQF Level              | 08                             |
| Prerequisites          | No prerequisites.              |
| Contact time           | 2 Block weeks                  |
| Language of tuition    | Module is presented in English |
| Department             | Statistics                     |
| Period of presentation | Semester 1                     |

#### Module content

The principles of experimental design as required for the selection of an appropriate research design. Identification of the design limitations and the impact thereof on the research hypotheses and the statistical methods. Identification and application of the appropriate statistical methods needed. Interpreting of statistical results and translating these results to the biological context.

#### Weed science 413 (OKW 413)

|                        |   |
|------------------------|---|
| Module credits         | 15.00                                       |
| NQF Level              | 08  |
| Prerequisites          | PLG 251                                     |
| Contact time           | 2 lectures per week, fortnightly practicals |
| Language of tuition    | Module is presented in English              |
| Department             | Department of Plant and Soil Sciences       |
| Period of presentation | Semester 2                                  |

#### Module content

Identification of important weeds of crops, gardens and recreational areas. Identification of alien invasive and indigenous encroaching species. Impacts of weeds on desirable vegetation. Interference between crop and weed species through allelopathy and competition phenomena. Role of weeds in plant-biodiversity and crop production potential. Weeds in annual and perennial crop situations. Weed biology and ecology. Mechanical, cultural, biological and chemical weed management practices. Integrated weed management. Herbicide formulations and application techniques. Modes of action of herbicides, and their behaviour and fate in the environment.

#### Seminar 400 (PGW 400)

|                |       |
|----------------|-------|
| Module credits | 15.00 |
|----------------|-------|



|                               |   |
|-------------------------------|---|
| <b>NQF Level</b>              | 08                                      |
| <b>Prerequisites</b>          | No prerequisites.                       |
| <b>Contact time</b>           | 1 lecture per week, 3 seminars per week |
| <b>Language of tuition</b>    | Module is presented in English          |
| <b>Department</b>             | Department of Plant and Soil Sciences   |
| <b>Period of presentation</b> | Year                                    |

#### Module content

Basic principles of the scientific process. Literature accessing and article assessment. Manuscript preparation and presentation of seminars. Basic instruction on the use of visual aids, etc. for effective oral presentations.

### Research project 462 (PLG 462)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 28.00                                     |
| <b>NQF Level</b>              | 08  |
| <b>Prerequisites</b>          | No prerequisites.                         |
| <b>Contact time</b>           | 1 practical per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Department of Plant and Soil Sciences     |
| <b>Period of presentation</b> | Year                                      |

#### Module content

A practical research project of limited extent under the supervision of one of the lecturers within the department. Any topic in plant pathology can be selected that reflect a current plant disease in South Africa.

### Plant disease epidemiology 463 (PLG 463)

|                               |   |
|-------------------------------|---|
| <b>Module credits</b>         | 18.00                                     |
| <b>NQF Level</b>              | 08  |
| <b>Prerequisites</b>          | PLG 251 or PLG 262 and PLG 363            |
| <b>Contact time</b>           | 1 practical per week, 2 lectures per week |
| <b>Language of tuition</b>    | Module is presented in English            |
| <b>Department</b>             | Department of Plant and Soil Sciences     |
| <b>Period of presentation</b> | Semester 2                                |



## Module content

Understanding of how plant disease epidemics occur in nature and how they can be monitored and analysed. In-depth knowledge how of plant diseases cause crop losses, how these losses are quantified, and how losses are predicted. Examples of how epidemiology is used to set the strategy of plant disease control. Use of some statistical procedures and modelling for quantifying and comparing epidemics. Classical case studies from South African disease epidemiological models will be discussed i.e. citrus black spot. Impact of climate change on plant disease development and how this relates to achieving the sustainable development goal #13 Take urgent action to combat climate change and its impact. In-depth discussions on plant-pathogen interactions and plant defence mechanisms.

## Advanced plant disease control 483 (PLG 483)

|                        |   |
|------------------------|---|
| Module credits         | 18.00   |
| NQF Level              | 08  |
| Prerequisites          | PLG 251 or PLG 262 and PLG 363.                     |
| Contact time           | 1 practical per week, 2 discussion classes per week |
| Language of tuition    | Module is presented in English                      |
| Department             | Department of Plant and Soil Sciences               |
| Period of presentation | Semester 1  |

## Module content

Advanced aspects of chemical and biological control of plant diseases as well as disease resistance. The importance of plant disease control in the context of sustainable development will be emphasised.

## Current concepts in plant pathology 490 (PLG 490)

|                        |                                       |
|------------------------|---------------------------------------|
| Module credits         | 18.00                                 |
| NQF Level              | 08                                    |
| Prerequisites          | PLG 351                               |
| Contact time           | 1 seminar per week                    |
| Language of tuition    | Module is presented in English        |
| Department             | Department of Plant and Soil Sciences |
| Period of presentation | Semester 2                            |

## Module content

This module will address the most recent concepts in plant pathology with a focus on diseases that is unique in the African context and the unpacking of the sustainable development goals in plant pathology.

## Applied entomology 365 (ZEN 365)

|                 |                      |
|-----------------|----------------------|
| Module credits  | 18.00                |
| NQF Level       | 07                   |
| Service modules | Faculty of Education |

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

### Module content

Impact of insects on economies, human health and well-being. Protection of crops from insect herbivores through monitoring, forecasting and application of the principles of integrated pest management; epidemiology and modern developments in the control of insect vectors of human and animal diseases; insects as a tool in forensic investigations; ecological and economic significance of insect pollinators and current threats to their survival and health. Lectures will be complemented by practical experiences that provide students with skills in the design, analysis, interpretation and reporting of applied entomological research. Examples used in this module are directly relevant to the sustainable development goals of Life on Land, No Poverty, Zero Hunger and Good Health and Well-being.

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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.