

University of Pretoria Yearbook 2024

BScHons *Plant Science* (02240707)

Department Department of Plant and Soil Sciences

Minimum duration of study 1 year

Total credits 135

NQF level 08

Admission requirements

1. Relevant BSc degree
2. A weighted average of at least 60% at final-year level
3. An admission examination may be required

Other programme-specific information

BOT 705 and BTW 701 are for BScHons (Biotechnology) students. PB students who wish to take one of these modules as an elective need to apply to the programme leader.

The curriculum for the balance of the credits will be determined by the heads of department of the interdepartmental BScHons (Biotechnology) degree programme.

Curriculum: Final year

Minimum credits: 135

Core credits: 75

Elective credits: 60

The programme consists of compulsory modules and elective modules. Students may register for modules to the maximum of 20 credits presented by another department, which forms part of the elective modules.

The following streams are presented in the BScHons in Plant Science programme:

- Plant Diversity (D)
- Plant Biotechnology/Physiology (PB)
- Plant Ecology (E)
- Plant Pathology (P)

Apart from the compulsory and elective modules, a project, leading to a research report (60 credits), forms an essential part of the training programme. One seminar (15 credits) must also be written and presented. Field excursions are undertaken.

In addition to the compulsory modules, electives are selected in consultation with the supervisor.

Suitably qualified candidates may also apply for the interdepartmental BScHons in Biotechnology degree (Code 02240393) with a supervisor in the Department of Plant and Soil Science.

Please consult the Head of Department of Biochemistry, Genetics and Microbiology for further information.

Core modules

Research report 782 (BOT 782)

Module credits	60.00
NQF Level	08
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Year

Module content

A mini research project with defined limits is undertaken under the guidance of a supervisor. The students identify potential projects by contacting supervisors from the different research programmes in the department. A list of projects on offer can be obtained from the Honours coordinator, and in exceptional circumstances a student can propose a project not listed. The module also has a strong theoretical component since emphasis is placed on writing and presenting a detailed project proposal. Additional relevant technical and analytical training is provided by the respective supervisors. The project is concluded with a final mini dissertation, presented in the format of a short manuscript, as well as an oral presentation.

Seminar 783 (BOT 783)

Module credits	15.00
NQF Level	08



Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Literature study, discussion and oral presentation of a subject related to the main discipline.

Elective modules

Crop physiology 761 (APS 761)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites.
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

An overview of photosynthesis and respiration, with the aim of examining the physiological basis of yield in cropping systems. This includes an assessment of parameters for determining plant growth, factors governing yield, partitioning of photoassimilates within plants and opportunities for increasing yield. Crop growth and yield will be put into context of a changing global climate. Evaluation of the manner in which plants respond to various abiotic stresses and how plants sense changing environments. The various roles of plant growth regulators in plants and the importance of these compounds in agriculture.

Statistics for biological sciences 780 (BME 780)

Module credits	15.00
NQF Level	08
Service modules	Faculty of Natural and Agricultural Sciences
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.

Natural woodland and forests: Ecology and management 700 (BOT 700)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Definitions of woodlands and forests and vegetation and forest resources in southern Africa; Classification of forest and woodland in southern Africa; Woodland dynamics including disturbance, recruitment, growth and mortality, recovery after disturbance; Ecosystem services (microclimate and nutrient cycling, carbon sequestration etc); Sustainable forest resource management (resource assessment, socio-economic assessment e.g. wood and non-forest products, participatory resource management processes); Forest health; Monitoring of resource-use impacts and adaptive management; Development of a framework for sustainable conservation and use of non-timber forest products; Climate change and resilience. Forest disease and pathology.

Molecular techniques 705 (BOT 705)

Module credits	15.00
NQF Level	08
Prerequisites	Admission into BSc Hons in Plant Science (Plant Biotechnology/Physiology)
Contact time	1 discussion class per week, 1 lecture per week, 5 practical per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Students are guided through the methodology of research planning and data handling. They are offered hands-on experience in a range of advanced techniques employed in molecular research and analysis.

Plant ecology 730 (BOT 730)

Module credits	10.00
NQF Level	08
Prerequisites	No prerequisites.

Contact time	8 hours per day for 5 days
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Year

Module content

Practical applications of plant ecology principles. Designing and executing field studies. Exposure to skills of field ecology and plant identification. This module includes a compulsory 5-day field component.

Applied plant anatomy 741 (BOT 741)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites
Contact time	Block: 4 wks for lectures with practical component
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Year

Module content

Theory of plant anatomy, understanding of basic tissue types and arrangement within organs. Evolutionary modifications to the basic anatomy. Introduction to seed anatomy/palynology. Understanding of developmental anatomy – ontogeny of tissues/organs. Advantages/disadvantages of different stains/techniques. Microscopy, including electron microscopy. Ethics and protocols of image manipulation. Practical understanding of tissue preservation, staining and sectioning techniques will be learnt and a portfolio of evidence submitted for assessment.

Plant classification and phytogeography 742 (BOT 742)

Module credits	20.00
NQF Level	08
Prerequisites	BOT 366
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

An overview of phylogenetics sets the scene, and sources of taxonomic information (morphology, anatomy, chemotaxonomy, cytogenetics, reproductive biology, palynology, ethnobotany and paleobotany) and how these data are used are discussed. This is followed by a section on the use of phylogenies as tools to understand ecological and geographical patterns and processes. Modern plant distribution patterns are assessed from the framework of the competing explanations of dispersal and vicariance.

Applications in plant biotechnology 746 (BOT 746)

Module credits	10.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	1 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Plant tissue culture. Plant gene transfer technologies (Agrobacterium-based, biolistics and other). Design of plant gene transfer constructs, including synthetic biology. New plant breeding technologies, including plant gene editing. Applications of genetically modified (GM) and gene edited crops and their impact on modern agriculture. Biosafety evaluation and regulation of GM and new plant breeding technologies.

Advanced phytomedicine 761 (BOT 761)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	1 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Basic concepts of toxicology. Systemic, developmental, genetic and organ-specific toxic effects. Hallucinogenic, allergenic, teratogenic and other toxic plants. Plant constituents, contradictions and interactions. Phytotoxicity unrelated to plant constituents. Safety and efficacy issues of commonly used plant compounds with emphasis on pharmaceutical applications. Pharmacokinetics and pharmacodynamics of phytomedicines. Metabolism and functions of secondary compounds such as tannins, alkaloids, terpenoids, flavonoids and free amino acids. Importance of secondary compounds in the defence mechanisms of plants. Isolation and identification of medicinal bioactive compounds from plants. Their current scope and potential applications in ethnobotany. Strategies to discover new pharmaceuticals from ethnomedicine.



Trends in plant science 784 (BOT 784)

Module credits	10.00
NQF Level	08
Prerequisites	No prerequisites.
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Literature study of recent publications in a subject related to one of the elective disciplines.

Plant identification and herbarium curation 786 (BOT 786)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites
Contact time	2 Block weeks, 2 practicals per week, 3 Block weeks
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Principles of identification, classification and nomenclature; identification of plants; family recognition; collection of plant specimens for identification; herbarium as a source of information. Variation in seed plants and breeding systems. Legal and ethical aspects of plant collection and permit requirements. Specimen preparation, including pressing, sterilisation, mounting, labelling and data capture. Introduction to herbarium databases. Herbarium curation and upkeep, including nomenclatural and taxonomic updates and classification systems, and aspects of pest control and health and safety. Practical work involves an excursion.

Spatial analysis in ecology 788 (BOT 788)

Module credits	10.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	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

Mapping and analysing spatial data. Theory and basic techniques of analysing and manipulating spatial data using geographical information systems. Mapping of vegetation types, species distributions and diversity, species traits. Understanding the spatial drivers of biodiversity patterns. The influence of scale on biodiversity analyses. Relevance for conservation planning for mapping biodiversity risk and prioritising conservation, especially in a South African context.

Plants, people and planet 789 (BOT 789)

Module credits	5.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	3 lectures/tutorials (1 hour each) per week, Presentation of proposal (1 hour), Self study
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Year

Module content

Introduction to Community Engagement (CE) in the South African and University of Pretoria context; plant blindness. Identification of community engagement topic and activities, field work and submission of report on these activities.

Land reclamation and restoration ecology 791 (BOT 791)

Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	Block: 6 weeks, 3 discussions 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 provide students with the skills to use biophysical information and data obtained by undertaking a natural resource inventory. This will be supported by taught methods of critically evaluating data and information obtained through assessment methodologies and an understanding of sampling design (choosing reference sites, spatial replication) and monitoring methods (e.g. recording biomass vs vegetation cover vs species richness; aspects of seed biology etc.). Through the additional understanding of ecological and agricultural concepts (e.g. productivity, decomposition rate, carbon uptake, pollinator abundance, erosion protection, dust reduction) students will acquire the skills to provide reclamation and restoration solutions to land degradation challenges in South Africa.

A site visit or field trip during which students will get exposed to the realities of reclamation and restoration and apply their knowledge and skills will be a compulsory component of this module.

Biotechnology in the workplace 701 (BTW 701)

Module credits	20.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	2 discussion classes per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Year

Module content

Introduction to the principles and realities of working in the field of biotechnology. Discussions on various essential components of the biotechnology industry including bio-entrepreneurship, marketing, business plan writing, business communication skills, capital for start-ups, incubators, basic accounting and finance as well as issues surrounding biosafety, ethics and legal aspects. The module is concluded by students writing a business plan for the development of a hypothetical biotechnological venture. This module is jointly presented in the Departments of Biochemistry, Genetics and Microbiology and Plant and Soil Sciences.

Advanced plant disease control 783 (PLG 783)

Module credits	15.00
NQF Level	08
Prerequisites	PLG 363 or permission from the HOD.
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.

Plant disease epidemiology 785 (PLG 785)

Module credits	15.00
NQF Level	08
Prerequisites	PLG 262, PLG 351 and PLG 363 or permission from the HOD.
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

Understanding of how plant disease epidemics occur in nature and how they can be monitored and analysed. In-depth knowledge of how 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 for quantifying and comparing epidemics. Impact of climate change on plant disease development. In-depth discussions on plant-pathogen interactions and plant defence mechanisms.

Molecular plant pathology and plant biosecurity 786 (PLG 786)

Module credits	15.00
NQF Level	08
Prerequisites	PLG 351 or equivalent.
Contact time	1 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

This module addresses the most recent concepts in plant pathology with a focus on phytopathogens including fungi, bacteria, viruses, and nematodes that affect Africa's crop production and how these pathogens interact with their hosts. The most recent molecular aspects in plant pathology and biosecurity tools are used to understand the different plant-pathogen interactions and how the risk of pathogens to food security and safety can be mitigated in the context of Africa's crop production. This knowledge is critical for ensuring local and global food security as well as achieving the sustainable development goals: two (Zero Hunger) and four (Quality Education).

General Academic Regulations and Student Rules

The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the

relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations. The G Regulations are updated annually and may be amended after the publication of this information.

Regulations, degree requirements and information

The faculty regulations, information on and requirements for the degrees published here are subject to change and may be amended after the publication of this information.

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQSF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.