

## THE INTERDEPARTMENTAL HONOURS PROGRAMME IN **BIOTECHNOLOGY**

Biotechnology is a broad area of the biosciences that involves the manipulation of living systems and organisms to develop or make products that help us fight hunger and disease, improve production to be safer, cleaner and more efficient, reduce our ecological footprint, and promote sustainability. Biotechnology is thus often linked to genetic engineering and depending on the tools and applications, it overlaps with related scientific fields, but is generally characterized by the fact that biotechnology has a stronger link with the innovation and commercialization aspects of the biosciences.

### **PROGRAMME INFORMATION**

The BScHons Biotechnology degree at UP is an inter-departmental programme aimed at enabling students to pursue their interest in biotechnology through any of the relevant research areas within the molecular biosciences, including genetics, biochemistry, microbiology, and plant science. The programme has a strong emphasis on gene technologies and interested students are expected to have a solid background in molecular biology.

While the Department of Biochemistry, Genetics & Microbiology (BGM) is responsible for coordinating the study programme, the students within this programme will register and conduct their studies within either biochemistry (BGM), genetics (BGM), microbiology (BGM) or plant science (Dept of Plant & Soil Sciences). A student's choice of undergraduate modules at final year level will guide which of these options are available to them.

### **OBJECTIVES OF THE PROGRAMME**

The Biotechnology Honours programme is designed to provide students with career-orientated training in molecular biotechnology. The most important study objective is to teach students to read critically, think logically and communicate effectively in their chosen field of study. The following specific objectives can be identified:

- ✓ To obtain an overview of biotechnology, its various applications and possibilities.
- ✓ To learn how to collect information from the literature and how to process and integrate that information.
- ✓ To learn how to communicate scientifically about their research.
- ✓ To master the technical aspects necessary for working in the field of molecular biotechnology.
- ✓ To learn how research is planned, conducted, evaluated and reported.
- ✓ To obtain insight into the entrepreneurial side of biotechnology.

### **APPLICATION PROCESS**

#### **MINIMUM REQUIREMENTS FOR ADMISSION:**

All applicants must have a Bachelor of Science (BSc) degree in the biological sciences (NQF level 7) with a specialisation in at least one of Biochemistry, Genetics, Microbiology or Plant Sciences and/or clear evidence of a strong background in molecular biology. We require *at least* a 60% average (lower second GPA) across your credit-bearing final year modules in the preceding degree.

In-house students who wish to continue with an Honours degree in Biotechnology must comply with the module and admission requirements as specified by each of the participating Departments

(also see their separate brochures). To be eligible, students must have completed and/or be registered for:

- **Genetics** - [GTS351 + GTS354 + (GTS367 or GTS368)] or
- **Biochemistry** - [BCM356 + BCM357 + (BCM367 or BCM368)] or
- **Microbiology** - [MBY351 + MBY355 + MBY364] or
- **Plant Biotechnology** - [GTS351 + BTC361 + BOT365].

All applications for admission are screened on an individual basis by the participating divisions/departments in accordance with their stated admission criteria and quotas. Only a limited number of students are annually admitted to the respective Hons programmes, and preference is given based on academic merit as evidenced in your academic study record.

The study programme is presented in English and we require all students to be fully proficient therein. Additional criteria and admission requirements may be imposed by the respective Departments and such information will be available from the relevant contact persons listed below.

Hons applications opened 1 May and closes 31 October. Please take note of the attached closing dates for more details. Successful candidates will be notified via email.

#### **THE SELECTION PROCESS:**

##### ■ **In-house students:**

Please apply for postgraduate study online through your **Student Portal** (MyTuks login) or at NAS Student Administration in the foyer of the Agricultural Sciences building. Please ensure that your correct contact details (email and cell phone number) are available on your Student Portal.

Applications will be placed for consideration according to the applicant's final year module combinations, e.g. applications that adhere to the stated minimum admission requirements for genetics, will be considered along with all other Hons applications in the Division of Genetics. The same applies for Biochemistry, Microbiology, and Plant and Soil Sciences. Applicants may, however, indicate a preference in which of the participating divisions/departments they would prefer to be considered by sending an email to Lucille Hermann. Contact details for each of the participating divisions/departments are provided below. Please clearly state "Hons 2022" in the subject line.

##### ■ **Students from institutions other than UP:**

Interested persons may apply by completing the online UP application at <https://www.up.ac.za/online-application>. Please ensure that you provide the correct contact details and address. It is essential that a CV and up-to-date academic record is attached as supporting documentation (see "step 10" of the online UP application process). If you do not have your final marks as yet, please include your official progress marks and ensure that we receive your final marks as soon as possible! Note that applications will not be processed based on 1st and 2nd year marks only, therefore hand in your academic record after the 1st semester of your final year is complete. Non-SA applications must be submitted by the end of August and will be processed as soon as possible thereafter.

Applicants are encouraged to indicate on the accompanying documents in which of the participating divisions/departments they wish to do their Hons programme. However, if no preference is indicated, applications will be placed according to the research field most closely aligned with the final year modules.

#### **BURSARIES:**

There are NRF bursaries available for students who have excelled in their academic career. Please consult the University's bursaries office for more information or apply online at <http://www.nrf.ac.za/bursaries/calls>. University Fees Waiver bursaries are also available and all registered students will automatically be considered, however, it is dependent on the availability of funds; bursaries are not guaranteed.

**GENERAL:**

This is a one year, full-time programme at NQF level 8. Students are generally expected to be in their Department on a full-time basis during the academic year and to participate fully in all departmental activities. Students are provided with space in their respective Department in which to work.

**COMPOSITION OF THE PROGRAMME**

The Honours programme serves as the first level of postgraduate training and therefore aims to provide the student with broad-based training, be it in biochemistry, genetics, microbiology, or plant science. While each of the Departments involved in the Biotechnology Hons curricula curricula the programme's 135 credits to suit *their* specific needs, it does have a general structure and two compulsory modules, namely MLB 721 and BTW 701, the latter of which is unique to this programme. Compulsory components common to all of the Biotechnology Honours programmes include:

**TECHNIQUES COURSE COMPONENT:**

All candidates must successfully complete a comprehensive molecular/recombinant DNA techniques course that will provide exposure to a wide range of gene technologies applicable in molecular biotechnology.

**RESEARCH PROJECT:**

Students are required to complete a limited research project within one of the research fields in the biosciences (biochemistry, genetics, microbiology or plant science). All projects will have a strong focus on molecular biotechnology and the above technical training serves as a foundation for the research project. The project aims to teach students the basic concepts of research planning and how to develop strategies and use technology to answer specific questions. Wherever possible, the project is conducted under the direct leadership of a lecturer or postdoctoral fellow, with one or more postgraduate student mentors.

**SCIENCE COMMUNICATION COMPONENT:**

The objective of this component is to teach students how to effectively search literature databases, use referencing software and condense collated information into the format of either a short oral presentation or a more detailed oral and written report. A main outcome for this module is that students understand the process through which information is accumulated, evaluated, processed and communicated.

**MLB 721: Molecular and Cellular Biology****(15 credits)**

The module addresses the principles and applications of molecular biotechnology. Very strong emphasis is placed on the principles of research planning and the use of molecular technology to address questions in the biological sciences. The module is assessed by means of a research project proposal submitted by each of the students. This proposal should focus on the use of recombinant DNA technology in addressing questions in the biological sciences. Students must choose their own research proposal topic and are encouraged to choose something that is related to their own field of interest, postgraduate specialization or future career commitments. There is also an oral defense based on the proposal submitted.

**BTW 701: Biotechnology in the Workplace 701****(20 credits)**

Given the continuing advances in the field of biotechnology and bioentrepreneurship, the content of this module has been updated and expanded to better align with the curricula of similar modules at peer Universities, as well as to reflect global developments. Following consultation with the Faculty of Economic and Management Sciences (EMS), business-related topics were defined and allocated credits based on the existing criteria for the Postgraduate Diploma in Entrepreneurship offered by EMS. This

interfaculty alignment will allow graduates the opportunity to apply for the MPhil degrees offered by the Faculty of EMS.

This module provides an introduction to the principles and realities of working in the field of biotechnology. Students will be guided through discussions on various essential components of the biotechnology industry including bio-entrepreneurship, marketing, business plan writing, business communication skills, procuring capital for start-ups, incubators, basic accounting and finance, as well as issues surrounding biosafety, ethics and legal aspects. Students are then tasked to develop a comprehensive business plan for a hypothetical biotechnological venture.

Specific details regarding the programmes can be obtained from the respective Departments (see contact info below). In addition to the modules MLB 721 and BTW 701, the elective modules must be chosen as follows:

- Students registering in the Division of Biochemistry must take BCM 771, BCM 773 and BCM 774 as electives.
- Students registering in the Division of Genetics must take GTK 702, GTK 703 and GTK 705 as electives.
- Students registering in the Division of Microbiology must take MCP 751, MCP 752 and MCP 754 as electives.
- Students registering in the Department of Plant and Soil Sciences must take BOT 705, BOT 746, BOT 782 and BOT 783 as electives.

## **ARTICULATION WITH FURTHER HIGHER DEGREES**

- MSc options in Biotechnology, Bioinformatics, Biochemistry, Genetics, Microbiology, as well as in the Plant Sciences are available. Please see: <https://www.up.ac.za/biochemistry-genetics-and-microbiology/article/2808568/study-programs> and <https://www.up.ac.za/plant-and-soil-sciences/article/45005/postgraduate-degrees-in-plant-and-soil-sciences> .
- There are also options for further study available through the Faculty of Economics & Management Sciences (EMS) - more information on the MPhil programmes can be found at: <https://www.up.ac.za/business-management/article/2521300/masters-degrees>.

Please feel free to contact any of the persons below for more information on the Biotechnology Honours programme in the contributing departments/divisions:

### **Div of Genetics, Dept of BGM**

- **Ms Lucille Hermann** +27 (0)12 420 3254 **LUCILLE.HERMANN @ up.ac.za**
- Prof Vida van Staden +27 (0)12 420 3257 **VIDA.VANSTADEN @ up.ac.za**

### **Dept of Plant and Soil Sciences**

- Prof Dave Berger +27 (0)12 420 4634 **DAVE.BERGER @ up.ac.za**

### **Div of Biochemistry, Dept of BGM**

- Dr Ntombenhle Gama +27 (0)12 420 6985 **NTOMBI.GAMA @ up.ac.za**
- Prof Anabella Gaspar +27 (0)12 420 2481 **ANABELLA.GASPAR @ up.ac.za**

### **Div of Microbiology, Dept of BGM**

- Ms Tarren Seale +27 (0)12 420 3263 **TARREN.SEALE @ up.ac.za**
- Prof Jacques Theron +27 (0)12 420 3266 **JACQUES.THERON @ up.ac.za**