



## The Department of Pharmacology

The Department of Pharmacology strives to research the complex interplay between biological systems and chemical entities. Through this research the department contributes to the current understanding of processes that occur within organisms and contribute to the exciting field of pharmacology. The Department is situated on the Prinshof Campus of the University of Pretoria (UP) on the sixth and seventh floor the Basic Medical Sciences Building.

## Selected accolades from staff and students of the Department for 2019/2020

- Prof K Outhoff
  - Promoted to Associate Professor (2019).
- Dr W Cordier
  - National Research Foundation Thuthuka Post-PhD research grant (2019).
  - UP Faculty of Education Research Indaba Best Doctoral Podium Presentation for Post-approval Projects (2020).
- Dr S Brand
  - Research Development Programme grant (2020).
- Dr BT Flepisi
  - Research Development Programme grant (2020).
- Ms H Parkar
  - UP Faculty of Health Sciences Research Day: 3<sup>rd</sup> Poster Prize in Basic Sciences for Young Researcher.
- Ms D Wilson
  - UP Faculty of Health Sciences Research Day: 2<sup>nd</sup> Short Presentation Prize in Basic Sciences for Young Researcher.
- Ms M Leuschner
  - SASBCP2020: 2<sup>nd</sup> Oral Prize in Basic Pharmacology for Young Pharmacologist.
- Mr M Ncube
  - SASBCP2020: 1<sup>st</sup> Oral Prize in Regulatory Pharmacology for Young Pharmacologist.
- Mr W van Eeden
  - SASBCP2020: 2<sup>nd</sup> Oral Prize in Regulatory Pharmacology for Young Pharmacologist.
- Dr Retha Duvenhage
  - SASBCP2020: Joint Best Poster in Clinical Pharmacology for Young Pharmacologist.
- Ms T Lebepe and Mr C Mashaba
  - SASBCP2020: Merit Award for Young Pharmacologist.

## What is B.Sc.Hons Pharmacology?

B.Sc.Hons Pharmacology is a one year, full-time postgraduate programme offered to students who are in possession of a BSc degree with Physiology/Biochemistry/Anatomy/Microbiology and Pharmacology as main subjects. This programme teaches research methodology and pharmacology in three tracks, namely basic, clinical trials and regulatory affairs pharmacology. As this is an intensive course, part-time studies are not permitted. Undergraduate modules in pharmacology are a pre-requisite for the degree, however, under exceptional circumstances students may take these modules during the honours year. Note that preference will be given to those already in possession of undergraduate pharmacology modules. Specific information pertaining to each track is provided in separate leaflets.

## Application procedure

Students need to apply using the [online postgraduate application portal](#) of the University of Pretoria. All applications must be accompanied by a short curriculum vitae, full academic record, motivation letter and track selection. After the application has been submitted, please send through your details to Ms Anwani Nekhumbe ([anwani.nekhumbe@up.ac.za](mailto:anwani.nekhumbe@up.ac.za)) so that we may track your submission. It is up to the applicant to ensure that their details have been received by the Department. Please note that the deadline for B.Sc.Hons Pharmacology is towards the end of August of each year. Late or incomplete applications will not be considered. For more information about the Department, research focus and tracks offered, please visit our web page at <http://www.up.ac.za/pharmacology>.



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- **Lepule KH**, **Cordier W**, Steenkamp P, **Nell M**, **Steenkamp V**. The ability of three African herbal remedies to offer protection against an *in vitro* model of Parkinson's disease. *South African Journal of Botany* 126 (2019) 121–131.
- Ker JA, **Outhoff K**. Burning issues in the prevention of heart failure. *South African Family Practice* 2019;61:11-12.
- Ker JA, **Outhoff K**. Burning issues in acute heart failure management. *South African Family Practice* 2019;61:6-8.



### What is basic pharmacology?

The area of basic pharmacology covers human and animal studies with respect to drug development, drug effects, toxicity or side effects, kinetics, mechanisms of action and the biochemistry behind a drug's ability to exert an effect in living systems. These entail *in vitro* and/or *in vivo* studies, and is paramount to drug discovery and development.

### Which areas of basic pharmacology are targeted?

The areas of basic pharmacology that the Department of Pharmacology focuses on comprise of the following:

- Analytical methodological development
- Blood-brain barrier permeability alterations due to cancer
- Cancer chemotherapy
- Cancer dormancy and proliferation
- Diabetes
- Drug discovery
- *In silico* design and “docking” studies
- Neurodegeneration
- Phytopharmacology (plant-based remedies)
- Proteomics
- Toxicology
- Wound healing and antimicrobial therapy

These areas often overlap depending on the scope of the research projects involved.

### What is the career path for a basic pharmacology graduate?

A recent survey of graduates indicated that six months after graduation, over 40% of pharmacology graduates were employed. The following lists a selection of often targeted professions:

- Academic research
- Clinical research technicians/associates
- Drug development
- Laboratory technician
- Medical writing
- Product sales or specialisation

### What does the B.Sc.Hons Pharmacology (Basic Track) entail?

This course will prepare the student to engage in all scientific aspects of basic pharmacology, including experimental design and research practice. It will equip the student with the basic knowledge required to design and perform experimental procedures, as well as troubleshoot and analyse data. The course consists of theoretical and practical components.

The academic component of this course consists of a variety of theoretical modules covering several pharmacological and scientific concepts. In addition the student attends Biostatistics and Research Methodology modules. The student is expected to complete a research project focussing on an area of basic pharmacology as proposed by the staff and supervised by senior postgraduate students and staff.

### Course requirements

For admission, candidates should have a minimum aggregate of 60% for undergraduate studies in a scientific field (including pharmacology). In special circumstances graduates who lack undergraduate pharmacology may be allowed to complete additional pharmacology modules during the honours year, but as this increases work burden, it should not be seen as a definite option. The department can accommodate six to eight students for this degree per year.

### Contact us

**Acting Head of Department:** Prof W Cordier at [werner.cordier@up.ac.za](mailto:werner.cordier@up.ac.za) or +12 27 319 2521  
**Course/Track coordinator:** Dr BT Flepisi at [brian.flepisi@up.ac.za](mailto:brian.flepisi@up.ac.za) or +27 12 319 2143  
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### What are clinical trials?

Clinical trials are research studies that explore whether a medical strategy, treatment, or device is safe and effective for humans. These studies also may show which medical approaches work best for certain illnesses or groups of people. Clinical trials produce the best data available for health care decision making.

### What is the purpose of clinical trials?

These standards protect patients and help produce reliable study results. Clinical trials are one of the stages of a long and careful research process. The process often begins in a laboratory, where scientists first develop and test new ideas. If an approach seems promising, the next step may involve animal testing. This shows how the approach affects a living body and whether it's harmful. However, an approach that works well in the laboratory or in animals doesn't always work well in people. Thus, research in humans is needed. For safety purposes, clinical trials start with small groups of patients to find out whether a new approach causes any harm. In later phases of clinical trials, researchers learn more about the new approach's risks and benefits.

A clinical trial may find that a new strategy, treatment, or device:

- Improves patient outcomes
- Offers no benefit
- Causes unexpected harm

All of these results are important because they advance medical knowledge and help improve patient care.

### Why are clinical trials important?

Clinical trials are a key research tool for advancing medical knowledge and patient care. Clinical research is done only if doctors don't know:

- Whether a new approach works well in people and is safe, and
- Which treatments or strategies work best for certain illnesses or groups of people.

The results from other clinical trials show what doesn't work or may cause harm. Clinical trials thus help improve and advance medical care. They also can help health care decision makers direct resources to the strategies and treatments that work best.

### How do clinical trials work?

Each clinical trial has a master plan called a protocol. This protocol explains how the trial will be carried out. The trial is led by a principal investigator (PI), who often is a doctor. The PI prepares the protocol for the clinical trial. The protocol outlines what will be done during the clinical trial and why. Each medical center involved in the study uses the same protocol.

Key information in a protocol includes:

- How many patients will take part in the clinical trial
- Who is eligible to take part in the clinical trial
- What tests will be done on patients will get and how often will they be repeated
- What type of data will be collected during the clinical trial
- Detailed information about the treatment plan

### What does the B.Sc.Hons Pharmacology (Clinical Track) entail?

This course will prepare the student to engage in aspects of conducting clinical trials. It will equip the student with the basic knowledge required by ICH-Good Clinical Practice. Each learner will be assigned to an academic and also clinical trial unit supervisor. Valuable practical work experience in all aspects of clinical trials is gained through this approach. The academic component of this course consists of a variety of theoretical modules covering various pharmaceutical laws and good clinical practice topics. In addition the student attends the Biostatistics and Research methodology modules. The student is expected to submit a research project focussing on a Clinical Trial topic.

### Course requirements

For admission, candidates should have a minimum aggregate of 60% for undergraduate studies in a scientific field (including pharmacology). In special circumstances graduates who lack undergraduate pharmacology may be allowed to complete additional pharmacology modules during the honours year, but as this increases work burden, it should not be seen as a definite option. The department can accommodate six to eight students for this degree per year.

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### What is regulatory affairs pharmacology?

Nearly everything you can think of needs to be regulated—from the simple manufacturing of a match stick to the building of a war ship. This ensures safety, reliability, reproducibility and functionality. The regulatory function in healthcare industries is vital in making safe and effective healthcare products available worldwide. South Africa has a challenging healthcare environment and legislation demands high standards and cost-effectiveness which will benefit the whole population. This can only be achieved by effective regulatory measures.

### What is the function of regulatory affairs?

Every pharmaceutical company in South Africa has a regulatory affairs department. The regulatory affairs department has to ensure that their company complies with all of the regulations and laws pertaining to their products, services or devices. It also acts in an advisory capacity on any regulatory aspect that would affect proposed activities. Regulation in the healthcare sector of South Africa is mandatory for pharmaceuticals, medical devices, *in vitro* diagnostics, biologicals and biotechnology, nutritional products, complementary medicines, cosmetics and veterinary products.

### What is the career path?

Regulatory professionals are employed in industry, government and academia and are involved with a wide range of activities. The regulatory professional's roles and responsibilities often begin in the research and development phases, preparation and submission of dossiers, moving into clinical trials and extending through premarket approvals, manufacturing, labelling, advertising and post market surveillance. Regulatory officers fulfil various tasks within the pharmaceutical industry and are involved with activities relating to middle management.

### Who works in regulatory affairs?

Regulatory affairs departments employ a variety of skilled professionals. According to South African law (Act 101 of 1965), the ultimate responsible person (Regulatory affairs manager) must be a registered pharmacist with the South African Pharmacy Council.

Regulatory assistants may be pharmacists or other people with suitable qualifications and experience. The non-pharmacist regulatory professionals come from diverse backgrounds. Most regulatory professionals have a B.Sc in a scientific or technical field. In addition, regulatory professionals usually have experience in other careers before transitioning. Only recently have candidates been trained at Honours and Masters level specifically in regulatory affairs to accommodate the high demand and request from the pharmaceutical industry and the South African Health Products Regulatory Authority (SAHPRA). Individuals who ensure regulatory compliance and prepare dossier submissions, as well as those whose main function is clinical affairs or quality assurance are all considered regulatory professionals.

### What does the B.Sc.Hons Pharmacology (Regulatory Affairs Track) entail?

This course will prepare the student to engage in all aspects of drug registration and regulation. It will equip the student with the basic knowledge required by pharmaceutical industries for drug registration and associated regulatory affairs, as well as regulatory requirements deemed essential by the SAHPRA. The course consists of a practical component where the student will receive hands-on training at a pharmaceutical industry for six weeks. The academic component of this course consists of theoretical modules covering pharmaceutical laws and regulatory affairs. In addition the student attends the Biostatistics and Research methodology modules. The student is expected to submit a research project on a Regulatory Affairs (or related) topic.

### Course requirements

For admission, candidates should have a minimum aggregate of 60% for undergraduate studies in a scientific field (including pharmacology). In special circumstances graduates who lack undergraduate pharmacology may be allowed to complete additional pharmacology modules during the honours year, but as this increases work burden, it should not be seen as a definite option. The department can accommodate six to eight students for this degree per year.

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