



DEPARTMENT OF PHARMACOLOGY AND TOXICOLOGY  
UNIVERSITY OF TORONTO

# Graduate Studies in Pharmacology

*This pamphlet has been prepared for prospective graduate students in  
Pharmacology at the University of Toronto.*

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## What is Pharmacology?

Pharmacology is a broadly based and integrative discipline of biology dealing with the properties of chemical compounds and their interactions with living systems. The discipline provides the scientific basis and principles for a variety of special applications, such as the study of drug actions in the health sciences, the use of drugs as therapeutic agents in medicine or as tools in scientific research, the development and control of pharmaceuticals, the investigation and control of poisons and pollutants in natural and social environments, and as yet unforeseen applications in the future.

Pharmacology is not the same as Pharmacy, which is the profession engaged in the preparation and dispensing of drugs and the operation of drug stores. Pharmacists are trained in the Faculty of Pharmacy, University of Toronto.

The goal of Pharmacology, as presently defined, is the design or identification of chemical agents to cure, ameliorate, or prevent disease; to understand and explain the mechanisms of their actions; and to contribute to the maintenance of health, well-being and productiveness of society. To be a pharmacologist requires a solid knowledge of the biological sciences, and also of mathematics, chemistry, and many aspects of medicine. The techniques and methods of investigation employed by pharmacologists are those used in biological and physical sciences.

## The Department:

The Department presently has 60 Graduate Faculty members; student enrolment is usually between 90-100 students. Most laboratories are in the Medical Sciences Building on the main campus of the University. Others are located in nearby institutes and hospitals.

## Degree Programs:

Our graduate study program for the M.Sc. and Ph.D. degrees involves course study and supervised research in one of the following general areas of Pharmacology.

- ⇒ Applied Clinical Pharmacology
- ⇒ Biochemical and Molecular Pharmacology
- ⇒ Cardiovascular Pharmacology
- ⇒ Clinical Pharmacology
- ⇒ Drug Addiction
- ⇒ Drug Metabolism, Distribution, and Pharmacokinetics
- ⇒ Endocrine Pharmacology
- ⇒ Immunopharmacology
- ⇒ Neuropharmacology
- ⇒ Pharmacogenetics
- ⇒ Psychopharmacology
- ⇒ Receptor Pharmacology
- ⇒ Second Messengers and Signal Transduction
- ⇒ Toxicology

### **M.Sc. Training in Pharmacology:**

The objective of the Pharmacology M.Sc. degree is to have students think critically about scientific issues and to develop a knowledge base (removed hyphen) in pharmacology. Graduates must be able to formulate hypotheses in a specific area of pharmacological research and test them through active research. During the training of M.Sc. students, emphasis is placed on obtaining a knowledge of pharmacology and its principles, as well as being experienced in selected experimental techniques commonly used in pharmacology. The Department sees a primary responsibility in training career pharmacologists and does not encourage training at the Master's level that is not intended to lead to a scientific career.

Presently the Department offers two formats of study leading to the M.Sc. degree. Students within the thesis-based M.Sc. will participate in a research program and present the results of the investigation as a written thesis. The thesis will be evaluated and defended to the satisfaction of a thesis examination committee. Students in the M.Sc. Applied Clinical Pharmacology field of study will be provided the opportunity to gain expertise in diverse areas within clinical pharmacology in a classroom setting, as well as through participation in smaller-scale independent research projects and practicums.

### **Ph.D. Training in Pharmacology:**

The objective of the Ph.D. degree from this Department is to have students possess a comprehensive understanding of the general field of pharmacology, in addition to specific expertise in their particular area of interest. They build on their knowledge of pharmacology so that they are able to think critically about specific areas in pharmacology. They should be able to formulate and design, as well as carry out and interpret investigations. Their findings should be publishable. They should show capacity for continuing significant contributions in pharmacology and for conducting independent research.

It is proposed that the following are some of the most important traits of the Ph.D. student:

- (1) enjoys learning; flexible in learning new areas;
- (2) self-motivated and self-teaching;
- (3) capability (including potential creativity, problem solving and interpretational ability) and the desire for independent scientific thought and action;
- (4) moral responsibility to science and society.

**PhD Direct Entry:** Well-qualified students with excellent research potential holding an appropriate bachelor's degree from a recognized university may be considered for direct admission to the PhD program.

### **Collaborative Programs:**

Pharmacology students are eligible to participate in any of the following collaborative programs provided their thesis research is applicable:

- ⇒ Biomedical Toxicology - [www.pharmtox.utoronto.ca/programs/cpbt.htm](http://www.pharmtox.utoronto.ca/programs/cpbt.htm)
- ⇒ Addiction Studies - [www.phs.utoronto.ca/c\\_copas.htm](http://www.phs.utoronto.ca/c_copas.htm)
- ⇒ Cardiovascular Sciences - [www.cscp.utoronto.ca/](http://www.cscp.utoronto.ca/)
- ⇒ Neuroscience - [www.neuroscience.utoronto.ca](http://www.neuroscience.utoronto.ca)
- ⇒ Resuscitation Sciences - [www.emergencymedicine.utoronto.ca/research/ptmr/CS/cprintro.htm](http://www.emergencymedicine.utoronto.ca/research/ptmr/CS/cprintro.htm)
- ⇒ Women's Health - [www.womensresearch.ca/graduate/index.html](http://www.womensresearch.ca/graduate/index.html)

### **Career Opportunities:**

Qualified pharmacologists may find employment in universities, large hospitals, the pharmaceutical industry, and government agencies, both within Canada and abroad. With few exceptions, a career in Pharmacology will be in an institutional setting. Depending on the strengths and inclinations of the individual, after further professional training, pharmacologists may practice their profession as physicians, researchers, teachers, administrators, or combinations of these. Another route into a career as a pharmacologist is from one of the health professions. Earning a degree in medicine (M.D.), dentistry (D.D.S.), veterinary medicine (D.V.M.) or pharmacy (B.Sc. Pharm.), or completing a combined M.D.- Ph.D. program will often be the path into a clinically oriented branch of Pharmacology.

### **Applying to Pharmacology:**

Applicants are admitted under the General Regulations of the School of Graduate Studies, Eligibility is determined via the on-line application and face-to-face admission interview. Applicants should keep in mind that background courses in physiology, biochemistry, or allied sciences are required to form a foundation for work in pharmacology. Detailed information may be found at website: <http://www.pharmtox.utoronto.ca/programs/grad/prospective/applying.htm>