



DEPARTMENT OF PHARMACOLOGY AND TOXICOLOGY
UNIVERSITY OF TORONTO

Graduate 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 Leslie Dan 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.

- ⇒ 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. Program is to train students in the principles and practices of Pharmacology research. M.Sc. Students obtain a core knowledge of pharmacology but also work towards expanding that knowledge base through research and scientific discovery. Graduates must be able to formulate hypotheses in a specific area of pharmacology and test them through active research. Graduates will acquire expertise in selected experimental techniques commonly used in pharmacology through project courses, laboratory courses and/or thesis-based research.

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 of a Graduate Faculty member 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 acquire research training in diverse areas within clinical pharmacology through independent research projects, practicums and placements.

Ph.D. Training in Pharmacology:

The objective of the Ph.D. degree from this Department is to provide advanced and comprehensive scientific training in Pharmacology research. Students will develop not only a comprehensive understanding of pharmacological principles, but also an in-depth expertise in their particular area of interest. Students will strive to be proficient in the design and conduct of research within their field of expertise, with the overall goal of developing research independence and contributing to the knowledge base of their chosen research topic.

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
- ⇒ Addiction Studies - www.dlsph.utoronto.ca/page/collaborative-program-addiction-studies
- ⇒ Cardiovascular Sciences - www.cscp.utoronto.ca/
- ⇒ Musculoskeletal Sciences - tmc.utoronto.ca/content/collaborative-program-musculoskeletal-sciences
- ⇒ Neuroscience - www.neuroscience.utoronto.ca
- ⇒ Resuscitation Sciences - www.emergencymedicine.utoronto.ca/research/ptmr/CS/cprsintro.htm
- ⇒ Women's Health - www.womensresearch.ca/learning-centre/graduate-programs/collaborative-graduate-program

Career Opportunities:

Pharmacologists are employed in universities, large hospitals, the pharmaceutical industry, government agencies and consulting firms, 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 a critical foundation for further study in pharmacology. Detailed information may be found at <http://www.pharmtox.utoronto.ca/admission-graduate-program>.