

Doctor of Philosophy in Medical Science Pharmacology
Program code: 055071

INTRODUCTION

The Department of Pharmacology & Toxicology (Faculty of Medicine) offers a Ph.D. program in Medical **Pharmacology**. The aim of this program is to train pharmacologists that will be capable of carrying out independent basic research in areas of their choice, and to acquire, critically analyze and interpret scientific data in order to prepare them for a career in teaching and research.

PROGRAM REQUIREMENTS

33 TOTAL COURSE CREDITS

8 COURSE CREDITS IN THE MAJOR SPECIALIZATION

0550-600	Selected Topics in Pharmacology	(2)
0550-601	Advanced Neuropharmacology	(2)
0550-602	Advanced Adrenergic Receptor Pharmacology	(2)
0550-603	Advanced Endocrine Pharmacology	(2)
0550-604	Advanced Immunopharmacology	(2)
0550-605	Advanced Pharmacokinetics	(2)
0550-606	Advanced Cardiovascular Pharmacology	(2)
0550-607	Seminars in Pharmacology I	(1)
0550-608	Seminars in Pharmacology II	(1)
0550-609	Seminars in Pharmacology III	(1)
0550-610	Advanced G Protein-Coupled Receptor Pharmacology	(2)
0550-611	Advanced Pharmacogenetics	(2)
0550-612	Research Methodology I	(3)
0550-613	Research Methodology II	(3)

7 COURSE OUTSIDE THE MAJOR SPECIALIZATION

0510-502	Advanced Biostatistics	(1)
0510-601	Biostatistical Methods in Medical Microbiology	(3)
0520-504	Immunity and Infection	(2)
0530-561	Cardiovascular Physiology	(3)
0540-562	Molecular Biology and Biotechnology	(2)
0570-501	Biology of Diseases	(3)
0570-506	Immuno-Pathology	(2)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)

18 COMPULSORY COURSES

0550-697	Dissertation	(0)
0550-698	Dissertation	(0)
0550-699	Dissertation	(18)

COURSE DESCRIPTION

**0550-600: SELECTED TOPICS IN
PHARMACOLOGY
CR: 2**

This course is aimed at entry level graduate students with little or no background in pharmacology. The objective of the course is to introduce the basic principles and terminology of different branches of pharmacology (e.g. pharmacokinetics, pharmacodynamics and toxicology) to allow the student to comprehend current research in the area.

**0550-601: ADVANCED
NEUROPHARMACOLOGY
CR: 2**

This course will cover relevant work that has been done (old& recent) in the neuropharmacology of pain transmission, with special reference to Neuropathic Pain from different causes (disease, trauma etc.). The major areas to be covered will include: excitatory amino acids, neuropeptides, inhibitory amino acids, opioids, cannabinoids, serotonin & noradrenaline and their receptors (types, distribution etc). Sodium, potassium and calcium channels (types, distribution) and the drugs/compounds that act on each will also be discussed. Animal models of Neuropathic Pain & different techniques to assess nociception will also be included.

**0550-602: ADVANCED ADRENERGIC
RECEPTOR PHARMACOLOGY
CR: 2**

This course will cover recent developments in α and β adrenergic receptor pharmacology. Topics to be covered will include detailed subclassification, distribution and localization of these receptors in tissues, molecular biology of adrenergic receptors including use of knock-out technology to study adrenergic functions in health and diseases, signal transduction pathways, desensitization inverse and biased agonism. The role of constitutive receptor activation in disease will also be covered. (Pre-requisite: PHTX 5xx).

**0550-603: ADVANCED ENDOCRINE
PHARMACOLOGY
CR: 2**

Structure activity relationship of hormones. Hypothalamic pituitary hormones and analogs. Thyroid disorders and drugs that affect thyroid gland. Adrenocortical hormones and drugs that affect the adrenal cortex. Ovarian hormones, oral contraceptives and antiestrogen. Testicular hormones, anabolic steroids and antiandrogens. Diabetes mellitus, pancreatic hormones and oral hypoglycaemic agents. Peptide and steroid hormone receptors and Signaling Mechanisms. Novel approaches for producing and administering hormones (Pre-requisite: PHTX 501).

**0550-604: ADVANCED
IMMUNOPHARMACOLOGY
CR: 2**

In this course, emphasis will be on antigen presentation and induction of the immune response, control of IgE synthesis, cytokines and anti-cytokine antibodies, therapeutic potentials of monoclonal antibodies, signal transductions and control of mediator release from inflammatory cells, molecular mechanism of anti-allergic and anti-inflammatory action of steroids, intercellular adhesion molecules, immunosuppressors and immunomodulators.

**0550-605: ADVANCED PHARMACOKINETICS
CR: 2**

Review of basic concepts, physico-chemical properties and physiological factors related to drug absorption and disposition. Pharmacokinetics of conventional dosage forms, modified-release drug products and targeted drug-delivery systems, hepatic and renal drug clearance, nonlinear pharmacokinetics and its significance to drug therapy, applications of pharmacokinetics in clinical situations such as: dosage adjustment, relationship between pharmacokinetics and pharmacologic response, modifications of pharmacokinetic parameters in disease states.

**0550-606: ADVANCED CARDIOVASCULAR
PHARMACOLOGY
CR: 2**

An advanced inter-disciplinary course studying the integrative aspects of the anatomy, physiology and pharmacology of the cardiovascular system at the tissue, organ and system level. Topics will include control of the circulation, structure-function of the heart and blood vessels, characteristics and treatments of pathological conditions. Course topics are selected to reflect activities in on-going cardiovascular research and cardiovascular drug investigation and development, with particular emphasis on the use of drugs to dissect physiological and pathophysiological processes, and to discover and validate novel targets for pharmacological exploitation in the management of cardiovascular diseases.

(3) SEMINARS IN PHARMACOLOGY

0550-607 CR: 1

0550-608 CR: 1

0550-609 CR: 1

There will be 3 courses. In each course, the student will be assigned a topic relevant to his/her area of specialization. The student will be required to critically review relevant literature and present it to the department.

**0550-610: ADVANCED G PROTEIN-COUPLED
RECEPTOR PHARMACOLOGY
CR: 2**

This course will cover recent developments in G Protein-Coupled Receptor (GPCR) pharmacology including sequence analysis, structure, activation, signal transduction, desensitization and the nature of agonist, inverse agonist and biased agonist action. The role of constitutive activation in disease will also be covered.

**0550-611: ADVANCED PHARMACOGENETICS
CR: 2**

This course will focus on the application of genetics and genomics to the development of safe and effective drugs. It will examine the genetic basis of variability in drug efficacy and toxicity. It will include the study of genetic polymorphisms in drug targets, drug transporters and drug metabolizing enzymes and how these factors influence drug pharmacokinetics and pharmacodynamics.

**0550-612: RESEARCH METHODOLOGY I
CR:3**

**0550-613: RESEARCH METHODOLOGY II
CR:3**

**0550-697: DISSERTATION
CR: 0**

**0550-698: DISSERTATION
CR: 0**

**0550-699: DISSERTATION
CR: 18**