

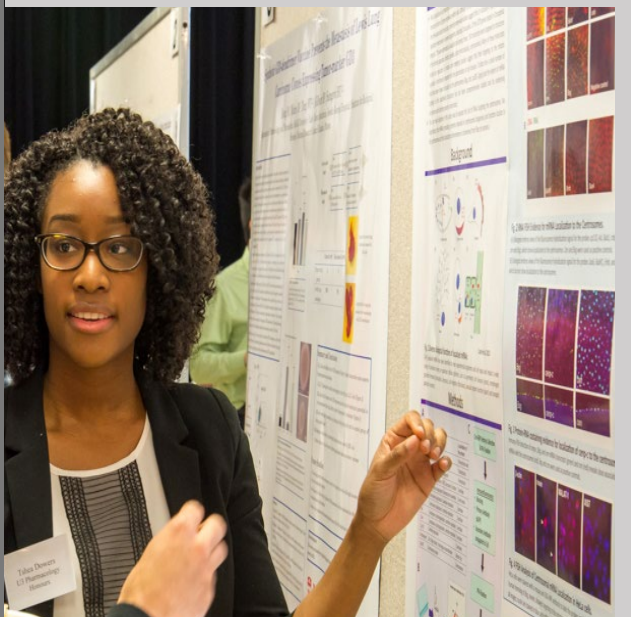


**McGill**

Department of  
Pharmacology and  
Therapeutics

Département  
de pharmacologie  
et de thérapeutique

# PHARMACOLOGY UNDERGRADUATE STUDENT HANDBOOK 2023-2024



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*Welcome!*

**to the Department of  
Pharmacology and  
Therapeutics!**

The Department of Pharmacology and Therapeutics offers, at the Undergraduate level, BSc: Minor in Pharmacology, Major in Pharmacology and Honours in Pharmacology.

The **Minor Program** is intended for students registered in a complementary BSc. program, who are interested in a focused introduction to specialized topics in Pharmacology.

The **Major Program** provides a solid background in Pharmacology and allied disciplines, which is excellent preparation for graduate studies in biomedical or environmental sciences, or professional programs, including: medicine, dentistry, nursing and veterinary sciences. Students will have the opportunity to enroll in the PHAR 599; Pharmacology Research Project, as an upper-level complementary course, allowing them to focus their studies on a topic of Pharmacology of great personal interest.

The **Honours Program** is designed for students who are interested in pursuing a research career, and are considering subsequent graduate studies in Pharmacology. It provides an opportunity for hands-on research experience – the student becomes affiliated with one of our pharmacology research laboratories and will carry out and interpret experiments on a designated project. The PHAR 598 D1&D2; Honours Pharmacology Research Project course is required for this program.

Our mission is to offer excellent educational opportunities to undergraduate students, graduate students and postdoctoral fellows alike. This Department is engaged in innovative biomedical research. We aim for excellence in teaching and research and are currently considering how to best integrate high impact research with multidisciplinary training of our graduate and undergraduate students.

For further information, visit the Department of Pharmacology and Therapeutics website: <http://www.mcgill.ca/pharma/>

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## Pharmacology Core Faculty Members

**Daniel Bernard**, Professor

[daniel.bernard@mcgill.ca](mailto:daniel.bernard@mcgill.ca)

Field of Research: Neuroscience, Reproduction and Development, Cellular Signalling.

The Bernard lab investigates molecular mechanisms of pituitary hormone synthesis using *in vitro* and *in vivo* approaches. Projects in the lab concern: 1) signal transduction mechanisms through which members of the transforming growth factor  $\beta$  superfamily regulate pituitary follicle-stimulating hormone (FSH) synthesis, 2) mechanisms of gonadotropin-releasing hormone (GnRH) signaling in pituitary gonadotrope cells, and 3) hypothalamic-pituitary control of thyroid hormone production.

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**Derek Bowie**, Professor

[derek.bowie@mcgill.ca](mailto:derek.bowie@mcgill.ca)

Field of Research: Neuroscience, Cellular Signaling, Drug Development and Nanomedicine.

The Bowie Lab studies the two major neurotransmitter receptors of the brain, namely ionotropic glutamate receptors and GABA-A receptors. Both receptor families are widespread in the vertebrate brain and fulfill many important roles in healthy individuals as well as being implicated in disease states (e.g. Autism, Epilepsy, and Alzheimer's disease). These receptors are studied to understand how they shape neuronal circuit behaviour and how they may be targeted to treat CNS disease.

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**Bastien Castagner**, Assistant Professor

[bastien.castagner@mcgill.ca](mailto:bastien.castagner@mcgill.ca)

Field of Research: Chemical Biology, Clostridium Difficile, Drug Discovery, Inositol phosphates.

Dr. Castagner's research focuses on the design of small-molecules and natural product analogues as novel drug candidates. He is especially interested in the chemistry and biology of inositol phosphates. His group has also been involved in novel strategies to inactivate the toxins responsible for the pathogenesis of Clostridium difficile.

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**Paul Clarke**, Professor

[paul.clarke@mcgill.ca](mailto:paul.clarke@mcgill.ca)

Field of Research: Neuroscience.

Addiction research: The cigarette habit is still one of the leading causes of death and disease worldwide, and drugs designed to aid smoking cessation are largely ineffective. Nicotine's role in tobacco addiction is both insidious and puzzling; for example, unlike drugs such as heroin and cocaine, nicotine is only a weak positive reinforcer. We believe that standard animal models do not fully capture the smoking-relevant effects of nicotine, and we are seeking to create better models in order to probe behavioural and pharmacological mechanisms that contribute to tobacco addiction.

Rat ultrasonic vocalizations: Rats seem silent to us, but they are in fact quite vocal - but at frequencies beyond our hearing range. The ultrasonic (20-80 kHz) vocalizations made by adult rats are remarkably varied and may convey complex information. These calls may yet be of use in animal models of human disorders such as drug addiction, depression and anxiety.

In vivo biosensors: We are also starting to apply biosensors in living rodents, using fibre photometry to record intracellular activity. This project is in collaboration with my colleague Prof. Terence Hébert.

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**Claudio A. Cuello**, Professor

[claudio.cuello@mcgill.ca](mailto:claudio.cuello@mcgill.ca)

Field of Research: Neuroscience, Drug Development and Nanomedicine.

Dr Cuello's lab is interested in degenerative and regenerative processes in the CNS with particular emphasis on aging and Alzheimer's disease (AD) related studies. His lab utilizes and develops transgenic animal models presenting features of the AD neuropathology. The research is of a multidisciplinary nature ranging from molecular approaches to whole animal experimentation and with a particular interest in Alzheimer's Therapeutics.

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**Barbara Hales**, Professor

[barbara.hales@mcgill.ca](mailto:barbara.hales@mcgill.ca)

Field of Research: Toxicology, Reproduction and Development.

Birth defects occur in 2-4% of the children in North America, yet the causes of most of these malformations remain unknown. The overall goal of our research is to elucidate the mechanisms(s) underlying the developmental toxicity of environmental chemicals and drugs. We use a combination of in vivo, in vitro, and molecular approaches to elucidate the effects of model teratogens on signaling pathways that play important roles in normal development. In collaboration with Bernard Robaire, we are exploring the consequences of paternal exposure to anticancer agents on male germ cell integrity and on epigenetic programming in early embryos. Finally, we are working with teams of researchers to evaluate the impact of exposure to "green" replacement plasticizers on the developing and adult testis and to determine the effects of chronic exposure to the environmentally relevant mixture of brominated flame retardants found in North American house dust on reproduction and development.

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**Terry Hébert**, Professor  
[terence.hebert@mcgill.ca](mailto:terence.hebert@mcgill.ca)

Field of Research: Neuroscience, Cardiovascular, Cellular Signalling.

Research in my lab is centered broadly around the theme of G protein-coupled signal transduction systems. These signalling systems are activated by agonists that bind to G protein-coupled receptors (GPCRs) leading to the regulation of effector proteins (e.g. enzymes and ion channels) by a transducer. We are interested in 1) basic mechanisms of how these signalling systems are wired, 2) novel signalling complexes and pathways associated with alternative subcellular localization of GPCRs and 3) the roles that these architectural features of signalling complex design might play in cardiac disease with a particular emphasis on congenital heart disease. More recently, my group has also become interested in how novel allosteric regulators of these receptors might be developed and tested, here with a focus on inflammatory mediators, their receptors and their roles in health and disease. I have also been investigating basic mechanisms of GPCR regulation, developing functional assays amenable to scaling up and for use as screens for novel modulators of the interactions within GPCR signalling complexes. All of the projects are currently funded.

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**Koren Mann**, Professor and Department Chair  
[koren.mann@mcgill.ca](mailto:koren.mann@mcgill.ca)

Field of Research: Environmental Health effects of metal.

Her laboratory researches the environmental health effects of metals, in particular, the toxic effects of arsenic and tungsten on the immune system and how this can lead to different pathologies. Currently, Dr. Mann leads projects including investigating arsenic-induced atherosclerosis and the effect of tungsten on bone and B lymphocytes.

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**Maureen McKeague**, Assistant Professor  
[Maureen.mckeague@mcgill.ca](mailto:Maureen.mckeague@mcgill.ca)

Field of Research: Genomic Chemistry

The McKeague lab is interested in defining the basis of chemotherapy resistance/sensitivity and to exploit these findings for patient stratification and the development of novel therapeutics. The lab employs a genomic chemistry approach that combines: (1) sequencing DNA damage distribution in the cancer genome; (2) characterizing DNA damage dynamics with real-time fluorescence monitoring; and (3) identifying novel DNA-based repair inhibitors.

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**Anne McKinney**, Professor  
[anne.mckinney@mcgill.ca](mailto:anne.mckinney@mcgill.ca)

Field of Research: Neuroscience.

Dr. McKinney's principal research interest is the mechanisms involved in development and maintenance of excitatory synapses in the CNS, during physiological and pathological conditions, such as epilepsy and mental retardation. The synaptogenesis and maintenance of synaptic structures, key issues in neuroscience, are still poorly understood despite intensive research efforts. Her group's studies are concentrated on the hippocampus, a brain region thought to be involved in learning and memory. The McKinney lab is using a combination of techniques including, 4-dimensional confocal laser scanning microscopy, serial electron microscopy, transgenic animals and electrophysiological techniques to investigate the structure and function of dendritic spines and their synapses.

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**Gerhard Multhaup**, Professor  
[gerhard.multhaup@mcgill.ca](mailto:gerhard.multhaup@mcgill.ca)

Field of Research: Neuroscience.

Dr. Multhaup's research interests include (i) understanding the APP biology, i.e., to unravel the protein network and the mechanisms involved in A $\beta$  generation by structural and functional analyses, and (ii)

investigating the molecular events of amyloid aggregation, gain of toxicity, and the causes of neuronal dysfunction. Our primary aim is to identify novel targets to develop pharmacological strategies for prevention and therapy.

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**Lisa Marie Münter**, Associate Professor  
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Field of Research: Neuroscience.

Our principal research interests are the molecular mechanisms of newly described enzymes mediating a cellular pathway termed “Regulated Intramembrane Proteolysis” (RIP). The enzymes cleave a broad set of substrates within the plane of the membrane, thereby delivering diverse signaling molecules. Slight deregulations in this pathway likely cause the neurodegenerative processes observed in Alzheimer disease. RIP is seemingly also associated with other diseases such as schizophrenia, autism or cancer. Thus, our research is directed to a general understanding of RIP pathways, e.g., their activation, regulation, and pathological deregulations. With this knowledge, we aim to identify novel strategies to treat disorders of the central nervous system where RIP plays a role. Our lab uses methods of biochemical pharmacology including MALDI-mass spectrometry and fluorescent resonance energy transfer (FRET), which are used to characterize molecules and their interactions on the cellular level and in vivo.

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**Alfredo Ribeiro-da-Silva**, Professor  
[alfredo.ribeirodasilva@mcgill.ca](mailto:alfredo.ribeirodasilva@mcgill.ca)

Field of Research: Neuroscience.

His main research interest is the unravelling of the mechanisms underlying chronic pain, both in the central and peripheral nervous systems. He is particularly interested in animal models of arthritis pain and of neuropathic pain. Methods used in his lab include: immunocytochemistry at the light and electron microscopic levels, animal behaviour testing, and neurochemistry. He uses advanced tools such as replication deficient viral vectors to study synaptic circuits in the spinal cord and their changes in pain states. He is also investigating the effects of modulating the endogenous levels of neurotrophic factors as a potential therapeutic approach for arthritis and neuropathic pain.

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**Bernard Robaire**, Professor  
[bernard.robair@mcgill.ca](mailto:bernard.robair@mcgill.ca)

Field of Research: Toxicology, Reproduction and Development and Epigenetics.

His research interests focus on the effects of environmental toxicants on male reproduction, on male mediated reproductive toxicology, on the structure, function and regulation of the epididymis, on androgen action, and on aging of the male reproductive system. This research activity has resulted in over 200 journal articles and book chapters, and editing/co-editing ten books.

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**Uri Saragovi**, Professor  
[uri.saragovi@mcgill.ca](mailto:uri.saragovi@mcgill.ca)

Field of Research: Neuroscience, Cancer, Drug Development and Nanomedicine.

Research in Dr. Saragovi’s laboratory focuses in understanding macromolecular structure function relationships, particularly in receptor-ligand interactions.

E-mail:

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**Jason Tanny**, Associate Professor  
[jason.tanny@mcgill.ca](mailto:jason.tanny@mcgill.ca)

Field of Research: Epigenetics.

My lab studies gene regulation by covalent histone modifications and the impact of these mechanisms on human disease. We focus on two general questions: (1) How are histone modifications established at active genes? (2) What are their functions in gene expression? We use classical and chemical genetics, genomics, biochemistry, and proteomics approaches in yeast and mammalian model systems to elucidate the molecular functions of histone modifications. Our recent work has uncovered a novel link between ubiquitylation of histone H2B and the conserved transcription elongation factor P-TEFb. Ultimately, we aim to target histone modifications and relevant modifying enzymes to develop novel therapeutic avenues for a variety of diseases.

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**Ajitha Thanabalasuriar**, Assistant Professor  
[ajitha.thanabalasuriar@mcgill.ca](mailto:ajitha.thanabalasuriar@mcgill.ca)

The Thanabalasuriar Lab is focused on understanding the interplay between innate immune cells, the lung

microbiota, and pulmonary infections. Using a combination of intricate in vivo models including intravital microscopy, my lab seeks to understand how innate immune cells mitigate infection control in the lung. Having experience in the drug development field during my time in the pharmaceutical company AstraZeneca, my research is tailored to developing novel new therapeutic targets.

My lab has three main research focuses:

1. To understand and visualize the mechanisms of bacterial biofilm development in vivo.
2. Determine the impact of the nasal microbiome on lung immunity.
3. Understand the interplay between cutaneous thermal injury and airway inflammation.

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**Jacquetta Trasler**, Professor

[jacquetta.trasler@mcgill.ca](mailto:jacquetta.trasler@mcgill.ca)

Field of Research: Reproduction and Development, Epigenetics.

Her research interests focus on epigenetics and the molecular and developmental regulation of gene expression in the germline and early embryo. More specifically she studies DNA methylation and genomic imprinting and the molecular and cellular targets for drug effects on germ cells and embryos. Ongoing studies include effects of drugs, diet (folate) and assisted reproductive technologies on the epigenome of germ cells and embryos and the implications for transgenerational passage of epigenetic defects.

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**Jean-François Trempe**, Associate Professor

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Field of Research: Parkinson's Disease, Structural Biology.

My research interests are in the structure and function of proteins implicated in Parkinson's disease, Parkin and PINK1 in particular. These proteins have been shown to mediate neuroprotection and mitochondrial maintenance through their enzymatic activities and post-translational modifications (PTMs): Parkin is an E3 ubiquitin ligase and PINK1 is a Ser/Thr kinase. My goals are to: 1) elucidate the composition and 3D structure of molecular complexes formed by Parkin and PINK1 on mitochondria, 2) develop novel therapies for PD based on these structures. My group will use the full range of structural biology tools available at McGill, such as X-ray

crystallography, NMR spectroscopy, SAXS, electron microscopy and mass spectrometry, in order to obtain the most complete and highest resolution picture of complexes formed by PINK1 and Parkin. These structures will inform us on how these enzymes become active and modify their substrates, and will guide the development of novel pharmacological targets.

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## Pharmacology Programs

### Admission:

All students admitted to McGill's Faculty of Science are eligible to pursue the Major in Pharmacology program.

Briefly, students are admitted after completing a CEGEP *Diplôme d'études Collégiales* (DEC) with the following prerequisites:

- Biology – NYA (OOUK)
- Chemistry – NYA, NYB, (OOUL, OOUM)
- Mathematics – NYA, NYB, NYC (OOUN, OOU, OOUQ)
- Physics – NYA, NYB, NYC (OOUR, OOUS, OOUT)
- General Biology II (OOXU)

Or students who have completed a Freshman Science Year (UO) at McGill, or an equivalent, with the following prerequisites:

- BIOL 112: Cell and Molecular Biology
- CHEM 110: General Chemistry 1
- CHEM 120: General Chemistry 2
- MATH 139 or MATH 140: Calculus 1
- MATH 141: Calculus 2
- PHYS 101: Intro. Physics - Mechanics
- PHYS 102: Intro. Physics - Electromagnetism

*NOTE: Students who graduated with CEGEP DEC, French Bacc, International Bacc, Advanced Placement, etc., may receive 30 credits of advanced standing. Therefore, you need to complete your Degree with 90 credits. If you are unsure, please go to:*  
[www.mcgill.ca/students/transferecredit](http://www.mcgill.ca/students/transferecredit).

## B.Sc. Major in Pharmacology (67 credits)

### U1 Required Courses (24 credits):

- BIOL 200 (3) Molecular Biology
- BIOL 202 (3) Basic Genetics
- CHEM 212\* (4) Introductory Organic Chemistry 1
- CHEM 222\* (4) Introductory Organic Chemistry 2
- PHAR 200 (1) Introduction to Pharmacology 1
- PHAR 201 (1) Introduction to Pharmacology 2
- PHGY 209 (3) Mammalian Physiology 1
- PHGY 210 (3) Mammalian Physiology 2
- PHGY 212 (1) Introductory Physiology Laboratory 1
- PHGY 213 (1) Introductory Physiology Laboratory 2

\* Students who have taken the equivalent of CHEM 212, CHEM 222, and/or MATH 203 in CEGEP (as defined at:

<http://www.mcgill.ca/students/transferecredit/prospective/cegep>)

are exempt and may not take these courses at McGill. Students must replace these credits with appropriate complementary course credits to satisfy the total credit requirements for their degree.

### U2 Required Courses (16 credits):

- BIOC 311 (3) Metabolic Biochemistry
- BIOL 301 (4) Cell and Molecular Laboratory
- PHAR 300 (3) Drug Action
- PHAR 301 (3) Drugs and Disease
- PHAR 303 (3) Principles of Toxicology



## Complementary Courses (27 credits total)

3 credits selected from (usually in Year 1):

- BIOL 201 (3) Cell Biology and Metabolism
- BIOC 212 or ANAT 212 (3) Molecular Mechanisms of Cell Function

3 credits selected from (usually in Year 2):

- CHEM 204 (3) Physical Chemistry Biological Sciences 1
- CHEM 203 (3) Survey of Physical Chemistry

3 credits selected from (usually in Year 2):

- BIOL 373 (3) Biometry
- MATH 203 \* (3) Principles of Statistics 1
- PSYC 204 (3) Introduction to Psychological Statistics

9 credits selected from the following Pharmacology courses:

- PHAR 503 (3) Drug Discovery & Development 1
- PHAR 505 (3) Structural Pharmacology
- PHAR 504 (3) Drug Discovery & Development 2
- PHAR 508 (3) Drug Discovery and Develop. 3
- PHAR 510 (3) New Advs: Antimicrobial Drugs
- PHAR 540 (3) Advances in Ind Biotech
- PHAR 562 (3) Neuropharmacology
- PHAR 563 (3) Endocrine Pharmacology
- PHAR 565 (3) Epigenetic Drugs and Targets

9 credits selected from the following courses:

- ANAT 321 Circuitry of the Human Brain (3 credits)
- ANAT 322 Neuroendocrinology (3 credits)
- ANAT 365 Cellular Trafficking (3 credits)

- ANAT 381 Experimental Embryology (3 credits)\*\*\*\*
- ANAT 458 Membranes and Cellular Signaling (3 credits) \*
- BIEN 510 Nanoparticles in the Medical Sciences (3 credits)
- BIOC 312 Biochemistry of Macromolecules (3 credits)
- BIOC 450 Protein Structure and Function (3 credits)
- BIOC 470 Lipids and Lipoproteins in Disease (3 credits) \*\*
- BIOC 454 Nucleic Acids (3 credits)
- BIOC 458 Membranes and Cellular Signaling (3 credits) \*
- BIOL 300 Molecular Biology of the Gene (3 credits)
- BIOL 303 Developmental Biology (3 credits)
- BIOL 306 Neural Basis of Behavior (3 credits)
- BIOL 314 Molecular Biology of Oncogenes (3 credits)
- BIOL 370 Human Genetics Applied (3 credits)
- BIOT 505 Selected Topics in Biotechnology (3 credits)
- CHEM 302 Introductory Organic Chemistry 3 (3 credits)
- CHEM 334 Advanced Materials (3 credits)
- CHEM 462 Green Chemistry (3 credits)
- CHEM 502 Advanced Bio-Organic Chemistry (3 credits)
- CHEM 503 Drug Discovery (3 credits)
- CHEM 504 Drug Design (3 credits)
- CHEM 522 Stereochemistry (3 credits)
- CHEM 552 Physical Organic Chemistry (3 credits)
- COMP 204 Computer Programming for Life Sciences (3 credits)
- EXMD 401 Physiology and Biochemistry Endocrine Systems (3 credits)
- EXMD 504 Biology of Cancer (3 credits)
- EXMD 509 Gastrointestinal Physiology and Pathology (3 credits) \*\*

- EXMD 511 Joint Venturing with Industry (3 credits)
- HGEN 400 Genetics in Medicine (3 credits) \*\*
- MIMM 387 The Business of Science (3 credits)
- MIMM 414 Advanced Immunology (3 credits)
- MIMM 466 Viral Pathogenesis (3 credits) \*\*
- NEUR 310 Cellular Neurobiology (3 credits)
- PARA 410 Environment and Infection (3 credits)
- PATH 300 Human Disease (3 credits)
- PHAR 503 Drug Discovery and Development 1 (3 credits)\*\*
- PHAR 504 Drug Discovery and Development 2 (3 credits)
- PHAR 505 Structural Pharmacology (3 credits)\*\*
- PHAR 508 Drug Discovery and Development 3 (3 credits)
- PHAR 510 New Advances in Antimicrobial Drugs (3 credits)
- PHAR 540 Advances in Industrial Biotech (3 credits)
- PHAR 562 Neuropharmacology (3 credits)
- PHAR 563 Endocrine Pharmacology (3 credits)
- PHAR 565 Epigenetic Drugs and Targets (3 credits)
- PHAR 599 D1 Pharmacology Research Project (3 credits)
- PHAR 599 D2 Pharmacology Research Project (3 credits)
- PHGY 311 Channels, Synapses & Hormones (3 credits)
- PHGY 312 Respiratory, Renal, & Cardiovascular Physiology (3 credits)
- PHGY 313 Blood, Gastrointestinal, & Immune Systems Physiology (3 credits)
- PHGY 314 Integrative Neuroscience (3 credits)
- PHGY 425 Analyzing Physiological Systems (3 credits)

- PHGY 520 Ion Channels (3 credits)
- PHGY 524 Chronobiology (3 credits)
- PPHS 501 Population Health and Epidemiology (3 credits)
- PSYC 302 The Psychology of Pain (3 credits)
- PSYC 305 Statistics for Experimental Design (3 credits) \*\*
- PSYC 311 Human Cognition and the Brain (3 credits)
- PSYC 317 Genes and Behaviour (3 credits) \*\*
- PSYC 318 Behavioural Neuroscience 2 (3 credits) \*\*
- PSYT 301 Issues in Drug Dependence (3 credits)
- PSYT 455 Neurochemistry (3 credits)
- PSYT 500 Advances: Neurobiology of Mental Disorders (3 credits)
- REDM 410 Writing Research Articles (3 credits)

Note:

\* Students may take either ANAT 458 or BIOC 458

\*\* Students may take either PHAR 503 or PHAR 505, but not both.

\*\*\* Access to these courses is not guaranteed

\*\*\*\* Open to students who have the Prerequisites

+ Access to these courses is not guaranteed. Open to students who have the Pre-requisites

## **B.Sc. Honours in Pharmacology** **(76 credits)**

The Honours program is designed as a preparation for graduate studies and research. In addition to the strong training provided by the Major program, it requires students to have direct research experience in a chosen area during their final year of study.

Acceptance into the Honours program takes place in the Winter term of U2 and requires a CGPA of 3.50. Students who wish to enter the Honours program should follow the Major program; those who satisfactorily complete the first three terms with a CGPA of at least 3.50 and a mark of B+ or higher in core Pharmacology courses (PHAR 300, PHAR 301, and PHAR 303) are eligible for admission.

Applications are available in January on the Departmental website:

<http://www.mcgill.ca/pharma/prospective-students/undergraduate-program-bsc/major-and-honours-pharmacology/honours>

### **U3 Required Courses (6 credits):**

- PHAR 598 D1 & D2 (6) Honours Pharmacology Research Project (must register for both terms)

12 credits selected from the following Pharmacology courses:

- PHAR 503 Drug Discovery and Development 1 (3 credits) \*\*
- PHAR 505 Structural Pharmacology (3 credits)\*\*
- PHAR 390 Laboratory in Pharmacology (3 credits)
- PHAR 504 Drug Discovery and Development 2 (3 credits)

- PHAR 508 Drug Discovery and Development 3 (3 credits)
- PHAR 510 New Advances in Antimicrobial Drugs (3 credits)
- PHAR 540 Advances in Industrial Biotech (3 credits)
- PHAR 562 Neuropharmacology (3 credits)
- PHAR 563 Endocrine Pharmacology (3 credits)
- PHAR 565 Epigenetic Drugs and Targets (3 credits)

### **9 credits selected from the following science courses:**

Committee approval is required to substitute a science course not in the list below.

- ANAT 321 Circuitry of the Human Brain (3 credits)
- ANAT 322 Neuroendocrinology (3 credits)
- ANAT 365 Cellular Trafficking (3 credits)
- ANAT 381 Experimental Embryology (3 credits) \*\*\*\*
- ANAT 458 Membranes and Cellular Signaling (3 credits) \*
- BIEN 510 Nanoparticles in the Medical Sciences (3 credits)
- BIOC 312 Biochemistry of Macromolecules (3 credits)
- BIOC 450 Protein Structure and Function (3 credits)
- BIOC 454 Nucleic Acids (3 credits)
- BIOC 458 Membranes and Cellular Signaling (3 credits) \*
- BIOC 470 Lipids and Lipoproteins in Disease (3 credits) \*\*\*
- BIOL 300 Molecular Biology of the Gene (3 credits)
- BIOL 303 Developmental Biology (3 credits)
- BIOL 306 Neural Basis of Behavior (3 credits)
- BIOL 314 Molecular Biology of Oncogenes (3 credits)
- BIOL 370 Human Genetics Applied (3 credits)
- BIOT 505 Selected Topics in Biotechnology (3 credits)

- CHEM 302 Introductory Organic Chemistry 3 (3 credits)
- CHEM 334 Advanced Materials (3 credits)
- CHEM 462 Green Chemistry (3 credits) \*\*\*\*
- CHEM 502 Advanced Bio-Organic Chemistry (3 credits)
- CHEM 503 Drug Discovery (3 credits)
- CHEM 522 Stereochemistry (3 credits)
- CHEM 552 Physical Organic Chemistry (3 credits)
- COMP 204 Computer Programming for Life Sciences (3 credits)
- EXMD 401 Physiology and Biochemistry Endocrine Systems (3 credits)
- EXMD 504 Biology of Cancer (3 credits)
- EXMD 509 Gastrointestinal Physiology and Pathology (3 credits) \*\*\*
- EXMD 511 Joint Venturing with Industry (3 credits)
- HGEN 400 Genetics in Medicine (3 credits) \*\*\*
- MIMM 387 The Business of Science (3 credits)
- MIMM 414 Advanced Immunology (3 credits)
- MIMM 466 Viral Pathogenesis (3 credits) +
- NEUR 310 Cellular Neurobiology (3 credits)
- PARA 410 Environment and Infection (3 credits)
- PATH 300 Human Disease (3 credits)
- PHAR 390 Laboratory in Pharmacology (3 credits)
- PHAR 503 Drug Discovery and Development 1 (3 credits) \*\*
- PHAR 505 Structural Pharmacology (3 credits)\*\*
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- PHAR 510 New Advances in Antimicrobial Drugs (3 credits)
- PHAR 540 Advances in Industrial Biotech (3 credits)
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- PHAR 563 Endocrine Pharmacology (3

- credits)
- PHAR 565 Epigenetic Drugs and Targets (3 credits)
- PHGY 311 Channels, Synapses & Hormones (3 credits)
- PHGY 312 Respiratory, Renal, & Cardiovascular Physiology (3 credits)
- PHGY 313 Blood, Gastrointestinal, & Immune Systems Physiology (3 credits)
- PHGY 314 Integrative Neuroscience (3 credits)
- PHGY 425 Analyzing Physiological Systems (3 credits)\*\*\*\*
- PHGY 520 Ion Channels (3 credits)
- PHGY 524 Chronobiology (3 credits)
- PPHS 501 Population Health and Epidemiology (3 credits)
- PSYC 302 The Psychology of Pain (3 credits)
- PSYC 305 Statistics for Experimental Design (3 credits)\*\*\*
- PSYC 311 Human Cognition and the Brain (3 credits)
- PSYC 317 Genes and Behaviour (3 credits) \*\*\*
- PSYC 318 Behavioural Neuroscience 2 (3 credits) \*\*\*
- PSYT 301 Issues in Drug Dependence (3 credits)
- PSYT 455 Neurochemistry (3 credits)
- PSYT 500 Advances: Neurobiology of Mental Disorders (3 credits)
- REDM 410 Writing Research Articles (3 credits)

**Note:**

Students may take either ANAT 458 or BIOC 458

\*\*Students may take either PHAR 503 or PHAR 505, but not both.

\*\*\* Access to these courses is not guaranteed

\*\*\*\* Open to students who have the Prerequisites

+ Access to these courses is not guaranteed. Open to students who have the Pre-requisites



### **Minor in Pharmacology** **(24 credits)**

The Minor in Pharmacology is intended for students registered in a complementary B.Sc. program who are interested in a focused introduction to specialized topics in pharmacology to prepare them for professional schools, graduate education, or entry into jobs in industry or research institutes. Students should declare their intent to enter the Minor in Pharmacology at the beginning of their U2 year. They must consult with, and obtain the approval of, the Coordinator for the Minor Program in the Department of Pharmacology and Therapeutics.

All courses in the Minor Program must be passed with a minimum grade C or better. Generally, no more than 6 credits of overlap are permitted between the Minor and the primary program.

#### **Required Courses (6 credits):**

- PHAR 300 (3) Drug Action
- PHAR 301 (3) Drugs and Disease

#### **Complementary Courses (18 credits):**

3 credits, one of:

- BIOL 200 (3) Molecular Biology
- BIOL 201 (3) Cell Biology and Metabolism
- BIOC 212 (3) Molecular Mechanisms of Cell Function

**3 credits, one of:**

- PHGY 209 (3) Mammalian Physiology 1
- PHGY 210 (3) Mammalian Physiology 2

**12 credits from:**

- PHAR 303 Principles of Toxicology (3 credits)
- PHAR 503 Drug Discovery and Development 1 (3 credits) \*
- PHAR 504 Drug Discovery and Development 2 (3 credits)
- PHAR 505 Structural Pharmacology (3 credits)\*
- PHAR 508 Drug Discovery and Development 3 (3 credits)
- PHAR 510 New Advances in Antimicrobial Drugs (3 credits)
- PHAR 540 Advances in Industrial Biotech (3 credits)
- PHAR 562 Neuropharmacology (3 credits)
- PHAR 563 Endocrine Pharmacology (3 credits)
- PHAR 565 Epigenetic Drugs and Targets (3 credits)
- PHAR 599 D1 Pharmacology Research Project (3 credits)\*\*
- PHAR 599 D2 Pharmacology Research Project (3 credits)\*\*

Note:

\*Students may take either PHAR 503 or PHAR 505, but not both.

\*\*PHAR 599D1 and PHAR 599D2 are taken together.

Recipients of Best Poster and Oral Presentations

6th PURE on April 6th 2018



Poster Presenter  
5th PURE on April 5th 2017



Recipients of Best Oral Presentations

4th PURE on April 4th 2016



Recipients of Best Poster and Oral Presentations

1st PURE on April 5th 2013





## **PILS: Pharmacology Integrative League of Students**

PILS is a student run organization that represents students in the Department of Pharmacology & Therapeutics. PILS formed shortly after the Pharmacology major program was approved in September 2009. They act as a liaison between administration and students representing the undergraduate voice within the Department. Although they are a small organization, their views and opinions are well respected. They provide services and events such as NTCs, academic and research seminars, lunches with profs, parties and much more!

Office: Room 506A in McIntyre Medical Building

Website: <http://pils.sus.mcgill.ca>

E-mail at: [pilsmcgill@gmail.com](mailto:pilsmcgill@gmail.com)

### **Council 2023/2024:**

|                     |                                     |
|---------------------|-------------------------------------|
| President:          | Cynthia Sun                         |
| VP Academic:        | Janeva Shahi                        |
| VP Communications:  | Ava Paton                           |
| VP External:        | Noe Francois-Saint-Cyr              |
| VP Finance:         | Kimiya Karimi                       |
| VP Fundraising:     | Elise Macdougall                    |
| VP Internal:        | Spencer Riddell                     |
| U3 Representative:  | Krystal Assaly and<br>Lauren Palmer |
| U2 Representatives: | Adele Lopes and<br>Phuong Ha        |
| U1 Representatives: | TBA in Fall 2023                    |

## **Pharmacology Undergraduate Mentorship Program (PUMP)**

PUMP is a PILS initiative directed towards the undergraduate students to facilitate peer advising. The Mentors' guidance ranges from course selection, study tips, to stress management. The Mentors are U3 pharmacology students, eager to impart knowledge onto their Mentee, either a U1 or U2 student.

If anyone is interested in becoming either a PUMP Mentor or Mentee, please contact the PUMP Program Coordinator at:

[pilspump@gmail.com](mailto:pilspump@gmail.com)

## **Pharmacology Research Bridge**

This event is for U1 and U2 Pharmacology students. Undergraduates will have the chance to meet with graduate students to discuss their research and what life in the lab is like. It is a great opportunity to ask questions, show what you'd be able to bring to a lab, and why you'd be a great addition to their labs! After you've met all the grad students, you will rank your top 5 labs. The grad students will also rank their top 5 undergrads, and if there's a match, the grad students will help you get in touch with the professor of the lab.

For info on the next event: <http://pils.sus.mcgill.ca/>

## Selecting your courses

### Year Designation

Students in their first year of a four-year, 120-credit, Bachelor of Science (B.Sc.) degree program, will complete a Freshman year, designated **U0**.

Students entering the second year of the four-year program, or the first year of the 90-credit program, are designated **U1**.

The second-to-last year of a program is considered **U2**, while **U3** refers to the final year of a B.Sc. Program.

### Electives

#### What is an elective?

Electives are courses taken for academic credit but are not required for your degree. In this regard, they differ from required or complementary courses.

Electives allow you to explore interests outside your core program, gain exposure to a wider world, and take advantage of the vast scope of opportunities at a large, comprehensive university like McGill. From astronomy to philosophy, from sociology to zoology, electives round out your education.

- For example; *EPSC 330, Mineral Deposits*, would count as an elective for the PHAR Major because it is not required for your program.
- Please consult the list "*Courses outside the Faculty of Science*". You may register for courses that are found on the "Approved" list. However, you may not register for courses that are found on the "Not-

*approved*" list – they will not count towards your Degree.

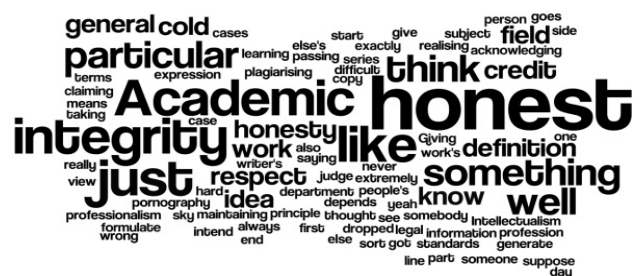
- The **number of electives that you may take** during your degree varies depending on how much room you have left after completing program requirements and prerequisites for your programs.

Please check the university calendar and carefully review course restrictions to determine whether you have permission to take a specific course:

<https://www.mcgill.ca/study/2022-2023/>

### Academic Integrity Tutorial

- For newly admitted students
- Students must login to *Minerva*, under **the student menu** to complete the tutorial.
- Must be completed by the end of your first term.
- Failure to complete the Tutorial will result in a registration block for the following term.





## Credit Load

The normal course load is 4-5 courses (12-15 credits) per term; a full year is normally 30 credits. If you are not sure how many credits to register for each term or for the academic year, keep the following regulations in mind:

- 12 credits per term to maintain full-time status, eligibility for student visas, loans and bursaries;
- Up to 14 credits (4 courses) maximum per term for students in probationary standing;
- Up to 17 credits per term for students in satisfactory standing;
- 27 graded (non-S/U) credits per academic year (both the fall and winter terms) to be considered for renewal of entrance scholarships or for in-course McGill scholarships or awards, including Dean's Honour List; at least 27 graded credits that fulfill the degree requirements to be considered for Faculty scholarships;
- 30 graded credits per year to maintain Canadian scholarships;
- Maximum allowed credits is up to 17 credits per term for students whose standing is Satisfactory or Interim Satisfactory.
- Students whose CGPA is 3.5 or higher and who wish to take a course overload of up to a maximum of 19 credits are required to fill out a request form at Service Point, and are strongly urged to consult their adviser. Allow several working days for the processing of your request.

## Registration



Minerva is McGill's web-based information system that serves students, staff and faculty. Students register and make course changes using Minerva: [www.mcgill.ca/minerva-students](http://www.mcgill.ca/minerva-students)

Students also use Minerva to update their personal information, such as address and emergency contacts, and to make minor corrections (adding accents, changing upper/lower case letters) to their legal name. Students can view their grades and fee information on Minerva.

### Visual Schedule Builder (VSB)

Visual Schedule Builder (VSB) is a web-based application to help students build potential class schedule options prior to and during registration periods. You may access it here:

<https://vsb.mcgill.ca/vsb/criteria.jsp?welcome=1>  
or access it on *myMcGill*.

Enter your courses into VSB. State your preferences (mornings or evenings off, for example) and watch as multiple conflict-free schedules are generated.

Then copy and paste CRNs (Course Reference Numbers) into the **Minerva Quick Add boxes** on the Registration menu so you can make your what-if schedule a reality. Or continue to browse to find more possibilities using helpful VSB features to further expand your scheduling options.

## What is the ADD/DROP Period?

Once you have registered for your courses, you will have the opportunity to change them during the **ADD/DROP** period. This course-change period occurs during both the fall and winter terms. Refer to the Calendar for specific dates:

<https://www.mcgill.ca/importantdates/key-dates>

From the beginning of the term until the end of the add/drop period, you will have the opportunity to “shop around” and attend as many courses as your schedule permits.

Any courses dropped during this period will be deleted from your record and will not appear on your transcript. Your record will only show the courses in which you are registered for once the add/drop period is over.

Please visit the rules and regulations for withdrawals:

<https://www.mcgill.ca/science/undergraduate/handbook#withdrawals>

## Late Registration Fees:

**Money \$\$ Saver:** Avoid late registration fees (\$85-150). If you are unsure of your course selection and wish to avoid this late fee charge, register for at least one course. Additions/deletions can be made after consulting an advisor, but before the end of the Course Change (ADD/DROP) Period.

## S/U Option (Satisfactory/Unsatisfactory)

You may choose to have a final grade of **S** (satisfactory) or **U** (unsatisfactory) for one of your **elective** courses (except for 396 courses). This option cannot be used for required courses within your program (including the **complementary** courses list). The decision to have an elective course graded as S/U must be made before the end of the Drop/Add period, and **no change can be made thereafter**.

Beware of the risks before you use this option. Refer to the 2023-2024 Undergraduate Programs, Courses and University Regulations for more information on this option:

[https://www.mcgill.ca/study/2023-2024/university\\_regulations\\_and\\_resources/undergraduate/gi\\_course\\_info\\_regulations](https://www.mcgill.ca/study/2023-2024/university_regulations_and_resources/undergraduate/gi_course_info_regulations)

**Note:** McGill Scholarship holders who wish to renew their scholarships, as well as students who would like to be considered for in-course awards (ex: Dean’s Honour List), must complete 27 credits each year - excluding S/U credits.



### Passing Grade (Required courses or complementary courses)

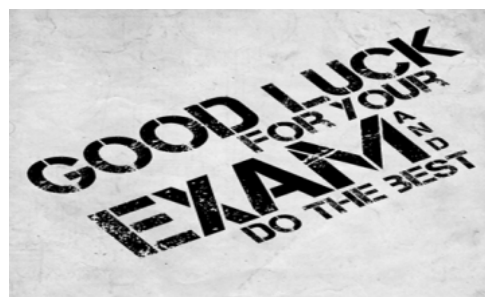
All **required** and **complementary** courses listed in the Minor, Major and Honours programs in Pharmacology must be passed with a grade of “C” or better.

“D” is a failure for required and complementary courses in your program.

If you fail a **required** course, substitution is not allowed. It must be repeated, but only once. If that course is failed a second time, you may appeal to the Director of Advising Services (SOUSA) for permission to take the course a third time. If the permission is denied, you must withdraw from the program.

In the case of **complementary** courses, if you receive a grade of “D”, this can be considered as one of your electives and then you can choose another complementary from the list of options.

If you are unsure, contact Chantal Grignon, your Pharmacology Student Advisor by e-mail; [undergradstudies.pharmacology@mcgill.ca](mailto:undergradstudies.pharmacology@mcgill.ca).



### Final Examinations

Formal final examinations are held following each term (fall, winter). The dates of the examination periods are listed on the Exams Office page:

<http://www.mcgill.ca/students/exams/>

### Deferred and Supplemental Exams

If you are unable to write your final exam due to illness or another serious problem, you may apply for a deferral exam. You must have a valid document (doctor’s note) explaining your inability to write the exam. Please bring your note to Service Point at 3415, McTavish.

If you received a grade of D, F, J or U, you may be permitted to write a supplemental exam.

For further information on the Rules, Regulations and application dates, please see the Deferred and Supplemental Exams page:

<http://www.mcgill.ca/students/exams/dates/supdefer>



## Getting Involved in Research

### PHAR 396 – Undergraduate Research Project (3):

- Dr. Jason Tanny, Course Coordinator
- 3 credit course elective. Could be done in Fall, Winter or Summer terms
- Projects require approval of the Supervisor and Department. Link to '396' forms:

<https://www.mcgill.ca/science/research/undergraduate-research/science-research-courses>

### PHAR 397 – Pharmacology Research Project 2 (3 credits):

- Dr. Jason Tanny, Course Coordinator
- 3 credit course elective
- Pre-requisite: successful completion of PHAR 396, a CGPA of 3.0, and permission of instructor.
- Projects required approval of the Supervisor and Department

### PHAR 599 D1/D2 – Pharmacology Research Project (3 credits per term):

- Dr. Anne McKinney and Dr. Dusica Maysinger, Course Coordinators
- Complementary Upper Level in PHAR Major and PHAR Minor programs
- Restrictions: U3 students with permission of instructors and course coordinators.
- Students are to find their own supervisor . Supervisors must be a Pharmacology Faculty member. Minimum of 9 hours/week to be spent in the lab .

- Completion of both PHAR 599 D1 and PHAR 599 D2 in order to receive credits.

### PHAR 598 D1/D2 – Honours Pharmacology Research Project (3 credits per term):

- Dr. Anne McKinney and Dr. Dusica Maysinger, Course Coordinators
- Required course in PHAR Honours programs
- Restrictions: only open to U3 students accepted in the BSc. Honours Pharmacology. Requires Departmental Approval to register.
- Students are to find their own supervisor . Supervisors must be a Pharmacology Faculty member. Minimum of 9 hours/week to be spent in the lab.
- Completion of both PHAR 598 D1 and PHAR 598 D2 in order to receive credits.

### Tips for contacting researchers:

- Link to Faculty of Science – tips for contacting researchers :  
<https://www.mcgill.ca/science/research/undergraduate-research/finding-opportunities>

## Funding Opportunities for Summer Research



The Melville Initiative for Equity in Science

### The Melville Undergraduate Research Bursary in Pharmacology and Therapeutics:

<https://www.mcgill.ca/pharma/initiatives/melville-legacy>

- Increase diversity in the pharmacology graduate program by offering funding for a summer research experience and mentorship to an undergraduate student from an underrepresented equity group, in general, and Black and Indigenous student in particular.
- Eligibility: undergraduate student from an underrepresented equity group with preference for a Black or Indigenous student. Mostly U2 students, but U1 students are also eligible.
- Stipend for a summer research internship (May to August) in a Department of Pharmacology & Therapeutics laboratory. The Bursary covers 80%; the host laboratory contributes 20%.
- Application deadline for Summer 2024 TBA.



### SURA & NSERC USRA Awards:

- Projects are completed during the summer term (May – August).
- Applications are in February of each year

- Link to SURA Awards:  
<https://www.mcgill.ca/science/research/undergraduate-research/sura>
- Link to NSERC USRA Awards:  
<https://www.mcgill.ca/science/research/undergraduate-research/nserc>



Deutscher Akademischer Austauschdienst  
German Academic Exchange Service



Schull Yang  
International  
Experience Awards

Mitacs

### Other Research Opportunities and Funding at McGill and beyond: DAAD, Mitacs, INRS, etc:

<https://www.mcgill.ca/science/research/undergraduate-research/other-research-opportunities>

### Summer Studies

The Summer Session at McGill covers the months of May to August. For more details, please consult the Summer Studies Calendar:

<https://www.mcgill.ca/study/2023-2024/faculties/summer>



## Science Internships & Field Studies Office

The Science Internships & Field Studies Office promotes **field studies** and **internship opportunities** to interested students seeking hands-on experience. The office coordinates the field study semesters offered through Faculty of Science and provides internship opportunities to students who are in Science programs at McGill. Whether you decide to participate in a field study semester or apply classroom theory to practice, the Science Internships & Field Studies Office will offer you assistance in your decision.

An internship gives you the opportunity to gain professional and practical experience in your field of study prior to graduation. An internship is a paid, full-time work term done during your McGill undergraduate degree in a field related to your studies.

### Contact:

Internship and Field Studies Officer  
Burnside Hall, Room 720

<http://www.mcgill.ca/science/student/internships-field>

## Study Away (including Exchanges)

Studying away from McGill is a once-in-a-lifetime opportunity whose benefits can go far beyond academic learning. The opportunity to study at another university can add significant dimensions to your undergraduate education by enabling you to develop broader perspectives on your fields of study, to enhance skills in cross-cultural communication and critical thinking applicable to your everyday life and provide you with a chance for personal growth.

*\*Graduating Students who are on any type of study away during their graduating term WILL NOT be able to graduate at the end of their final term; instead, these students must select a graduation term (on Minerva) for the term following their Study Away, Exchange, etc..*

### Contact:

Study Away Coordinator  
Dawson Hall, Room 405

[https://www.mcgill.ca/science/undergraduate/handbook#contents\\_exchange](https://www.mcgill.ca/science/undergraduate/handbook#contents_exchange)

## Essential Information

### Service Point

Service Point addresses a wide variety of students' needs:

- assistance with course and program registration for Arts and Science students
- information about exams, and approval of requests for supplemental and deferred exams for Arts or Science students
- ranking/recommendation letters for Arts and Science students
- proof of enrolment letters
- certified or translated copies of diplomas
- help with admissions
- help with Minerva
- international health insurance card and exemptions
- McGill ID cards
- official transcript pick-up
- replacement diplomas
- student study-abroad exchange programs
- help with submission of legal documents
- tuition and fees information
- US loans pick-up

Need to contact Service Point?

<https://www.mcgill.ca/servicepoint/contact>

#### Location:

Service Point

3415 McTavish Street

<http://www.mcgill.ca/students/servicepoint/>

## Useful McGill Sites



- **Pharmacology and Therapeutics**

homepage:

<http://www.mcgill.ca/pharma/>

- **SOUSA (Science Office for Undergraduate Student Advising)** provides assistance in interpreting and updating records, as well as general academic information and advice about degree requirements, registration and course changes, procedures for withdrawal, deferred and supplemental exams, rereads, inter-faculty transfers, study away, academic standing and graduation:

<http://www.mcgill.ca/science/student>

- **Undergraduate Programs, courses and University Regulations** (e-calendar): This link describes McGill's programs, courses, regulations and other important information for the current Academic year:

<https://www.mcgill.ca/study/2023-2024/>

### Students' Home Page

The "Students' home page" connects students to many other important sites:

<https://www.mcgill.ca/resources-services-students>

Here are just a few of the links available through this site:

<https://www.mcgill.ca/students/directory>

- Essential Services and Information
- Navigating the University
- Finances

- Campus Life
- Academic Resources
- Safety and Security
- McDonald Campus
- Health, Wellness and Personal Support
- Learning beyond the Classroom
- Getting involved
- Graduation and Beyond
- Student Life and Learning

## Undergraduate Calendar

The University Calendar contains the rules and regulations concerning your academic life at McGill, such as:

- Deadlines
- ID cards
- Fees
- Registration (including ADD/DROP and withdrawal dates)
- Courses
- Grading
- Exams (incl. what to do if you are ill; supplemental/deferred exams; what happens if you are caught cheating)
- Transfer credits
- Study away
- Individual faculty regulations
- Residences

The following website provides access to all course calendars:

<http://www.mcgill.ca/students/courses/calendars/>

## Student Services

**Student Services** promotes and supports student success and well-being, offering a wide range of services to students:

- [Student Wellness Hub](#)
- [Campus Life & Engagement](#) (CL&E)
- [Students Helping Students](#)
- [Career Planning Service](#) (CaPS)
- [First Peoples' House](#)
- [International Student Services](#) (ISS)
- [Student Accessibility & Achievement](#)
- [Office of Religious and Spiritual Life](#) (MORSL)
- [Scholarships and Student Aid](#)
- [Tutorial Service](#)
- [McGill International Parent Committee](#)





Most students graduate at the end of the final year in Pharmacology (U3). All program requirements and degree credits (i.e. 90 or 120 etc.) must be completed by April of your final year in order to meet the deadline for spring convocation. If you take a summer course at the end of your final year, then you are expected to graduate in November, not in the spring.

*Please note:* It is YOUR RESPONSIBILITY to verify your eligibility for graduation during your final semester. You can access your whole record via MINERVA at any time. You must complete the program (i.e. Minor, Majors or Honours) as well as the number of credits required for your degree (i.e. 90/120 etc). If you have met all these requirements, then you will graduate.

## Convocation

Convocation dates and information can be found here: [www.mcgill.ca/convocations/](http://www.mcgill.ca/convocations/)

For information on **graduation photos**, contact the members of the PILS Council: [pils@sus.mcgill.ca](mailto:pils@sus.mcgill.ca)



## Graduate Studies in Pharmacology:

The Department of Pharmacology and Therapeutics at McGill University offers programs of study, which lead to either M.Sc. (thesis) or Ph.D. degrees through the Graduate and Post-Doctoral Studies Office (GPSO). The GPSO has information for prospective graduate students:

<http://www.mcgill.ca/gradapplicants/>

The objective of the M.Sc. (thesis) and Ph.D. programs is to provide in-depth research experience in a specific area of pharmacology in order to develop individuals capable of independent research and scholarly activity in industry, government or academia.

In the M.Sc. (Thesis) and Ph.D. programs, students select their own area of research for their thesis project. The thesis proposal usually follows the first year of the program and, if approved, thesis work begins. Since

several members of the Department hold joint appointments in clinical and other basic science departments, students can participate in interdisciplinary research projects that are relevant to pharmacology.

### How do I apply for Pharmacology Graduate Studies?

Instructions for submitting an application is found on the Departmental web site:

<https://www.mcgill.ca/pharma/graduate-program/admissions>

For more information, please contact the Graduate Studies Coordinator:

[gradstudies.pharmacology@mcgill.ca](mailto:gradstudies.pharmacology@mcgill.ca)

