

NEUROSCIENCE

Facilities

The Centre for Neuroscience Studies is an interdisciplinary center with a membership that includes faculty members from multiple departments in both the Faculty of Health Sciences and the Faculty of Arts & Science. The graduate program in Neuroscience provides an enriched environment for the training of highly qualified personnel with the skills required to study fundamental questions of function and diseases of the nervous system. Faculty members participating in the graduate program in Neuroscience have access to world-class laboratory facilities applicable to all aspects of neuroscience research.

Graduate Student Support

Scholarships, fellowships and stipends from supervisors' research grants are available to graduate students. It is the policy of The Centre for Neuroscience Studies that a minimum level of assistance is available to each graduate student. Details regarding the current level of support available to graduate students in the program are available from the Centre's graduate office and from the Centre for Neuroscience Studies web page at <http://neuroscience.queensu.ca/graduate> (<http://neuroscience.queensu.ca/graduate/>).

Fields of Research

The fields of specialization within the graduate program in Neuroscience are: Cellular/Molecular Neuroscience; Systems Neuroscience; Cognitive/Behavioural Neuroscience; and Neurological/Psychiatric Conditions.

Degree Programs

Master of Science and Doctor of Philosophy

Applicants for the degrees of Master of Science and Doctor of Philosophy are accepted under the general regulations of the School of Graduate Studies.

Faculty

Director

Milev, R.

Coordinator of Graduate Studies

Cook, D.J.

Faculty

Andrew, R.D., Arboleda-Florez, J.E., Bendena, W., Beninger, R.J., Blohm, G., Brien, J.F., Brouwer, B., Brunet, D., Cahill, C.M., Castelhana, Dorris, M.C., Dow, K., Dringenberg, H.C., Dumont, E., Ferguson, A.V., Flanagan, J.R., Flavin, M.P., Forster-

Gibson, C., Garcia, A., Gilron, I., Glasgow, J.I., Hawryshyn, C., Holden, J.A., Hollenstein, T., Johnsrude, I., Kawaja, M.D., Kelley, E., Kuhlmeier, V.A., Lederman, S.J., LePage-Partentreau, Lomax, A., Magoski, N.S., Marin, A., McLean, L., Melanson, M., Menard, J., Milev, R., Munhall, K.G., Munoz, D.P., Norman, K., Olmstead, M.C., Ouellette-Kuntz, H., Oyewumi, K.L., Paré, M., Pari, G., Pelland, L., Pukall, C., Reynolds, J.N., Robertson, R.M., Rose, P.K., Rossiter, J.P., Sabbagh, M., Scott, D., Scott, S.H., Singh, A.N., Smith, G., Spiller, A., Stroman, P., Ten Hove, M., Troje, N., Van Vugt, D.A., Wilson, D., Wynne-Edwards, K.

Retired Members of Faculty

Boegman, R., Jhamandas, K., Lawson, S., Weisman, R.

Courses

All courses are 3.0 credit units with the exception of NSCI 868 (1.0 credit unit) and NSCI 825, NSCI 899, and NSCI 999 (all 6.0 credit units.)

NSCI 800 Current Concepts in Neuroscience

An advanced course that will focus on current research topics in selected areas of Neuroscience. Topics will include research in all fields of specialization within the Neuroscience graduate program (Cellular/Molecular Neuroscience, Systems Neuroscience, Cognitive/Behavioural Neuroscience, Neurological & Psychiatric Disorders) to introduce students to the breadth of research in Neuroscience. This course is required for all M.Sc. students in the Neuroscience graduate program. Three hour seminar/week.

PREREQUISITE: An introductory course in neuroscience (LISC 322 or equivalent), or permission of the course supervisor.

In the absence of a background in either biological or natural sciences, students will be required to enroll in NSCI 821 Fundamentals of Neuroscience as a prerequisite. Enrolment is limited with priority given to Neuroscience graduate students.

NSCI 801 Developmental Disabilities - From Neurobiology to Neurobehaviour

This course is designed for graduate students in neuroscience and for residents, fellows, and clinical interns in the mental health professions. Topics range from epidemiology and etiology to the molecular genetics and biology of specific disorders, to legal and ethical issues regarding care and treatment and promoting equity for this vulnerable population. This course is mandatory for all M.Sc. students in the Neuroscience graduate program. Three hour seminar/week. (3.0 credit units) (Offered in years ending in an uneven number)



PREREQUISITE: Introductory courses in neuroscience/neurobiology and genetics. Enrolment is limited with priority given to Neuroscience graduate students.

NSCI 802 Psychiatric Disorders - From Neurobiology to Neurobehaviour

This course is designed to provide students with an in depth understanding of psychiatric conditions including bipolar disorder, schizophrenia, major depression, obsessive compulsive disorders, anxiety disorder, personality disorders, dementia, and childhood psychopathology. Discussions range from the genetics underlying these conditions to the neurophysiological, neurobehavioural and neurocognitive correlates. Topics include epidemiology, etiology, assessment methods, treatments, neurobiology, genetics, neuropathology and recent research on each condition.

Three hour seminars/week. (Offered in years ending in an even number).

PREREQUISITE: Introductory courses in neuroscience/neurobiology and genetics. Enrolment is limited with priority given to Neuroscience graduate students.

NSCI 803 Magnetic Resonance Imaging

This course is designed for graduate students who want to learn the theory and practice of magnetic resonance imaging (MRI) for anatomical imaging, imaging of dynamic physiological processes, and MRI to detect neuronal function (functional MRI, fMRI). The course will allow the student to gain an understanding of the principles that underlie the applications of MRI and fMRI as a research tool. Three hour lecture/week.

PREREQUISITES: Introductory courses in Chemistry, Mathematics and Physics. Permission of the Instructor.

NSCI 813 Advances in Neuropharmacology

Recent advances in understanding neurotransmission and pharmacology in the central nervous system will be discussed. The current literature describing progress in understanding molecular, cellular and behavioural aspects of brain function, and the impact of drugs and disease, will be examined. Winter; seminars. Given in years ending with an uneven number.

PREREQUISITE: Permission of Graduate Program

EXCLUSION: PHAR 810, BMED 813

NSCI 815 Special Directed Topics

Designed for students with special interests that are not covered by existing courses offered in the Centre for Neuroscience Studies. Normally, this will take the form of a closely supervised reading course in the area of a graduate instructor's expertise, but may also include supervised laboratory work and/or specialized clinical experience.

NSCI 822 Cellular and Molecular Neuroscience

An in-depth study of the biophysical properties of neurons and diseases that affect the function of neurons and glia. Topics will include cable properties of dendrites, voltage- and ligand-dependent channels, and molecular mechanisms responsible for neuronal death and regeneration. The course will be based on lectures and student seminars of selected readings. Given concurrently with LISC 422, with additional assignments for graduate students. (Same as ANAT 822) One hour lecture/week, 2 hour seminar/week. (Offered in years ending in an even number)

PREREQUISITE: LISC 322 with a minimum of 70%, or an equivalent course, or permission of the instructor. Enrollment is limited.

EXCLUSIONS: LISC 422

NSCI 825 Medical Neuroscience

A multidisciplinary graduate level course exposing students to the clinical aspects of neuroscience (same as ANAT 825, PHAR 825 and PHGY 825). Didactic lectures cover detailed organization of the nervous system with clinical implications. Laboratories review basic neuroanatomy and pathology. Clinical demonstrations expose students to several neurological disorders. Lectures, laboratories, and clinical cases. Up to 20 hr/week; 9 weeks total.

NSCI 826 Cognitive Neuroscience

A course for graduate students to explore advanced concepts of cognitive processes in the central nervous system. This is a multi-disciplinary lecture/seminar course with active student participation expected. The course will consist of weekly sessions focusing on specific concepts such as perception, motor processing, reward systems, working memory, executive functions and decision making. Offered jointly with NSCI 426.

PREREQUISITE: Permission of Instructor

EXCLUSION: ANAT 826, PHGY 826, NSCI 426

NSCI 829 Disorders of the Nervous System

A multi-disciplinary course exploring advanced concepts of clinical neuroscience. Topics can include stroke, traumatic brain and cord injuries, neurodegenerative disorders, epilepsy, schizophrenia, depression, deep brain stimulation, pain and placebo effects, normal and abnormal aging, stem cells. Students will learn to critically evaluate scientific literature and present these concepts to classmates during student-led seminars. Enrolment is limited.

PREREQUISITE: NSCI 322 or NSCI 323 or ANAT 312 or PSYC 271 or permission of instructors

EXCLUSION: NSCI 429

NSCI 830 Biological Psychiatry

Biological psychiatry recognizes mental disorders as brain disorders requiring a multilevel approach from genes to neuroimaging to psychosocial mechanisms. This course

provides an overview of major psychiatric diagnoses through a framework of neurobiology, psychopharmacology and evidenced-based practice. Students will gain exposure to a broad range of mental disorders and biological treatments in modules covering neuropsychiatric disorders, neurodevelopmental disorders, neurocognitive disorders, mental illnesses, paraphilic disorders and neuromodulation. This course will be delivered by mixed teaching methods and include selected readings as well as presentations by student participants on topics related to biological psychiatry. Weekly seminars will be facilitated by faculty members affiliated with the CNS and other departments at Queen's University. (3.0 credit units)

NSCI 844 Controversies in Neuroscience

As insight regarding the human brain expands, so do related issues such as what constitutes personhood, what drives the criminal mind, intelligence-enhancing drugs and end-of-life issues. Led by experts who deal daily with such concerns, we will focus weekly on a particular topic in neuroscience which impacts on society.

PREREQUISITE: At minimum, an introductory course in the Neurosciences or permission of the Instructor.

NSCI 850 Computational Approaches to Neuroscience

This course will provide an overview and hands on experience of the most important computational approaches in Neuroscience. The main topics covered include single cell and neural network modelling, Bayesian approaches, State Space modelling and Optimal Control Theory. More specific modelling approaches will also be discussed as well as some widely used computational data analysis methods.

PREREQUISITE: permission of course director

NSCI 855 Modelling in Neuroscience

This course is based on the annual Summer School in Computational Sensory-Motor-Neuroscience (CoSMo), which is a 2-week (12 days) intensive course. Through lectures, tutorials and a problem-based project, students will gain advanced knowledge and experience in the application of computational methodologies to modelling in neuroscience. Summer term.

NSCI 868 Clinical neuroscience methods

The objective of this course is to familiarize graduate students with the principles and practice of cutting edge technologies used in clinical neuroscience methods involved in biomedical research. (1.0 credit unit)

EXCLUSION: BMED 868

NSCI 899 Master's Thesis Research

NSCI 999 Ph.D. Thesis Research

The following is a list of courses that also may be appropriate for students in the Neuroscience graduate program. For full descriptions refer to the appropriate departmental course listing.

BIOL 815 Neuronal Basis of Behaviour
PSYC 921 Visual and Auditory Processes
PSYC 930 Somatosensory, Intersensory and Motor Processes
PSYC 931 Neuroplasticity and Behaviour
PSYC 932 Neuroethology
PSYC 934 Animal Behaviour (Ethology)
PSYC 935 Neurotransmitters and Behaviour
PSYC 965 Memory, Decision and Choice
PSYC 966 Comprehension and Performance
RHBS 801 Motor Performance in Rehabilitation