

# Neuroscience (NEUR)

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## Department of Neuroscience

### Faculty of Science

#### **NEUR 1201 [0.5 credit]**

##### **Introduction to Mental Health and Disease**

Common mental health diseases; clinical symptoms of disease, genetic, developmental, experiential and environmental risk factors contributing to disease; the neurobiological basis of disease. Topics may include depression, Alzheimer's Disease, schizophrenia and ADHD.

Lecture three hours a week.

#### **NEUR 2001 [0.5 credit]**

##### **Introduction to Research Methods in Neuroscience**

A general introduction to research methodologies employed within neuroscience. Topics covered include research designs and techniques, basic descriptive statistics, and how to interpret and report research findings.

Precludes additional credit for PSYC 2000 and PSYC 2001.

Lecture three hours a week.

#### **NEUR 2002 [0.5 credit]**

##### **Introduction to Statistics in Neuroscience**

A general introduction to statistical techniques employed within contemporary neuroscience. Topics covered include basic data analysis using descriptive and inferential statistics (t-tests, ANOVA, correlation, chi-square).

Precludes additional credit for ENST 2006, GEOG 2006, PSYC 2002.

Prerequisite(s): PSYC 2001 or NEUR 2001.

Lectures three hours a week.

#### **NEUR 2003 [0.5 credit]**

##### **Introduction to Techniques in Neuroscience**

Introduction to common techniques used in neuroscience research. Brain imaging, animal behaviour, electrophysiology, immunohistochemistry and microscopy, genomics, transgenics, cell culture, and DSM-IV-based clinical assessment.

Lectures three hours a week.

#### **NEUR 2200 [0.5 credit]**

##### **Biological Foundations of Behaviour**

How molecular, cellular, and systems-level processes primarily within the brain underlie sensation, movement, motivation, emotion, learning and cognition.

Precludes additional credit for PSYC 2200.

Prerequisite(s): PSYC 1001 or NEUR 1201, or permission of the Department.

Lectures three hours a week.

#### **NEUR 2801 [0.5 credit]**

##### **Neuroscience and Creativity**

Abnormal brain function, associated with mental illness or substance abuse, has been commonly depicted in, or been the inspiration for important cultural works including movies, music, paintings and literature. The neurobiological basis of creativity in individuals with and without mental illness.

Prerequisite(s): PSYC 1001 or NEUR 1201.

Lectures and seminars three hours a week.

#### **NEUR 3200 [1.0 credit]**

##### **Principles of Neuroscience**

Core principles of neuroscience, including neural signaling, sensation, movement, neurodevelopment, neuroplasticity, neuroendocrinology, learning and memory, and other complex brain functions.

Precludes additional credit for PSYC 3200.

Prerequisite(s): Neuroscience Major or Cognitive Science Biological Foundations of Behaviour stream, and NEUR 2200 or permission of the Department.

Lectures, colloquia and seminars, three to six hours a week.

#### **NEUR 3202 [0.5 credit]**

##### **Sensory Processes**

The physiological basis of sensation. Topics include sensory mechanisms, neuropsychological bases of perception and psychological phenomena encountered in the various senses.

Precludes additional credit for PSYC 3202 and PSYC 3702.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

#### **NEUR 3203 [0.5 credit]**

##### **Field Course in Animal Behaviour**

Offered in the Department of Biology as BIOL 3605. Only those modules dealing with animal behaviour topics may be offered for Neuroscience credit.

Also listed as BIOL 3605.

Precludes additional credit for PSYC 3203.

Prerequisite(s): permission of the department.

#### **NEUR 3204 [0.5 credit]**

##### **Principles of Psychopharmacology: From Drugs to Behaviour**

Introduction to synaptic mechanisms and the arrangements of the transmitter-specific brain systems, followed by a discussion of neuro-pharmacological bases of normal and abnormal behaviour and of the behavioural effects of various classes of psychoactive drugs such as stimulants, tranquilizers, opiates.

Precludes additional credit for PSYC 3204.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3301 [0.5 credit]****Genetics of Mental Health**

Most common mental health diseases have a genetic component. By focusing on specific diseases, this course will discuss how disease susceptibility genes are identified, and describe the genetic, genomic and epigenetic mechanisms through which DNA alterations can predispose to disease.

Prerequisite(s): BIOL 2104 and NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3302 [0.5 credit]****Sex and the Brain**

Neurobiological processes behind reproductive behaviours in various animal species including humans. Evaluation of data concerning neurobiological differences between sexes, biological determinants of sexual orientation, and relating to neurobiology of sex disorders.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3303 [0.5 credit]****The Neuroscience of Consciousness**

Consciousness remains one of the least understood aspects of the nervous system. This course explores neural mechanisms underlying consciousness, changes in consciousness associated with sleep, coma, vegetative states, drugs, and other stimuli, and considers the evolutionary basis of consciousness, and its relationship with awareness.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3304 [0.5 credit]****Hormones and Behaviour**

The effects of hormones throughout life at all levels of the nervous system. The role of hormones in mediating behaviours that are both basic (feeding, reproduction and social interactions) and complex (motivation, emotion, learning and memory).

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3305 [0.5 credit]****Immune-Brain Interactions**

This course will discuss growing evidence of communication between the brain and the immune system, and of the messengers mediating the interaction.

We will discuss how disturbances of immune-brain signaling can lead to disease (multiple sclerosis, Parkinson's) and to changes in mood and cognition.

Prerequisite(s): NEUR 3200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3306 [0.5 credit]****The Neural Basis of Addiction**

How substance and behavioural addictions impact neural function to ultimately lead to the neuropathology of addiction in vulnerable populations. The neurobiological mechanism of action of each drug class; contemporary neurobiological theories of addiction.

Prerequisite(s): NEUR 2200 and third-year standing.

Lecture and seminar three hours a week.

**NEUR 3401 [0.5 credit]****Environmental Toxins and Mental Health**

Exposure to environmental toxins from the air, water or food can interfere with neuronal function, alter neurodevelopment, and damage the brain. This course will explore associations between toxins and diseases such as Parkinson's disease, multiple sclerosis and depression, focusing on mechanisms underlying development of pathology.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3402 [0.5 credit]****Impact of Lifestyle and Social Interactions on Mental Health**

Healthy lifestyle choices and positive social interactions can reduce the incidence of pathological conditions such as depression, obesity, cardiovascular disease and impaired immunity. This course focuses on psychosocial and neurobiological mechanisms that underlie the relationship between lifestyle, social interactions and health.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3403 [0.5 credit]****Stress and Mental Health**

Stressful events can have profound repercussions on physical and psychological well-being. This course examines the psychosocial and biological processes by which stressors predispose to both physical (immune-related disorders, diabetes, heart disease) and psychological (acute stress disorder, posttraumatic stress disorder, depression, anxiety) pathologies.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3501 [0.5 credit]****Neurodegeneration and Aging**

Neurodegeneration is particularly acute in the aging population, and is characteristic of diseases such as Alzheimer's, Parkinson's, multiple sclerosis and Huntington's disease. This course will explore mechanisms underlying neurodegeneration, plus recent advances aimed at the restoration of nervous tissue, potentially curing these pathologies.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3502 [0.5 credit]****Neurodevelopmental Determinants of Mental Health**

Development of the human brain, the generation and differentiation of the various cell types, and the formation of the vast network of neural connections. How neurodevelopmental dysregulation can result in pathologies including dyslexia, ADHD, schizophrenia and autism.

Prerequisite(s): NEUR 2200 and third-year standing.

Lectures and seminars three hours a week.

**NEUR 3999 [0.0 credit]****Co-operative Work Term****NEUR 4001 [0.5 credit]****Special Topics in Neuroscience**

Each section of NEUR 4001 deals with a different topic. Topics change yearly. Students may register in more than one section of NEUR 4001 but can register in each section only once.

Prerequisite(s): NEUR 3200 and fourth year standing, or permission of the Department.

Lectures three hours a week.

**NEUR 4200 [0.5 credit]****Seminar on Current Research in Neuroscience**

A seminar discussing how research on brain structure and function can lead to development of novel pharmacological, surgical and behavioral therapies of mental health diseases. Students will gain insight into the relationship between clinical observations and hypothesis-driven research into the biological basis of disease.

Precludes additional credit for PSYC 4200.

Prerequisite(s): NEUR 3200.

Seminar three hours a week.

**NEUR 4801 [0.5 credit]****Neuroethics**

Ethical issues of key importance to current neurobiological research. Topics may include the use of animals in research, stem cell research, genetic diagnosis and gene therapy, neuroimaging, and the effect on identity and autonomy of manipulations such as psychopharmaceuticals and psychosurgery.

Prerequisite(s): NEUR 3200.

Lectures and seminars three hours a week.

**NEUR 4900 [0.5 credit]****Independent Study**

A reading or research course for selected students who wish to investigate a particular topic of interest. Normally students may not offer more than one credit of independent study in their total program.

Prerequisite(s): third- or fourth- year standing and permission of the Department.

**NEUR 4907 [1.0 credit]****Honours Essay and Research Proposal**

An independent essay based critical review and research proposal on a topic in neuroscience, using library resources, under the direct supervision of a Faculty advisor. Evaluation is based on a written report.

Precludes additional credit for NEUR 4908.

Prerequisite(s): fourth-year standing in an Honours Neuroscience program and permission of the Department.

**NEUR 4908 [1.0 credit]****Honours Research Thesis**

An independent research project undertaken under the direct supervision of a faculty advisor typically from the Department of Neuroscience. Evaluation is based on a written report and poster.

Precludes additional credit for NEUR 4907.

Prerequisite(s): fourth-year standing in an Honours Neuroscience program, minimum CGPA of 9.0 and permission of the Department.

**Summer session:** some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)