NEUROSCIENCE (NSC)

NSC 5102 Cellular and Molecular Neuroscience (3 units)
The molecular and cellular properties of neurons. Emphasis to be placed
on the molecular basis of electrical activity of neurons and chemical
synaptic transmission.
Course Component: Lecture

NSC 5104 Systems Neuroscience (3 units)
Structure and function of representative components of the nervous
system to be presented in an integrated and comprehensive manner,
emphasizing a reductionist approach to the study of neural networks
and their behavioural output.
Course Component: Lecture

NSC 5106 Molecular Psychiatry (3 units)
Study of genetic and neurochemical bases of mental illnesses using
transgenic and gene knockout mouse models, animal behavioural
paradigms, in vivo imaging. Gene therapy approaches in psychiatry;
influence of environmental stressors.
Course Component: Lecture

NSC 6101 Consciousness: An Interdisciplinary Perspective from
Neuroscience, Philosophy and Psychology (3 units)
This interdisciplinary course addresses two fundamental questions
in the study of the mind: 1) what is consciousness? 2) Can we explain
the emergence and operation of this central feature of human life by
analyzing the brain?
Course Component: Lecture

NSC 6300 Seminars
Course Component: Lecture

NSC 7100 Neurotransmission and Neuromodulation (3 units)
Molecular and cell biology of neurotransmission including the identity,
actions and mechanisms of neurotransmitters and neuromodulators. Use
of computer simulations to explore the complex interactions between
synaptic input and the electrical architecture of neurons.
Course Component: Seminar
Permission of the Department is required.

NSC 8101 Advanced Topics in Neuropathology (3 units)
General histopathological responses of central and peripheral nervous
tissue to pathological stimuli including hypoxic-ischemic, traumatic,
inflammatory/infectious, demyelinating and toxic. Emerging topics in
neurology and neuropathology including the following: the pathology
and pathogenesis of protein-based neurodegenerative disorders, the
emerging family of RNA-mediated neurological disorders, mendelian and
non-mendelian genetic diseases of the nervous system (including the role
of microRNA in neurological disease), advances in diseases of skeletal
muscle, advances in the molecular pathogenesis of Central Nervous
System tumours, and advances in metabolic/mitochondrial/storage
diseases.
Course Component: Lecture

NSC 8103 Developmental Neuroscience (3 units)
Fundamental concepts of development of the nervous system with
an emphasis on those aspects unique to this tissue type. Topics to
include control of proliferation and differentiation, axonal outgrowth and
pathfinding, synaptogenesis and formation of neuronal maps, neuronal
plasticity, growth factor action and neural regeneration.
Course Component: Lecture

NSC 8104 Computational Neuroscience (3 units)
Basic concepts of sensory-motor processing from the cellular level
of excitable membranes and synaptic signalling mechanisms to the
emergent properties of complex neural networks.
Course Component: Lecture

NSC 8105 Molecular Biology of the Neuron (3 units)
Emphasis on how signal transduction regulates neuronal function.
Topics to include the role of the cytoskeleton in neuronal function,
membrane sorting in exocytosis and endocytic pathways, metabotropic
and ionotropic receptor signaling, signaling by the GTP-binding proteins,
plasma membrane and vesicular transporters, role of protein-protein
interactions in the regulation of neuronal signaling, and genomic and
proteomic approaches to study neuronal signaling.
Course Component: Lecture

NSC 8106 Mechanisms of Neurological Disease (3 units)
Current knowledge of select neuropathologies with emphasis on the
underlying genetics and biochemistry of these conditions. Examination
of some fundamental cellular processes important for understanding
neurological diseases.
Course Component: Lecture

NSC 8107 NEURAL CONTROL OF METABOLISM (3 units)
Examination of how the brain controls metabolism and how metabolic
disorders affect brain function. Topics include the brain’s control of food
intake, glucose homeostasis and energy expenditure. Examination of
the effects of mental states on metabolic homeostasis, the relationship
between neurogenesis and metabolism, neurovascular coupling in brain
metabolism, and genetic risk in metabolic syndromes.
Course Component: Lecture
Prerequisite: NSC 5102 or NSC 5104

NSC 8324 Seminar for MSc Students (3 crédits / 3 units)
All graduate students enrolled in the MSc program or who have been
admitted to a PhD program without an MSc must participate in these
seminars for one year. Two seminars must be presented by each student
during the year.
Volet / Course Component: Séminaire / Seminar

NSC 8325 Seminar for PhD Students (3 crédits / 3 units)
All graduate students enrolled in the PhD program must participate in
these seminars for one year during their doctoral or post MSc training.
Two seminars must be presented by each student during the year: one on
an assigned subject, the other on his or her research project.
Volet / Course Component: Séminaire / Seminar

NSC 8340 Neuromuscular Function and Dysfunction (3 units)
Topics to be covered include factors controlling muscle- and synapse-specific
gene expression, regulation of myogenesis and muscle cell
growth, formation of the neuromuscular junction, motor neuron-muscle
interactions, the role of the cytoskeleton in the organization of post-
synaptic domains, functional role of ion channels in muscle, molecular
genetics of neuromuscular disease.
Course Component: Lecture
Prerequisite: CMM 5340 or equivalent.

NSC 9998 Examen de synthèse (doctorat) / Comprehensive Examination
(Ph.D.)
Volet / Course Component: Recherche / Research