

NEUROSCIENCE (NEUR)

Departments of Biomedical Sciences (Ontario Veterinary College), Human Health and Nutritional Sciences (College of Biological Science), Molecular & Cellular Biology (College of Biological Science), and Psychology (College of Social and Applied Human Science).

Major (Honours Program)

This Honours program provides a foundation in the natural sciences and an opportunity to develop advanced knowledge of nervous system structure and function, and the skills required for independent inquiry within neuroscience. The specialization is unique in its emphasis on integrative/interdisciplinary problem solving. Through the use of electives, students may structure a program that emphasizes molecular and biomedical neuroscience, behavioural and cognitive neuroscience, or comparative neuroscience.

The major prepares students for professional programs in health science (medical, physiotherapy, pharmacy, veterinary medicine, nursing), post-graduate degrees in neuroscience research, and provides a strong foundation for students wishing to pursue careers in the pharmaceutical and biotechnology industries, public health, teaching, and scientific publishing & journalism.

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult with a Faculty Advisor. A minimum total of 20.00 credits is required to complete the major.

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at: https://www.uoguelph.ca/bsc/revised_SS (https://www.uoguelph.ca/bsc/revised_SS/)

Code	Title	Credits
Semester 1		
BIOL*1080	Biological Concepts of Health	0.50
CHEM*1040	General Chemistry I	0.50
MATH*1080	Elements of Calculus I	0.50
PHYS*1080	Physics for Life Sciences	0.50
0.50 Liberal Education electives		0.50
Semester 2		
BIOL*1070	Discovering Biodiversity	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
CHEM*1050	General Chemistry II	0.50
PHYS*1070	Physics for Life Sciences II	0.50
PSYC*1000	Introduction to Psychology	0.50
Semester 3		
BIOC*2580	Introduction to Biochemistry	0.50
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
NEUR*2000	Foundations in Neuroscience	0.50
STAT*2040	Statistics I	0.50
or PSYC*1010	Making Sense of Data in Psychological Research	
0.50 Liberal Education electives		0.50
Semester 4		

MCB*2050	Molecular Biology of the Cell	0.50
PHYS*2030	Biophysics of Excitable Cells	0.50
PSYC*3410	Behavioural Neuroscience II	0.50
1.00 electives or restricted electives		1.00
Semester 5		
BIOM*3000	Functional Mammalian Neuroanatomy	0.50
NEUR*3100	Molecular Mechanisms of Neurological Disorders	0.50
PSYC*3270	Cognitive Neuroscience	0.50
1.00 electives or restricted electives		1.00
Semester 6		
BIOM*3090	Principles of Pharmacology	0.50
NEUR*3500	Techniques in Neuroscience	1.00
1.00 electives or restricted electives		1.00
Semester 7		
NEUR*4000	Current Issues in Neuroscience	0.50
NEUR*4100	Neuropharmacology	0.50
1.50 electives or restricted electives		1.50
Semester 8		
2.50 electives or restricted electives		2.50

Note: Physiology restricted elective (# 3) must be taken before registering in BIOM*3090 Principles of Pharmacology in semester 6.

Restricted Electives

Students are advised to pay particular attention to pre-requisite requirements when choosing individual courses, and seek advice as needed.

1. A minimum of 0.50 credits of Critical thinking/ Philosophy / Ethics from:

Code	Title	Credits
BIOM*3210	Critical Thinking in the Health Sciences	0.50
PHIL*2100	Critical Thinking	0.50
PHIL*2110	Formal Logic	0.50
PHIL*2120	Ethics	0.50
PHIL*2180	Philosophy of Science	0.50
PHIL*2240	Knowledge and Belief	0.50

Note: if a PHIL course is completed from this list, students are required to take an additional 0.50 credit approved science course as an elective to ensure the minimum science requirement is met.

2. A minimum of 0.50 credits of Developmental Biology

Code	Title	Credits
BIOM*3040	Medical Embryology ¹	0.75
MBG*3040	Molecular Biology of the Gene	0.50
ZOO*3050	Developmental Biology	0.50

3. A minimum of 0.50 credits of Physiology

Code	Title	Credits
BIOM*3200	Biomedical Physiology	1.00
HK*2810	Human Physiology I - Concepts and Principles ²	0.50
ZOO*3600	Comparative Animal Physiology I ¹	0.50

4. A minimum of 0.50 credits of additional statistics or experimental design

Code	Title	Credits
PSYC*2360	Psychological Methods and Statistics	0.50
STAT*2050	Statistics II	0.50

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Indicates courses that require additional prerequisites.

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Note: If HK*2810 Human Physiology I - Concepts and Principles is completed in Semester 4, HK*3810 Human Physiology II - Integrated Systems must be completed in Semester 5 in order to meet the BIOM*3090 Principles of Pharmacology pre-requisite requirement

Lists of Recommended Electives

The following lists contain recommended electives for students wishing to emphasize particular areas in neuroscience.

Code	Title	Credits
Psychology		
PSYC*2330	Principles of Learning	0.50
PSYC*2390	Sensation and Perception	0.50
PSYC*2650	Cognitive Psychology	0.50
PSYC*3030	Neurochemical Basis of Behaviour ³	0.50
PSYC*3100	Evolutionary Psychology ³	0.50
PSYC*3330	Memory and Attention ³	0.50
PSYC*3410	Behavioural Neuroscience II	0.50
PSYC*4470	Advanced Topics in Behavioural and Cognitive Neuroscience	0.50
PSYC*4570	Special Topics in Applied Psychology	0.50
Computation, Modeling and Statistics		
CIS*1300	Programming	0.50
CIS*2500	Intermediate Programming ³	0.50
MATH*1090	Elements of Calculus II	0.50
MATH*1160	Linear Algebra I	0.50
MATH*2270	Applied Differential Equations ³	0.50
MATH*3510	Biomathematics ³	0.50
PSYC*3250	Psychological Measurement ³	0.50
PSYC*3290	Conducting Statistical Analyses in Psychology ³	0.50
STAT*3240	Applied Regression Analysis ³	0.50
Biological Science		
BIOC*3560	Structure and Function in Biochemistry	0.50
BIOC*4580	Membrane Biochemistry ³	0.50
BIOM*4070	Biomedical Histology ³	0.50
MBG*3050	Human Genetics	0.50
MCB*3010	Dynamics of Cell Function and Signaling	0.50
MCB*4010	Advanced Cell Biology ³	0.50
ZOO*3000	Comparative Histology ³	0.50
Health & Disease		
BIOM*3040	Medical Embryology ³	0.75
BIOM*4030	Endocrine Physiology ³	0.50
BIOM*4050	Biomedical Aspects of Aging ³	0.50
HK*3100	Neuromuscular Physiology ³	0.50

HK*3810	Human Physiology II - Integrated Systems ³	0.75
HK*4070	Clinical Biomechanics ³	0.50
TOX*4000	Medical Toxicology	0.50

Research Based

For students who are interested in graduate studies, a research course is recommended

BIOM*4500	Literature-based Research in Biomedical Sciences	0.50
BIOM*4510	Research in Biomedical Sciences	1.00
BIOM*4521	Research in Biomedical Sciences	1.00
BIOM*4522	Research in Biomedical Sciences	1.00
HK*4230	Advanced Study in Human Health and Nutritional Sciences	0.50
HK*4360	Research in Human Health and Nutritional Sciences	1.00
HK*4371	Research in Human Health and Nutritional Sciences II	0.50
HK*4372	Research in Human Health and Nutritional Sciences II	0.50
IBIO*4500	Research in Integrative Biology I	1.00
IBIO*4510	Research in Integrative Biology II	1.00
IBIO*4521	Thesis in Integrative Biology	1.00
IBIO*4522	Thesis in Integrative Biology	1.00
MCB*4500	Research Project in Molecular and Cellular Biology I ³	1.00
MCB*4510	Research Project in Molecular and Cellular Biology ³	1.00
MCB*4600	Topics in Molecular and Cellular Biology ³	0.50
NEUR*4401	Research in Neurosciences	0.50
NEUR*4402	Research in Neurosciences	0.50
NEUR*4450	Research in Neurosciences	1.00
PSYC*3240	Independent Research Project ⁴	0.50
PSYC*4240	Advanced Independent Research Project ⁴	0.50
PSYC*4870	Honours Thesis I ⁴	0.50
PSYC*4880	Honours Thesis II ⁴	1.00

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Indicates courses that require additional prerequisites.

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Faculty advisor will determine if this course is an eligible science elective, depending on the instructor and topic

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
	First year science core	4.00
	Required science courses semester 3-8	7.50
	Restricted elective (#1,2,3,4 in restricted electives list)	2.00
	Approved Science Elective ¹	2.50
	Required Liberal Education Elective ²	0.50
	Liberal Education Electives	1.00
	Free Electives	2.50
Total Credits		20

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3.00 Approved Science Electives if a PHIL*XXXX course is selected for restricted electives #1

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PSYC*1000 Introduction to Psychology

Of the 20 total credits required, students must complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Minor (Honours Program)

A minor in Neuroscience requires a minimum of 5.00 credits including:

Code	Title	Credits
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
PSYC*1000	Introduction to Psychology	0.50
PSYC*2330	Principles of Learning	0.50
NEUR*2000	Foundations in Neuroscience	0.50
or PSYC*2410	Behavioural Neuroscience I	
PSYC*1010	Making Sense of Data in Psychological Research	0.50
or STAT*2040	Statistics I	
Select a minimum of 0.50 credits from the following:		
BIOM*2000	Concepts in Human Physiology	0.50
BIOM*3200	Biomedical Physiology	1.00
HK*2810	Human Physiology I - Concepts and Principles	0.50
ZOO*3600	Comparative Animal Physiology I	0.50
Select a minimum of 2.00 credits from the following:		
BIOM*3000	Functional Mammalian Neuroanatomy	0.50
BIOM*3090	Principles of Pharmacology	0.50
BIOM*4030	Endocrine Physiology	0.50
HK*3100	Neuromuscular Physiology	0.50
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
MBG*3050	Human Genetics	0.50
MCB*2050	Molecular Biology of the Cell	0.50
NEUR*3100	Molecular Mechanisms of Neurological Disorders	0.50
NEUR*4000	Current Issues in Neuroscience	0.50
NEUR*4100	Neuropharmacology	0.50
PHYS*2030	Biophysics of Excitable Cells	0.50
PHYS*2330	Electricity and Magnetism I	0.50
PSYC*2390	Sensation and Perception	0.50
PSYC*2650	Cognitive Psychology	0.50
PSYC*3030	Neurochemical Basis of Behaviour	0.50
PSYC*3270	Cognitive Neuroscience	0.50
PSYC*3330	Memory and Attention	0.50
PSYC*3410	Behavioural Neuroscience II	0.50
PSYC*4750	Seminar in Motivation and Emotion	0.50

Of the 2.00 additional credits, students may select one course from the following:

BIOM*3040	Medical Embryology	0.75
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MBG*4040	Genetics and Molecular Biology of Development	0.50
ZOO*3050	Developmental Biology	0.50

Please note that some of the restricted electives require prerequisites that are not included in the minor.