NEUROSCIENCE (NSCI)

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NOTE: The department/program code is NSCI which replaces BPSY (Biopsychology)

DEGREES/PROGRAMS OFFERED
3-Year BSc
3-Year BSc (Business Stream)
4-Year BSc
4-Year BSc (Business Stream)
Honours BSc

INTRODUCTION

Neuroscience is the branch of the natural sciences concerned with how the brain and the nervous system control behaviour in both health and disease. This rapidly developing research area includes all aspects of the structure and function of the nervous systems in humans and nonhuman species. It is interdisciplinary in nature and seeks to merge perspectives from molecular biology, genetics, physiology, anatomy, biochemistry and biophysics with those of psychology to understand the mechanisms that control behaviour and cognitive function. Understanding neural processes has applications to a variety of health and psychosocial problems including dementing diseases, traumatic brain injury, stroke, and a wide variety of developmental or drug-induced behavioural and cognitive disorders. This program prepares students for further study in neuroscience, psychology, medicine, speech pathology, and communication disorders, to name a few. Students pursuing a 3-year or 4-year BSc in Neuroscience have the opportunity to take a Business Stream – a set of core courses in the Faculty of Business that will provide them with the skills needed to enter and succeed in industry and business. See the "Science with a Business Stream" section of this Course Calendar.

NOTE ON DEPARTMENT COURSE ADMISSION REQUIREMENTS

Neuroscience students are expected to meet course requirements specified by the department offering the courses.
Please note that Biology and Psychology courses may have somewhat different requirements for registration in certain courses. Biology requires no special permission to enroll in 4000-level BIOL courses, whereas Psychology requires academic advising and approval from the Honours Committee to register for 4000-level PSYC courses. Psychology approval normally requires (1) a minimum 3.0 GPA (B) in Psychology courses based on all attempts (including course repeats and failures), and (2) a minimum 2.5 GPA (C+) in all non-Psychology courses calculated as for the general degree (i.e., F's are not included, and in the case of repeated courses, only the highest grade is used). Exemptions are granted to students taking only 3 credits per term at the 4000 level.

REQUIREMENTS FOR THE 3-YEAR BSc IN NEUROSCIENCE

ADMISSION REQUIREMENT
Both Chemistry 40S and either Pre-Calculus or Applied Mathematics 40S are required for students wishing to pursue a BSc.
Entry into the program after completing a minimum of 30 credit hours
A grade of C or better in PSYC-1000(6)

GRADUATION REQUIREMENT 90 credit hours

RESIDENCE REQUIREMENT

Degree:	Minimum 30 credit hours
Major:	Minimum 18 credit hours

GENERAL DEGREE REQUIREMENT

Humanities:	12 credit hours in Humanities
Writing:	Minimum 3 credit hours of Academic Writing
Indigenous:	3 credit hours in designated Indigenous requirement courses
Distribution:	Minimum five (5) different subjects

Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 48 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses.

3-YEAR MAJOR REQUIREMENT

Single Major:	Minimum 48 credit hours in the subject as per the Required Course list
Double Major:	Minimum 48 credit hours in subject as per the Required Course list, and specified number of credit hours in other Major (may vary depending on interdisciplinary courses completed as they may be able to be credited to both Majors)

Required courses:

PSYC-1000(6) Introductory Psychology
CHEM-1111(3) Introduction to the Chemical Properties of Matter
CHEM-1112(3) Basic Principles of Chemical Reactivity
BIOL-1115(3) Cells and Cellular Processes
BIOL-1116(3) Evolution, Ecology and Biodiversity
PSYC-2101(3) Introduction to Data Analysis OR **STAT-2001(3)** Elementary Biological Statistics II OR **STAT-1302 (3)** Statistical Analysis II
PSYC-2102(3) Research Methods
CHEM-2202(3) Organic Chemistry I
CHEM-3502(3) Intermediate Biochemistry I: Structure, Function, and Energetics of Biomolecules
BIOL-2301(3) Genetics
BIOL-3221(3) Cell Biology
PSYC-2900(3) Physiological Psychology I

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A minimum of 9 credits hours are required from Areas 1 and 2 with a minimum of 6 credit hours in one Area.

Area 1 – Biology, physiology and chemistry of the nervous system.

PHYS-1101(6) Foundations of Physics ***OR*** **PHYS-1301(6)** Introduction to Physics
PHYS-2503(3) Medical Imaging
BIOL-2116(3) Biology of the Vertebrates
BIOL-3202(3) Histology
BIOL-3303(3) Molecular Genetics and Genomics
BIOL-3563(3) Human Embryology
BIOL-3602(3) Comparative Animal Physiology I
BIOL-3603(3) Comparative Animal Physiology II
BIOL-3702(3) Parasites and Disease
BIOL-4501(3) Developmental Biology
BIOL-4502(3) Molecular Cell Biology
BIOL-4601(3) Ecological Animal Physiology*
BIOL-4904(3) Virology*
BIOL-4931(3) Immunology*
CHEM-2203(3) Organic Chemistry II
CHEM-3503(3) Intermediate Biochemistry II: Intermediary Metabolism
CHEM-4204(3) Medicinal Chemistry*
CHEM-4507(3) Drug Design*
CHEM-4502(3) Molecular Enzymology

Area 2 – Cognitive, behavioural and clinical neuroscience

BIOL-2451(3) Introduction to Animal Behavior
BIOL-4602(3) Field Research in Animal Ecology and Energetics*
PSYC-2600(3) Introduction to Cognitive Psychology
PSYC-2620(3) Psycholinguistics
PSYC-2610(3) Perception I
PSYC-2800(3) Fundamentals of Animal Learning
PSYC-2920(3) Drugs & Behaviour
PSYC-3600(3) Cognitive Processes*
PSYC-3830(3) Genes, Evolution, and Behaviour I
PSYC-3900(3) Physiological Psychology II
PSYC-3910(3) Human Neuropsychology*
PSYC-3920(3) Cognitive Neuroscience*
PSYC-4600(3) Topics in Human Learning and Memory*
PSYC-4610(3) Topics in Perception*
PSYC-4630(3) Topics in Cognitive Psychology*
PSYC-4730(3) Biological Considerations in Clinical Psychology
PSYC-4800(3) Topics in Animal Learning*
PSYC-4830(3) Genes, Evolution, and Behaviour II
PSYC-4820(3) Neurobiology of Addiction and Fear*
PSYC-4900(3) Topics in Physiological Psychology*
PSYC-4920(3) Topics in Cognitive Neuroscience*

Advisory: Starred courses (*) may not be taught every year.

REQUIREMENTS FOR THE 3-YEAR BSc IN NEUROSCIENCE WITH A BUSINESS STREAM

Students must complete the requirements of the 3-year BSc in Neuroscience (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar.

REQUIREMENTS FOR THE 4-YEAR BSc IN NEUROSCIENCE

This allows program students with interests in the natural sciences to expand their knowledge of the neural basis of behavior and cognition. Students are required to consult with a Departmental Honours Advisor at the time they enroll in 4000-level courses in the Psychology Department. Appointments for advising are arranged through the departmental secretary at 786-9130. Enrolling in 4000-level courses in the Biology department does not require a consultation with a faculty member.

ADMISSION REQUIREMENT
Students are required to consult with a Program Advisor or Coordinator in planning their course of study.
Both Chemistry 40S and either Pre-Calculus or Applied Mathematics 40S are required for students wishing to pursue a BSc (Hons).
Entry into the program after completing a minimum of 30 credit hours
A grade of C or better in PSYC-1000(6)

GRADUATION REQUIREMENT 120 credit hours

GRADUATION GPA REQUIREMENT
Graduation minimum GPA is 2.5 (C+) in major subject courses (Neuroscience) and 2.5 (C+) in all non-major subject courses
Minimum 2.5 GPA (C+) based on all attempts (including course repeats and failures) in Neuroscience courses
Minimum 2.5 GPA (C+) in all non-major subject courses calculated as for the general degree (i.e. F's are not included, and in the case of repeated courses, only the highest grade will be used)

RESIDENCE REQUIREMENT

Degree:	Minimum 60 credit hours
Major:	Minimum 30 credit hours

GENERAL DEGREE REQUIREMENT

Humanities:	12 credit hours in Humanities
Writing:	Minimum 3 credit hours of Academic Writing
Indigenous:	3 credit hours in designated Indigenous requirement courses
Distribution:	Minimum five (5) different subjects

Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 78 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses.

4-YEAR MAJOR REQUIREMENT

Single Major:	Minimum 63 credit hours in the subject as per the Required Course list
Double Major:	Minimum 63 credit hours in subject as per the Required Course list, and specified number of credit hours in other Major (may vary depending on interdisciplinary courses completed as they may be able to be credited to both Majors)

Required courses:

PSYC-1000(6)	Introductory Psychology
CHEM-1111(3)	Introduction to the Chemical Properties of Matter
CHEM-1112(3)	Basic Principles of Chemical Reactivity
BIOL-1115(3)	Cells and Cellular Processes
BIOL-1116(3)	Evolution, Ecology and Biodiversity
PSYC-2101(3)	Introduction to Data Analysis OR **STAT-2001(3)** Elementary Biological Statistics II OR **STAT-1302 (3)** Statistical Analysis II
PSYC-2102(3)	Research Methods
CHEM-2202(3)	Organic Chemistry I
CHEM-3502(3)	Intermediate Biochemistry I: Structure, Function, and Energetics of Biomolecules
BIOL-2301(3)	Genetics
BIOL-3221(3)	Cell Biology
PSYC-2900(3)	Physiological Psychology I

Minimum of 12 credit hours from either of areas 1 or 2, and a minimum of 6 credits from the remaining area.

Minimum of 12 credit hours at the 3000 or 4000 level from either area 1 or 2, or Electives
Minimum total of 24 credit hours over both areas, including Electives

Area 1 – Biology, physiology and chemistry of the nervous system.

PHYS-1101(6) Foundations of Physics ***OR*** **PHYS-1301(6)** Introduction to Physics
PHYS-2503(3) Medical Imaging
BIOL-2116(3) Biology of the Vertebrates
BIOL-3202(3) Histology
BIOL-3303(3) Molecular Genetics and Genomics
BIOL-3563(3) Human Embryology
BIOL-3602(3) Comparative Animal Physiology I
BIOL-3603(3) Comparative Animal Physiology II
BIOL-3702(3) Parasites and Disease
BIOL-4501(3) Developmental Biology
BIOL-4502(3) Molecular Cell Biology
BIOL-4601(3) Ecological Animal Physiology*
BIOL-4904(3) Virology*
BIOL-4931(3) Immunology*
CHEM-2203(3) Organic Chemistry II
CHEM-3503(3) Intermediate Biochemistry II: Intermediary Metabolism
CHEM-4204(3) Medicinal Chemistry*
CHEM-4507(3) Drug Design*
CHEM-4502(3) Molecular Enzymology

Area 2 – Cognitive, behavioural and clinical neuroscience

BIOL-2451(3) Introduction to Animal Behavior
BIOL-4602(3) Field Research in Animal Ecology and Energetics*
PSYC-2600(3) Introduction to Cognitive Psychology
PSYC-2620(3) Psycholinguistics
PSYC-2610(3) Perception I
PSYC-2800(3) Fundamentals of Animal Learning
PSYC-2920(3) Drugs & Behaviour
PSYC-3600(3) Cognitive Processes*
PSYC-3830(3) Genes, Evolution, and Behaviour I
PSYC-3900(3) Physiological Psychology II
PSYC-3910(3) Human Neuropsychology*
PSYC-3920(3) Cognitive Neuroscience*
PSYC-4600(3) Topics in Human Learning and Memory*
PSYC-4610(3) Topics in Perception*
PSYC-4630(3) Topics in Cognitive Psychology*
PSYC-4730(3) Biological Considerations in Clinical Psychology*
PSYC-4800(3) Topics in Animal Learning*
PSYC-4830(3) Genes, Evolution, and Behaviour II
PSYC-4820(3) Neurobiology of Addiction and Fear*
PSYC-4900(3) Topics in Physiological Psychology*
PSYC-4920(3) Topics in Cognitive Neuroscience*

Electives

PSYC-4010(3) Directed Readings (in a neuroscience area) with approval by Neuroscience Advisor
PSYC-4020(3) Directed Readings (in a neuroscience area) with approval by Neuroscience Advisor
BIOL-4191(3) Directed Studies in Biology (in a neuroscience area) with approval by Neuroscience Advisor

Advisory: Starred courses (*) may not be taught every year.

REQUIREMENTS FOR THE 4-YEAR BSc IN NEUROSCIENCE WITH A BUSINESS STREAM

Students must complete the requirements of the 4-year BSc in Neuroscience (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar.

REQUIREMENTS FOR AN HONOURS BSc IN NEUROSCIENCE

This program allows students with demonstrated ability an opportunity to deal more extensively and intensively with the subject matter. Students are required to consult with a Departmental Honours Advisor at the time they enroll in 4000-level courses in the Psychology Department. Appointments for advising are arranged through the departmental secretary at 786-9130. Enrolling in 4000-level courses in the Biology department does not require a consultation with a faculty member.

ADMISSION REQUIREMENT
Students are required to consult with a Program Advisor or Coordinator in planning their course of study.
Both Chemistry 40S and either Pre-Calculus or Applied Mathematics 40S are required for students wishing to pursue a BSc (Hons).
Entry into the program after completing a minimum of 30 credit hours.
A grade of C or better in PSYC-1000(6)

GRADUATION REQUIREMENT 120 credit hours

GRADUATION GPA REQUIREMENT
Graduation minimum GPA is 3.0 (B) for honours subject courses (Neuroscience) and 2.75 for non-honours subject courses.
Minimum GPA is 3.0 (B) for honours subject courses based on all attempts (including course repeats and failures)
Minimum 2.75 GPA in all non-honours subject courses calculated as for the general degree (i.e. F's are not included, and in the case of repeated courses, only the highest grade will be used)

RESIDENCE REQUIREMENT

Degree:	Minimum 60 credit hours
Honours:	Minimum 30 credit hours

GENERAL DEGREE REQUIREMENT

Humanities:	12 credit hours in Humanities
Writing:	Minimum 3 credit hours of Academic Writing
Indigenous:	3 credit hours in designated Indigenous requirement courses
Distribution:	Minimum five (5) different subjects

Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. As a result, students must take a minimum of 78 credit hours at the 2000-level or above in order to not exceed the maximum number of introductory courses.

HONOURS REQUIREMENT

Single Honours:	Minimum 78 credit hours in the subject as per the Required Course list
Double Honours:	Minimum 78 credit hours in subject as per the Required Course list, and specified number of credit hours in other Major (may vary depending on interdisciplinary courses completed as they may be able to be credited to both Majors).

Required courses:

PSYC-1000(6)	Introductory Psychology
CHEM-1111(3)	Introduction to the Chemical Properties of Matter
CHEM-1112(3)	Basic Principles of Chemical Reactivity
BIOL-1115(3)	Cells and Cellular Processes
BIOL-1116(3)	Evolution, Ecology and Biodiversity
PSYC-2101(3)	Introduction to Data Analysis OR **STAT-2001(3)** Elementary Biological Statistics II OR **STAT-1302 (3)** Statistical Analysis II
PSYC-2102(3)	Research Methods
CHEM-2202(3)	Organic Chemistry I
CHEM-3502(3)	Intermediate Biochemistry I: Structure, Function, and Energetics of Biomolecules
BIOL-2301(3)	Genetics
BIOL-3221(3)	Cell Biology
PSYC-2900(3)	Physiological Psychology I
PSYC-4100(6)	Intermediate Research Design and Data Analysis
BIOL-4111(6)	Biology Honours Thesis in a neuroscience area approved by the Neuroscience Coordinator ***OR*** **PSYC-4040(6)** Honours Thesis in a neuroscience area of Psychology approved by the Neuroscience Coordinator

Minimum of 12 credit hours from either Area 1 or Area 2, and a minimum of 6 credit hours from the remaining area.
Minimum of 12 credits at the 4000 level from Area 1 and 2, or Electives.
Minimum total of 27 credit hours over both areas and Electives.

Area 1 – Biology, physiology and chemistry of the nervous system.

PHYS-1101(6)	Foundations of Physics ***OR*** **PHYS-1301(6** Introduction to Physics
PHYS-2503(3)	Medical Imaging
BIOL-3202(3)	Histology
BIOL-3303(3)	Molecular Genetics and Genomics
BIOL-3563(3)	Human Embryology
BIOL-3602(3)	Comparative Animal Physiology I
BIOL-3603(3)	Comparative Animal Physiology II
BIOL-3702(3)	Parasites and Disease
BIOL-4501(3)	Developmental Biology
BIOL-4502(3)	Molecular Cell Biology
BIOL-4601(3)	Ecological Animal Physiology*
BIOL-4904(3)	Virology*
BIOL-4931(3)	Immunology*
CHEM-2203(3)	Organic Chemistry II
CHEM-3503(3)	Intermediate Biochemistry II: Intermediary Metabolism
CHEM-4204(3)	Medicinal Chemistry*
CHEM-4507(3)	Drug Design*
CHEM-4502(3)	Molecular Enzymology

Area 2 – Cognitive, behavioural and clinical neuroscience

BIOL-2451(3)	Introduction to Animal Behavior
BIOL-4602(3)	Field Research in Animal Ecology and Energetics*
PSYC-2600(3)	Introduction to Cognitive Psychology
PSYC-2620(3)	Psycholinguistics
PSYC-2610(3)	Perception I
PSYC-2800(3)	Fundamentals of Animal Learning
PSYC-2920(3)	Drugs & Behaviour
PSYC-3600(3)	Cognitive Processes*
PSYC-3830(3)	Genes, Evolution, and Behaviour I
PSYC-3900(3)	Physiological Psychology II
PSYC-3910(3)	Human Neuropsychology*
PSYC-3920(3)	Cognitive Neuroscience*
PSYC-4600(3)	Topics in Human Learning and Memory*
PSYC-4610(3)	Topics in Perception*
PSYC-4630(3)	Topics in Cognitive Psychology*
PSYC-4730(3)	Biological Considerations in Clinical Psychology*
PSYC-4800(3)	Topics in Animal Learning*
PSYC-4830(3)	Genes, Evolution, and Behaviour II
PSYC-4820(3)	Neurobiology of Addiction and Fear*
PSYC-4900(3)	Topics in Physiological Psychology*
PSYC-4920(3)	Topics in Cognitive Neuroscience*

Electives

PSYC-4010(3)	Directed Readings (in a neuroscience area) with approval by Neuroscience Advisor
PSYC-4020(3)	Directed Readings (in a neuroscience area) with approval by Neuroscience Advisor
BIOL-4191(3)	Directed Studies in Biology (in a neuroscience area) with approval by Neuroscience Advisor

Advisory: Starred courses (*) may not be taught every year.

All course descriptions for all undergraduate programs can now be found in one large PDF called “Course Descriptions” in the “Academic Calendar” section of the University website:
http://uwinnipeg.ca/academics/calendar/index.html