



<p>1.0 Degree Title Specify the two degrees for concurrent degree programs</p> <p><input type="text" value="Bachelor of Science (B.Sc.)"/></p> <p>1.1 Major (Legacy= Subject) (30-char. max.)</p> <p><input type="text" value="Neuroscience"/></p> <p>1.2 Concentration (Legacy = Concentration/Option) If applicable (30 char. max.)</p> <p><input type="text"/></p> <p>1.3 Minor (with Concentration, if applicable) (30 char. max.)</p> <p>1.4 Category</p> <table border="0"> <tr> <td><input type="checkbox"/> Faculty Program (FP)</td> <td><input type="checkbox"/> Honours (HON)</td> </tr> <tr> <td><input checked="" type="checkbox"/> Major</td> <td>Joint Honours</td> </tr> <tr> <td><input type="checkbox"/> Joint Major</td> <td>Component (HC)</td> </tr> <tr> <td><input type="checkbox"/> Major Concentration (CON)</td> <td>Internship/Co-op</td> </tr> <tr> <td><input type="checkbox"/> Minor</td> <td>Thesis (T)</td> </tr> <tr> <td><input type="checkbox"/> Minor Concentration (CON)</td> <td>Non-Thesis (N)</td> </tr> <tr> <td></td> <td>Other</td> </tr> <tr> <td></td> <td>Please specify</td> </tr> <tr> <td></td> <td><input type="text"/></td> </tr> </table> <p>1.5 <input type="text" value="B.Sc.; Major in Neuroscience"/></p>	<input type="checkbox"/> Faculty Program (FP)	<input type="checkbox"/> Honours (HON)	<input checked="" type="checkbox"/> Major	Joint Honours	<input type="checkbox"/> Joint Major	Component (HC)	<input type="checkbox"/> Major Concentration (CON)	Internship/Co-op	<input type="checkbox"/> Minor	Thesis (T)	<input type="checkbox"/> Minor Concentration (CON)	Non-Thesis (N)		Other		Please specify		<input type="text"/>	<p>2.0 Administering Faculty/Unit</p> <p><input type="text" value="Faculty of Science, Dean's Office; Multidisciplinary Program"/></p> <p>Offering Faculty/Department</p> <p><input type="text" value="Medicine and Science – Biology, Physiology & Psychology"/></p> <p>3.0 Effective Term of revision or retirement Please give reasons in 5.0 "Rationale" in the case of retirement (Ex. Sept. 2004 = 200409) Retirement</p> <p>Term: <input type="text" value="201101"/></p> <p>4.0 Existing Credit Weight Proposed Credit Weight</p> <table border="1"> <tr> <td><input type="text" value="65"/></td> <td><input type="text" value="65"/></td> </tr> </table> <p>5.0 Rationale for revised program</p> <div style="border: 1px solid black; padding: 5px;"> <p>The revision involves addition of 4 new courses to the program. This will enhance the flexibility of the program by extending the choices open to students and by helping to alleviate the difficulty some students have had in fulfilling the requirement of 15 credits at the 400- and 500-level. More detailed justification for each course addition is given in Appendix 1. Some editorial changes have also been made in order to help make it easier for students to read and understand the program.</p> </div>	<input type="text" value="65"/>	<input type="text" value="65"/>
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6. The Major program in Neuroscience is a focused program for students interested in how the nervous system functions. It is highly interdisciplinary and borrows principles and methodologies from a number of fields including: biology, biochemistry, physiology, psychology, as well as mathematics, physics, computer science and immunology. To ensure that students have the appropriate foundation, they are required to take 29 credits in lower-level courses from physiology, biology, mathematics, computer science, psychology and ethics. While flexible, the program offers students a concentrated selection of 15 credits to be taken from one of three areas of current scientific activities in the neurosciences: Cell/Molecular, Neurophysiology/Computation, or Cognition/Behaviour. In addition, students select 21 credits from a wide array of complementary courses to obtain more specialized training in areas of neuroscience that best suit their interest.

Notes on admission to the Neuroscience Major Program: Please note that enrolment in the Neuroscience Major is limited.

7.0 List of existing program and proposed program

Existing program (list courses as follows: Subj Code/Crse Num, Title, Credit weight, under the headings of: Required Courses, Complementary Courses, Elective Courses)

Core Required Courses (20 credits)

* Note: If CHEM 212 is taken prior to the start of the program, credits must be replaced with an alternative 3-4 credit course in the program, with approval from the Program Adviser.

BIOL 200 Molecular Biology (3)
CHEM 212 Introductory Organic Chemistry 1 (4)*
NSCI 200 Introduction to Neuroscience 1 (3)
NSCI 201 Introduction to Neuroscience 2 (3)
NSCI 300 Neuroethics (3)
NSCI 400D1 Neuroscience Seminar (0.5)
NSCI 400D2 Neuroscience Seminar (0.5)
PSYC 311 Human Cognition and the Brain (3)

Complementary Courses (45 credits)

9 credits selected as follows:

3 credits from:

BIOL 373 Biometry (3)
PSYC 305 Statistics for Experimental Design (3)

3 credits completed by taking the course below or an equivalent in Computer Science:

COMP 202 Introduction to Computing 1 (3)

3 credits from:

BIOL 309 Mathematical Models in Biology (3)
MATH 222 Calculus 3 (3)**

** Note: Students who have successfully completed an equivalent to MATH 222 at CEGEP or elsewhere, may substitute another 3-credit course for MATH 222.

Streams

15 credits selected from one of the following Streams:

A. Cell and Molecular Stream

15 credits selected as follows:

~~* Students take either BIOL 201 OR BIOC 212 but not both.~~

BIOC 212 Molecular Mechanisms of Cell Function (3)*
BIOC 311 Metabolic Biochemistry (3)
BIOL 201 Cell Biology and Metabolism (3)*
BIOL 202 Basic Genetics (3)
MIMM 314 Immunology (3)
PHGY 311 Channels, Synapses & Hormones (3)

(continued on Attachment 1A)

Proposed program (list courses as follows: Subj Code/Crse Num, Title, Credit weight, under the headings of: Required Courses, Complementary Courses, Elective Courses)

Core Required Courses (20 credits)

* Note: If CHEM 212 is taken prior to the start of the program, credits must be replaced with an alternative 3-4 credit course in the program, with approval from the Program Adviser.

BIOL 200 Molecular Biology (3)
CHEM 212 Introductory Organic Chemistry 1 (4)*
NSCI 200 Introduction to Neuroscience 1 (3)
NSCI 201 Introduction to Neuroscience 2 (3)
NSCI 300 Neuroethics (3)
NSCI 400D1 Neuroscience Seminar (0.5)
NSCI 400D2 Neuroscience Seminar (0.5)
PSYC 311 Human Cognition and the Brain (3)

Complementary Courses (45 credits)

9 credits selected as follows:

3 credits from:

BIOL 373 Biometry (3)
PSYC 305 Statistics for Experimental Design (3)

3 credits completed by taking the course below or an equivalent in Computer Science:

COMP 202 Introduction to Computing 1 (3)

3 credits from:

BIOL 309 Mathematical Models in Biology (3)
MATH 222 Calculus 3 (3)**

** Note: Students who have successfully completed an equivalent to MATH 222 at CEGEP or elsewhere, may substitute another 3-credit course for MATH 222.

Streams

15 credits selected from one of the following Streams:

A. Cell and Molecular Stream

15 credits selected as follows:

12 credits as follows:

BIOC 311 Metabolic Biochemistry (3)
BIOL 202 Basic Genetics (3)
MIMM 314 Immunology (3)
PHGY 311 Channels, Synapses & Hormones (3)

3 credits from:

BIOC 212 Molecular Mechanisms of Cell Function (3)
BIOL 201 Cell Biology and Metabolism (3)

(continued on Attachment 1A)

Attach extra page(s) as needed

8.0 Consultation with
Related Units

Yes No

Financial Consult Yes No

Attach list of consultations - Please see Attachment 1C

9. Approvals

Routing Sequence	Name	Signature	Date
Department	Monroe W. Cohen		
Curric/Acad Committee			
Faculty 1			
Faculty 2			
Faculty 3			
SCTP			
GS			
APPC			
Senate			

Submitted by

Name
Phone
Email
Submission Date

To be completed by ARR:

CIP Code

Attachment 1A – continuation of Section 7.0

B. Neurophysiology/Neural Computation Stream
15 credits selected as follows:

~~9 credits from:~~

~~* Students take either BIOL 201 OR BIOC 212 but not both.~~

ANAT 321 Circuitry of the Human Brain (3)
BIOC 212 Molecular Mechanisms of Cell Function ~~(3)*~~
BIOL 201 Cell Biology and Metabolism ~~(3)*~~
PHGY 311 Channels, Synapses & Hormones (3)

3 credits from:

BIOL 306 Neural Basis of Behaviour (3)
PHGY 314 Integrative Neuroscience (3)

3 credits from:

BIOL 309 Mathematical Models in Biology (3)
COMP 206 Introduction to Software Systems (3)
MATH 222 Calculus 3 (3) **

** Note: Students who have successfully completed an equivalent to MATH 222 at CEGEP or elsewhere may substitute another 3-credit course for MATH 222.

C. Cognitive/Behavioural Stream
15 credits selected as follows:

~~12 credits as follows:~~

~~* Students take either BIOL 306 OR PHGY 314, but not both.~~

ANAT 321 Circuitry of the Human Brain (3)
BIOL 306 Neural Basis of Behaviour ~~(3)*~~
PHGY 314 Integrative Neuroscience ~~(3)*~~
PSYC 213 Cognition (3)
PSYC 318 Behavioural Neuroscience 2 (3)

~~and~~ 3 credits from:

LING 390 Neuroscience of Language (3)
PSYC 317 Genes and Behaviour (3)
PSYC 342 Hormones and Behaviour (3)

Other Complementary Courses
(21-23 credits)

3-16 credits from:

BIOL 301 Cell and Molecular Laboratory (4)
BIOL 389 Laboratory in Neurobiology (3)
NSCI 410 Independent Research 1 (6)
NSCI 420D1 Independent Research 2 (4.5)
NSCI 420D2 Independent Research 2 (4.5)

The remainder of the credits should be taken from the following lists. At least 15 of the 21-23 credits must be at the 400 or 500 level, which could include the above NSCI 410 or NSCI 420D1/D2 research courses:

200- and 300-level courses:

* Students take either BIOL 201 OR BIOC 212, but not both.

BIOC 212 Molecular Mechanisms of Cell Function (3)*

(continued on Attachment 1B)

B. Neurophysiology/Neural Computation Stream
15 credits selected as follows:

6 credits as follows:

ANAT 321 Circuitry of the Human Brain (3)
PHGY 311 Channels, Synapses & Hormones (3)

3 credits from:

BIOC 212 Molecular Mechanisms of Cell Function (3)
BIOL 201 Cell Biology and Metabolism (3)

3 credits from:

BIOL 306 Neural Basis of Behaviour (3)
PHGY 314 Integrative Neuroscience (3)

3 credits from:

BIOL 309 Mathematical Models in Biology (3)
COMP 206 Introduction to Software Systems (3)
MATH 222 Calculus 3 (3) **

** Note: Students who have successfully completed an equivalent to MATH 222 at CEGEP or elsewhere may substitute another 3-credit course for MATH 222.

C. Cognitive/Behavioural Stream
15 credits selected as follows:

9 credits as follows:

ANAT 321 Circuitry of the Human Brain (3)
PSYC 213 Cognition (3)
PSYC 318 Behavioural Neuroscience 2 (3)

3 credits from:

BIOL 306 Neural Basis of Behaviour (3)
PHGY 314 Integrative Neuroscience (3)

3 credits from:

LING 390 Neuroscience of Language (3)
PSYC 302 The Psychology of Pain (3)
PSYC 317 Genes and Behaviour (3)
PSYC 342 Hormones and Behaviour (3)

Other Complementary Courses
(21-23 credits)

3-16 credits from:

BIOL 301 Cell and Molecular Laboratory (4)
BIOL 389 Laboratory in Neurobiology (3)
NSCI 410 Independent Research 1 (6)
NSCI 420D1 Independent Research 2 (4.5)
NSCI 420D2 Independent Research 2 (4.5)

The remainder of the credits should be taken from the following lists. At least 15 of the 21-23 credits must be at the 400 or 500 level, which could include the above NSCI 410 or NSCI 420D1/D2 research courses:

200- and 300-level courses:

* Students take either BIOL 201 OR BIOC 212, but not both.

** COMP 206, or equivalent 300- or 400-level Computer Science Course

BIOC 212 Molecular Mechanisms of Cell Function (3)*

(continued on Attachment 1B)

Attachment 1B – continuation of Section 7.0

BIOC 311 Metabolic Biochemistry (3)
 BIOL 201 Cell Biology and Metabolism (3)*
 BIOL 300 Molecular Biology of the Gene (3)
 BIOL 306 Neural Basis of Behaviour (3)
 CHEM 222 Introductory Organic Chemistry 2 (4)
 COMP 206 Introduction to Software Systems (3)**
 LING 390 Neuroscience of Language (3)
 MATH 315 Ordinary Differential Equations (3)
 MATH 323 Probability (3)
 MATH 324 Statistics (3)
 MIMM 314 Immunology (3)
 NEUR 310 Cellular Neurobiology (3)
 PHGY 311 Channels, Synapses & Hormones (3)
 PHGY 314 Integrative Neuroscience (3)
 PSYC 315 Computational Psychology (3)
 PSYC 317 Genes and Behaviour (3)
 PSYC 318 Behavioural Neuroscience 2 (3)
 PSYC 342 Hormones and Behaviour (3)
**** COMP 206 or equivalent 300- or 400-level Computer Science Course**

400- and 500-level courses:

BIOC 455 Neurochemistry (3)
 BIOL 514 Neurobiology of Learning and Memory (3)
 BIOL 530 Advances in Neuroethology (3)
 BIOL 532 Developmental Neurobiology Seminar (3)
 BIOL 588 Adv in Molecular/Cellular Neurobiology (3)
 BMDE 519 Biomedical Signals and Systems (3)
 MATH 437 Mathematical Methods in Biology (3)*
 MIMM 414 Advanced Immunology (3)
 MIMM 509 Inflammatory Processes (3)
 NEUR 550 Free Radical Biomedicine (3)
 PHGY 425 Analyzing Physiological Systems (3)
 PHGY 451 Advanced Neurophysiology (3)
 PHGY 513 Cellular Immunology (3)
 PHGY 520 Ion Channels (3)
 PHGY 556 Topics in Systems Neuroscience (3)
 PHYS 413 Physical Basis of Physiology (3)*
~~PSYC 302 The Psychology of Pain (3)~~
 PSYC 410 Special Topics in Neuropsychology (3)
 PSYC 427 Sensorimotor Behaviour (3)
 PSYC 470 Memory and Brain (3)
 PSYC 501 Auditory Perception (3)
 PSYC 502 Psychoneuroendocrinology (3)
 PSYC 522 Neurochemistry and Behaviour (3)
 PSYC 526 Advances in Visual Perception (3)
 PSYC 532 Cognitive Science (3)
 PSYT 500 Adv: Neurobiology of Mental Disorders (3)
 PSYT 505 Neurobiology of Schizophrenia

* Students may select either MATH 437 OR PHYS 413, but not both.

BIOC 311 Metabolic Biochemistry (3)
 BIOL 201 Cell Biology and Metabolism (3)*
 BIOL 300 Molecular Biology of the Gene (3)
 BIOL 306 Neural Basis of Behaviour (3)
 CHEM 222 Introductory Organic Chemistry 2 (4)
 COMP 206 Introduction to Software Systems (3)**
 LING 390 Neuroscience of Language (3)
 MATH 315 Ordinary Differential Equations (3)
 MATH 323 Probability (3)
 MATH 324 Statistics (3)
 MIMM 314 Immunology (3)
 NEUR 310 Cellular Neurobiology (3)
 PHGY 311 Channels, Synapses & Hormones (3)
 PHGY 314 Integrative Neuroscience (3)
~~PSYC 302 The Psychology of Pain (3)~~
 PSYC 315 Computational Psychology (3)
 PSYC 317 Genes and Behaviour (3)
 PSYC 318 Behavioural Neuroscience 2 (3)
 PSYC 342 Hormones and Behaviour (3)

400- and 500-level courses:

* Students take either MATH 437 OR PHYS 413, but not both.

BIOC 455 Neurochemistry (3)
 BIOL 514 Neurobiology of Learning and Memory (3)
 BIOL 530 Advances in Neuroethology (3)
 BIOL 532 Developmental Neurobiology Seminar (3)
 BIOL 588 Adv in Molecular/Cellular Neurobiology (3)
 BMDE 519 Biomedical Signals and Systems (3)
 MATH 437 Mathematical Methods in Biology (3)*
 MIMM 414 Advanced Immunology (3)
 MIMM 509 Inflammatory Processes (3)
 NEUR 550 Free Radical Biomedicine (3)
 PHGY 425 Analyzing Physiological Systems (3)
 PHGY 451 Advanced Neurophysiology (3)
 PHGY 513 Cellular Immunology (3)
 PHGY 520 Ion Channels (3)
~~PHGY 524 Chronobiology (3)~~
 PHGY 556 Topics in Systems Neuroscience (3)
 PHYS 413 Physical Basis of Physiology (3)*
 PSYC 410 Special Topics in Neuropsychology (3)
 PSYC 427 Sensorimotor Behaviour (3)
~~PSYC 444 Sleep Mechanisms and Behaviour (3)~~
 PSYC 470 Memory and Brain (3)
 PSYC 501 Auditory Perception (3)
 PSYC 502 Psychoneuroendocrinology (3)
~~PSYC 506 Cognitive Neuroscience of Attention (3)~~
 PSYC 522 Neurochemistry and Behaviour (3)
 PSYC 526 Advances in Visual Perception (3)
 PSYC 532 Cognitive Science (3)
 PSYT 500 Adv: Neurobiology of Mental Disorders (3)
 PSYT 505 Neurobiology of Schizophrenia

Attachment 1C – continuation of Section 8.0

The Neuroscience Curriculum Committee unanimously approved the revisions to the Neuroscience Major. The committee members are:

Monroe Cohen
Joseph Dent
Julio Martinez-Trujillo
Gillian O'Driscoll
Gerald Pollock
Edward Ruthazer

The Chairs of the Departments of Biology, Physiology, and Psychology – the 3 coordinating departments of the Neuroscience Major – each approved the revisions. Their approvals are attached.

Each of the Coordinators of the following 4 courses approved addition of their course to the program. Their approvals are attached, as are the course descriptions/outlines.

PSYC 302
PHGY 524
PSYC 444
PSYC 506

Appendix 1 – Justification of Proposed Changes

Addition of PSYC 302 (The Psychology of Pain) to Stream C

There are 2 reasons for adding this course as a choice for the 15 credits in Stream C. First, the subject matter of PSYC 302 is consistent with Stream C's focus, namely Cognitive and Behavioural Neuroscience. Second, PSYC 302 (formerly PSYC 505) will be given in the Fall of even-numbered years whereas PSYC 317 (Genes and Behaviour), which is currently a choice in Stream C, will be given in the Fall of odd-numbered years. So addition of PSYC 302 will ensure that Stream C students will have the same number of choices each year. Moreover, the course choices for Stream C's 15 credits will remain at the 200- and 300-level, as is the case for Streams A and B.

Addition of PHGY 524 (Chronobiology) and PSYC 444 (Sleep Mechanisms and Behaviour) to Other Complementary Courses at the 400- and 500-level

Both are new courses dealing with different aspects of rhythmic behaviour in the nervous system. PHGY 524 focuses on rhythmic activity in neurons and neural systems, and includes molecular mechanisms. PSYC 444 focuses on sleep mechanisms and disorders. Since all students in the program will have the prerequisites for both courses, these two courses will help relieve the difficulty that some students have had in satisfying the 15-credit requirement of Other Complimentary Courses at the 400- and 500-level, and will enhance the overall flexibility of the program.

Addition of PSYC 506 (Cognitive Neuroscience of Attention) to Other Complementary Courses at the 400- and 500-level

The subject matter of this new course (formerly PSYC 365) is particularly relevant to Stream C students. Since all will have the course prerequisites, PSYC 506 will also help relieve the difficulty that some Stream C students have had in satisfying the 15-credit requirement of Other Complimentary Courses at the 400- and 500-level.

Editorial Changes

To make the program listing easier to read and understand, asterisks and related explanations have been eliminated where possible. For example, in Stream A the asterisks have been removed from BIOC 212 and BIOL 201 and replaced by "3 credits from:" those 2 courses. Similar changes have been made in Streams B and C.

In the lists of Other Complementary Courses, PSYC 302 (formerly PSYC 505) has been shifted from the 400- and 500-level list to the 200- and 300-level list. And, for the sake of consistency, explanations of asterisks have been moved to the top of each list.