10 Course Modifications:

BCH370H1: Laboratory Course in Biochemical Techniques

| Contact Hours: | Previous: Lecture: 6 / Practical: 42 |
|               | New: Practical: 48                  |
| Description:  | This course is designed to provide hands-on experience at an introductory level reinforces theoretical principles through experiments that encompass pH and buffers; spectrophotometry; chromatography; protein electrophoresis, employing a variety of biochemical techniques commonly used in research enzyme kinetics and DNA isolation and clinical diagnostic laboratories analysis. This course is intended for students who are not proceeding further in biochemistry. It is highly recommended that students take this course in their third year as space is limited and priority will go to third-year students; cGPA of 2.5 is required for non-Biochemistry Majors and Specialists. This course will be offered in the FALL & WINTER terms. No enrolment will be permitted after the start of class. (Enrolment limited.) (Lab fees: $50) |
| Prerequisites:| BCH210H1 (a final grade of 70% or higher is required for non-Biochemistry students) |
| Exclusions:   | BCH377H1, CHM379H1 |
| Rationale:    |  |
| Consultation: |  |
| Resources:    |  |

BCH372Y1: Summer Research in Biochemistry

| Description: | Real-world opportunity to apply theoretical knowledge and hone technical skills through full-time research in an active research laboratory for students who have completed second year. Students are responsible for arranging for supervision by a Department of Biochemistry faculty member in advance of the academic year-end. Participants must have a minimum cGPA of 3.0 and the approval of the course coordinator. Not eligible for CR/NCR option. |
| Prerequisites:| A final grade of 75% or higher in BCH242Y1; and approval permission of the course coordinator. |
| Rationale:    |  |
| Consultation: |  |
| Resources:    |  |
**BCH374Y1: Research Project in Biochemistry**

**Description:**

(formerly BCH373H1, BCH375H1)

This course provides an opportunity to perform specialized research in biochemistry under the direct supervision of Biochemistry Department Faculty. A cGPA of 3.3 is required for students in Major programs and a cGPA of 3.0 is required for students in Specialist programs. Not eligible for CR/NCR option.

**Prerequisites:**

For Specialist: BCH242Y1 (75% or higher); BCH242Y1; BIO230H1; CHM247H1/CHM249H1, and approval permission of the course coordinator Department. For Major: BCH210H1 (80% or higher); BCH210H1; BIO230H1; CHM247H1/CHM249H1, and approval permission of the course coordinator. Department.

**Exclusions:**

Previous: BCH373H1, BCH375H1

New:

**Rationale:**

**Consultation:**

**Resources:**

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**BCH426H1: Regulation of Signalling Pathways**

**Description:**

Previous:

A variety of questions relating to signal transduction are investigated. How is calcium regulated in the cell and how does calcium regulate cell function? How are extracellular signals such as morphogens, growth factors or insulin, received and transmitted by intracellular proteins including kinases and phosphatases to control cellular proliferation and differentiation? < / p>

New:

This course is focussed on the molecular aspects of signal transduction, covering how cells receive and then transmit signals via intracellular proteins such as kinases and phosphatases and how this ultimately regulates cell function. Specific topics covered may include calcium regulation and signalling by extracellular ligands including morphogens, growth factors and/or insulin.

**Rationale:**

**Consultation:**

**Resources:**
BCH428H1: Genomics of microbial communities in human health and beyond

Description:

There is a growing appreciation that microbes do not operate in isolation but form parts of larger populations and communities (microbiomes) with unique considerations for human health. Combining lectures, small group discussions, and a computer lab component, this course will cover how genomics can be applied to analyze microbial communities and the transformative discoveries that continue to result.

Rationale:

Consultation:

Resources:

BCH440H1: Protein Biosynthesis

Description:

"The life of proteins: from birth to death". This course is presented as eight themes. 1. Structure, assembly, and evolution of the ribosome. 2. Messenger RNA mRNA synthesis, maturation, and localization. 3. Mechanisms and regulation of translation initiation. 4. Fidelity during translation elongation. 5. Translation termination and translation-mediated mRNA decay. 6. Nascent protein folding and molecular chaperones. 7. Protein aging, misfolding and disease. 8. Protein degradation via the ubiquitin proteasome system and autophagy. In addition to the lectures, groups of students will work in groups during tutorial sessions to interpret a recent paper related to one of the lecture material eight themes to be formally presented during regular class hours.

Rationale:

Consultation:

Resources:

BCH444H1: Protein Trafficking in the Secretory & Endocytic Pathways

Description:

This course examines the molecular details of the secretory and endocytic pathways in the cell. Some of the specific topics covered will include protein translocation into the ER, chaperones and protein folding in the ER, retrotranslocation and protein degradation, the Unfolded Protein Response (UPR), vesicle biogenesis and ER-Golgi transport, regulated secretion, basic concepts in endocytosis and protein sorting in polarized cells. Emphasis is placed on current experimental approaches. A good understanding of basic biochemical methods is an asset: Participants must have a minimum cGPA of 2.8.

Prerequisites: BCH210H1/BCH242Y1; BCH311H1 (75% or higher)/MGY311Y1 (75% or higher)/PSL350H1 (75% or higher).
### Biochemistry (MED), Department of

| Rationale: |  |
| Consultation: |  |
| Resources: |  |

### BCH446H1: Membrane Dynamics of the Cell Surface

**Description:**

This course covers the principles and concepts related to molecular cell biology of the cell surface in multicellular organisms. Topics include: biophysical properties of cells, membranes, cytoskeleton and extracellular matrix, dynamic remodelling organization of the cytoskeleton; membrane dynamics; cell-cell and cell-matrix interactions; interactions and signalling; cell migration and adhesion; maintenance of planar and apical-basal cell polarity; cytokinesis turnover and renewal of membrane by vesicular trafficking; structure and function of primary cilia, cytonemes and tunneling nanotubes; ectosomes and non-canonical secretion pathways; viral uptake by macropinocytosis and engulfment by phagocytosis. In addition to lectures, groups Note: cGPA of students will interpret a recent scientific paper related to the course material to be formally presented during regular class hours 2.5 is required for non-Biochemistry Majors and Specialists: (Enrolment limited.)

**Prerequisites:**

BCH210H1/BCH242Y1; BCH311H1/MGY311Y1/PSL350H1, and permission of department. Non-Biochemistry students must have achieved a final grade of 75% or higher in BCH311H1, MGY311Y1, or PSL350H1. department.

| Rationale: |  |
| Consultation: |  |
| Resources: |  |

### BCH472Y1: Advanced Summer Research Project in Biochemistry

**Description:**

Real-world opportunity to apply theoretical knowledge and hone technical skills through full-time research in an active research laboratory for students who have completed third year. Students are responsible for arranging for supervision by a Department of Biochemistry faculty member in advance of the academic year-end. Participants must have a minimum cGPA of 3.0 and the approval of the course coordinator. Not eligible for CR/NCR option.

**Prerequisites:**

A final grade of 75% or higher in each of BCH340H1; BCH377H1; BCH378H1; and approval permission of the course coordinator. Department

| Rationale: |  |
| Consultation: |  |
| Resources: |  |
### BCH473Y1: Advanced Research Project in Biochemistry

**Description:**

This course provides opportunities to pursue an original individual research project in a particular area of biochemistry, under the direct supervision of a Biochemistry Department faculty member. A cGPA of 3.3 is required for students in Major programs and a cGPA of 3.0 is required for students in Specialist programs. Not eligible for CR/NCR option.

**Prerequisites:**

For Specialist: BCH340H1; BCH377H1; BCH378H1; 75% or higher in MGY311Y1; and approval permission of the course coordinator Department. For Major: BCH370H1; 80% or higher in BCH311H1; and approval permission of the course coordinator Department.

**Rationale:**

**Consultation:**

**Resources:**

### 1 Retired Course:

**BCH427H1: Advanced Molecular Biophysics**

**Rationale:**

Since its inception in 2007, there are no records of students enrolling in BCH427H1 (via ROSI and department marks binders). We propose to formally retire this course from the calendar in order to accurately reflect this reality and avoid student confusion going forward.
4 Minor Program Modifications:

Biological Chemistry Specialist

Completion Requirements:

(14 full courses or their equivalent, including at least three 400-series full-course equivalents)

First Year: BIO120H1, BIO130H1; CHM151Y1 (strongly recommended)/(CHM135H1/CHM139H, CHM136H1/CHM138H); (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1

First or Second Year: (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Second and Higher Years:

1. BCH210H1; BIO230H1/BIO255H1 BIO250Y; CHM217H1, (CHM220H1/CHM222H1, CHM221H/CHM223H1)/CHM225Y, CHM238Y1, (CHM249H1 strongly recommended)/CHM247H1
2. CHM347H1, CHM348H1, CHM379H1
3. At least 1.0 credit from the following: CHM317H1, CHM327H1, CHM338H1, CHM343H1, CHM410H1, CHM499Y1/PHC489Y1
4. Further 300/400-series courses in BCH or CHM, including CHM437H1, CHM447H1, and CHM479H1 to make a total of 14 full courses. CSB450H1 is also acceptable.

Description of Proposed Changes:

Addition of PHC489Y1. With Chemistry taking over the administration of the Pharmaceutical Chemistry program in May 2019, our students will have the opportunity to enroll in PHC489Y1 or CHM499Y1 as part of their degree requirements.

Also removed CHM221H1 and CHM225Y1 as neither course has been offered since 2007-2008.

Rationale:

Impact:

Consultation:

Resource Implications:

Chemistry Specialist

Completion Requirements:

(14 full courses or their equivalent, including at least three 400-series full-course equivalents)

First Year: (CHM151Y1 strongly recommended)/(CHM135H1/CHM139H, CHM136H1/CHM138H); (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1; (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Second Year: CHM217H1, (CHM220H1/CHM222H1, CHM221H/CHM223H1)/CHM225Y, CHM238Y1, CHM249H1; MAT235Y1/MAT237Y1
Chemistry (FAS), Department of

Third and Fourth Years:

1. BCH210H1, CHM326H1/CHM328H1, CHM327H1
2. Further 300/400-level full course equivalents in CHM/MAT/another science, including at least three of CHM317H1, CHM338H1, CHM343H1, CHM379H1, CHM410H1, CHM499Y1/PHC489Y1 and at least three 400-level CHM full course equivalents to make a total of 14 full courses.

Description of Proposed Changes:
Addition of PHC489Y1. With Chemistry taking over the administration of the Pharmaceutical Chemistry program in May 2019, our students will have the opportunity to enroll in PHC489Y1 or CHM499Y1 as part of their degree requirements.

Also removed CHM221H1 and CHM225Y1 as neither course has been offered since 2007-2008.

Rationale:

Impact:

Consultation:

Resource Implications:

Environmental Chemistry Specialist

Completion Requirements:

(14 full courses or their equivalent, including at least one 400-series full-course equivalent)

First Year: (BIO120H1, BIO130H1/BIO220H1); CHM151Y1 (strongly recommended)/(CHM135H1/CHM139H, CHM136H1/CHM138H); (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1

First or Second Year: (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Second and Higher Years:

1. CHM217H1, (CHM220H1/CHM222H1, CHM224H1/CHM223H1)/CHM225Y, CHM238Y1, CHM247H1/CHM249H1; (CHM210H1, GGR203H1/GGR314H1); STA220H1/GGR270H1
2. CHM310H1, CHM410H1, CHM415H1; ENV234H1, (ENV221H1, ENV222H1), ENV334H1/ENV341H1/ENV346H1
3. One additional FCE from 300/400-series CHM courses
4. ENV421H1/CHM499Y1/PHC489Y1/CHM398H0 (in areas relevant to the program with prior approval by the Department)
5. Further courses from any 300/400 series courses with DR=SCI, BR=4 or BR=5 such that the total FCE for the specialist is 14.

Description of Proposed Changes:
Addition of PHC489Y1. With Chemistry taking over the administration of the Pharmaceutical Chemistry program in May 2019, our students will have the opportunity to enroll in PHC489Y1 or CHM499Y1 as part of their degree requirements.

Also removed CHM221H1 and CHM225Y1 as neither course has been offered since 2007-2008.
Synthetic & Catalytic Chemistry Specialist

Completion Requirements:

(14 full courses or their equivalent)

First Year: (CHM151Y1 strongly recommended)/(CHM135H1/CHM139H, CHM136H1/CHM138H); (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1; (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Second and Higher Years:

1. BCH210H1, CHM217H1, (CHM220H1/CHM222H1, CHM223H1/CHM225Y), CHM238Y1, (CHM249H1 strongly recommended)/CHM247H1; MAT235Y1/MAT237Y1
2. CHM317H1, CHM338H1, CHM342H1, CHM343H1, CHM347H1, CHM348H1
3. CHM432H1, CHM440H1, CHM441H1, CHM443H1
4. CHM499Y1/PHC489Y1 and/or CHM398H0 in areas relevant to the program with prior approval by the Department
5. Further 300/400-series courses in CHM, including CHM325H1, CHM328H1, CHM379H1, CHM416H1, CHM434H1, CHM437H1, CHM447H1 and CHM479H1 to make a total of 14 full courses.

Description of Proposed Changes:

Addition of PHC489Y1. With Chemistry taking over the administration of the Pharmaceutical Chemistry program in May 2019, our students will have the opportunity to enroll in PHC489Y1 or CHM499Y1 as part of their degree requirements.

Also removed CHM221H1 and CHM225Y1 as neither course has been offered since 2007-2008.

Rationale:
CHM211H1: Chemicals in the Environment: The Good, the Bad, and the Ugly

| Contact Hours: |  
| Lecture: 24 |

| Description: |  
| The world is made up of chemicals, some are natural and some are unnatural. This course will explore sources and fate of chemicals in the environment and how humans interact with them. From this perspective, we will examine how to assess exposure and risk in our everyday lives. |

| Prerequisites: |

| Corequisites: |

| Exclusions: |  
| CHM135H1/CHM136H1/CHM151Y1 |

| Recommended Preparation: |

| Breadth Requirements: |  
| The Physical and Mathematical Universes (5) |

| Distribution Requirements: |  
| Science |

| Competencies: |
| Communication: notably; Critical and Creative Thinking: notably; Information Literacy: extensively |
| Quantitative Reasoning: extensively; Social and Ethical Responsibility: notably |

| Experiential Learning: |
| Research: none; Other: notably; |
| Nature of "Other" Experiential Learning: none selected |

| Rationale: |
| This course will provide students without a scientific background in first-year chemistry with the scientific literacy and skills to navigate the increasingly complex information age where it can be difficult to distinguish science from similarly packaged pseudo-science. |

| Consultation: |

| Resources: |
| Budget Implications: The academic unit will provide the resources required for this course from existing budget. |

| Overlap with Existing Courses: |
| Overlap with other environmental courses avoided. |

| Programs of Study for Which This Course Might be Suitable: |
| Any social science or humanities students with an interest in the environment. |

| Estimated Enrolment: |
| 100-200 |

| Instructor: |
| Professor Jessica D'eon |
# 1 Course Modification:

**CHM210H1: Chemistry of Environmental Change**

<table>
<thead>
<tr>
<th>Prerequisites:</th>
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<tbody>
<tr>
<td>CHM135H1/CHM139H1/CHM151Y1,</td>
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<tr>
<td>(MAT135H1; MAT136H1)/MAT137Y1/MAT157Y1</td>
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<tr>
<th>Rationale:</th>
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<tr>
<td>CHM210 has traditionally required MAT135 and 136 as a pre-req. However, the course is now listed a core course in the Env Sci major, which only requires MAT135. I have discussed this with Jen, Jess, and Hui (Chem Env Faculty), and we all agree that we should make the course accessible for the Env Sci majors, so we agree that we can adjust the pre-req for next year. Jen and I use minimal calculus in CHM210 (mostly the integrated first-order rate law), so we will provide extra support/direction for the (likely, few) students who will not have MAT136.</td>
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<tr>
<th>Consultation:</th>
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<tr>
<td>We are making this change after ENV reached out to us about the pre-requisite issue.</td>
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<tr>
<th>Resources:</th>
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4 Minor Program Modifications:

Computer Science Major

Enrolment Requirements:

(Note: the following enrolment requirements will apply for students enrolling in the 2019 enrolment period. Students enrolling in the 2018 enrolment period should consult the 2017-18 Calendar. Please refer to the Department of Computer Science for more information.)

This is a limited enrolment program (Type 2L) that can only accommodate a certain number of students. Eligibility is based on the following criteria:

A. Completion of at least 4.0 FCEs including CSC148H1 (with a minimum grade of 70%) and CSC165H1/CSC240H1 (with a minimum grade of 70%), AND
B. An average of the grades in CSC148H1 and CSC165H1/CSC240H1 that meets the department's annual cutoff. CSC240H1 grades will be adjusted to account for the course's greater difficulty. Note that the cutoff changes from year to year, depending on the current capacity of the program and the pool of applicants. For more information, including historical data, please visit http://web.cs.toronto.edu/program/ugrad/admission.htm.

Note:

- Students admitted to the program after second or third year will be required to pay retroactive deregulated program fees.
- 100-level courses repeated as “extra” credits are not considered for program admission if a student has already passed specific 200-level CSC courses. For full details more information about repeating courses for admission to Computer Science, visit http://web.cs.toronto.edu/program/ugrad/admission.htm.

Completion Requirements:

(8.0 full course equivalents [FCEs], including at least 0.5 FCE at the 400-level)

First year (2.5 FCEs):
1. ± CSC108H1, CSC148H1, CSC165H1/CSC240H1; MAT137Y1/MAT157Y1/(MAT135H1, MAT136H1)

Notes:

a. ± Students with a strong background in an object-oriented language such as Python, Java or C++ may omit CSC108H1 and proceed directly with CSC148H1. [There is no need to replace the missing half-credit for program completion; however, please base your course choice on what you are ready to take, not on “saving” a half-credit].

b. CSC240H1 is an accelerated and enriched version of CSC165H1 plus CSC236H1, intended for students with a strong mathematical background, or who develop an interest after taking CSC165H1. If you take CSC240H without CSC165H1, there is no need to replace the missing half-credit for program completion; but please see Note (a):

c. Consult the Undergraduate Office for advice about choosing among CSC108H1 and CSC148H1, and between CSC165H1 and CSC240H1.

d. We recommend that students take MAT137Y1 or MAT157Y1, as they have been determined to provide the best preparation for upper-year courses in computer science and benefit students in CSC165H1/CSC240H1. Similarly, we recommend MAT223H1 or MAT240H1, if students choose one of these options in their later years.
Second year (2.5 FCEs):

2. CSC207H1, CSC236H1/CSC240H1, CSC258H1, CSC263H1/CSC265H1; STA247H1/STA255H1/STA257H1

Later years (3.0 FCEs):

3. 3.0 FCEs from the following:

- Any 200-/300-/400-level CSC course;

- BCB410H1, BCB420H1, BCB330Y1/BCB430Y1;

- ECE385H1, ECE489H1;

- MAT221H1/MAT223H1/MAT240H1/MAT221H1, MAT235Y1/MAT237Y1/MAT257Y1, any 300-/400-level MAT course except MAT329Y1, MAT390H1, MAT391H1

with at least 0.5 FCE from a 400-level CSC/BCB course, at least 1.0 additional FCE from 300-/400-level CSC/BCB/ECE courses, and at least 0.5 additional FCE from a 300-/400-level course.

No more than 1.0 FCE from CSC490H1, CSC491H1, CSC494H1, CSC495H1, BCB330Y1/BCB430Y1 may be used to fulfill program requirements.

The choices in 3 must satisfy the requirement for an integrative, inquiry-based activity by including one of the following half-courses: CSC301H1, CSC318H1, CSC404H1, CSC311H1/CSC411H1, CSC418H1, CSC420H1, CSC428H1, CSC454H1, CSC485H1, CSC490H1, CSC491H1, CSC494H1, CSC495H1. This requirement may also be met by participating in the PEY (Professional Experience Year) program. Transfer credits cannot comprise more than 1.0 FCE at the 300-/400-level, and cannot be used to satisfy the requirement for an integrative, inquiry-based activity. In addition, transfer credits cannot be used to satisfy the requirement for 0.5 FCE at the 400-level in CSC/BCB.

Description of Proposed Changes:

- Added a note to recommend specific MAT courses from options provided. Added new course numbers (CSC311H1 in place of CSC411H1). Added a note about transfer credits.

Rationale:

We want to ensure students complete a majority of their 300-/400-level CSC credits at UofT, which they could have avoided in the past.

Impact:

Consultation:

Discussed and approved by CS UGC October 15, 2018.
Resource Implications:

Computer Science Minor

Enrolment Requirements:

(Note: the following enrolment requirements will apply for students enrolling in the 2019 enrolment period. Students enrolling in the 2018 enrolment period should consult the 2017-18 Calendar. Please refer to the Department of Computer Science for more information.)

This is a limited enrolment program (Type 2L) that can only accommodate a certain number of students. Eligibility is based on the following criteria:

A. Completion of at least 4.0 FCEs including CSC148H1 (with a minimum grade of 70%) and CSC165H1/CSC240H1 (with a minimum grade of 70%), AND

B. An average of the grades in CSC148H1 and CSC165H1/CSC240H1 that meets the department's annual cutoff. CSC240H1 grades will be adjusted to account for the course's greater difficulty. Note that the cutoff changes from year to year, depending on the current capacity of the program and the pool of applicants. For more information, including historical data, please visit http://web.cs.toronto.edu/program/ugrad/admission.htm.

Note: 100-level courses repeated as “extra” credits are not considered for program admission if a student has already passed specific 200-level CSC courses. For full details more information about repeating courses for admission to Computer Science, visit http://web.cs.toronto.edu/program/ugrad/admission.htm.

Completion Requirements:

(4.0 full course equivalents [FCEs])

1. CSC108H1/CSC120H1, CSC148H1, CSC165H1/CSC240H1

Notes:

a. Students with a strong background in Java or C++ may omit CSC108H1 and proceed directly with CSC148H1.
b. CSC240H1 is an accelerated and enriched version of CSC165H1 plus CSC236H1, intended for students with a strong mathematical background, or who develop an interest after taking CSC165H1.
c. Consult the Undergraduate Office for advice about choosing among CSC108H1 and CSC148H1, and between CSC165H1 and CSC240H1.

2. CSC207H1, CSC236H1/CSC240H1

(Total of above requirements: 2.5 FCEs. If you take fewer than 2.5 FCEs, you must take more than 1.5 FCEs from the next list, so that the total is 4.0 FCEs.)

3. 1.5 FCEs from the following list, of which at least 1.0 FCE must be at the 300-/400-level:
Computer Science (FAS), Department of

- CSC: any 200-/300-/400-level

Note:

- Computer Science Minors are limited to three 300-/400-level CSC/ECE half-courses.
- Transfer credits cannot comprise more than 0.5 FCE at the 300-/400-level.

**Description of Proposed Changes:**
- Added CSC120H1 as an alternative to CSC108H1.
- Added a note about transfer credits.

**Rationale:**
- We want to ensure students complete a majority of their 300-/400-level CSC credits at UofT, which they could have avoided in the past.

**Impact:**

**Consultation:**
- Discussed and approved by Comp Sci Undergrad Committee in October 2018.

**Resource Implications:**

### Computer Science Specialist

#### Enrolment Requirements:

*(Note: the following enrolment requirements will apply for students enrolling in the 2019 enrolment period. Students enrolling in the 2018 enrolment period should consult the 2017-18 Calendar. Please refer to the Department of Computer Science for more information.)*

This is a limited enrolment program (Type 2L) that can only accommodate a certain number of students. Eligibility is based on the following criteria:

A. Completion of at least 4.0 FCEs including CSC148H1 (with a minimum grade of 70%) and CSC165H1/CSC240H1 (with a minimum grade of 70%) ; AND
B. An average of the grades in CSC148H1 and CSC165H1/CSC240H1 that meets the department's annual cutoff. CSC240H1 grades will be adjusted to account for the course's greater difficulty. Note that the cutoff changes from year to year, depending on the current capacity of the program and the pool of applicants. For more information, including historical data, please visit [http://web.cs.toronto.edu/program/ugrad/admission.htm](http://web.cs.toronto.edu/program/ugrad/admission.htm).

**Note:**

- Students admitted to the program after second or third year will be required to pay retroactive deregulated program fees.
- 100-level courses repeated as “extra” credits are not considered for program admission if a student has already passed specific 200-level CSC courses. For full details [more information](http://web.cs.toronto.edu/program/ugrad/admission.htm) about repeating courses for admission to Computer Science, visit [http://web.cs.toronto.edu/program/ugrad/admission.htm](http://web.cs.toronto.edu/program/ugrad/admission.htm).

**Completion Requirements:**
Computer Science (FAS), Department of

(12.0 full course equivalents [FCEs], including at least 1.5 FCEs at the 400-level)

First year (2.5 FCEs):

1. CSC108H1, CSC148H1, CSC165H1/CSC240H1; MAT137Y1/MAT157Y1/(MAT135H1, MAT136H1)

Notes:

a. Students with a strong background in an object-oriented language such as Python, Java or C++ may omit CSC108H1 and proceed directly with CSC148H1. There is no need to replace the missing half-credit for program completion; however, please base your course choice on what you are ready to take, not on “saving” a half-credit.

b. CSC240H1 is an accelerated and enriched version of CSC165H1 plus CSC236H1, intended for students with a strong mathematical background, or who develop an interest after taking CSC165H1. If you take CSC240H1 without CSC165H1, there is no need to replace the missing half-credit for program completion; but please see Note (a).

c. Consult the department's Undergraduate Office for advice about choosing among CSC108H1 and CSC148H1, and between CSC165H1 and CSC240H1.

d. We recommend that students take MAT137Y1 or MAT157Y1, as they have been determined to provide the best preparation for upper-year courses in computer science and benefit students in CSC165H1/CSC240H1. Similarly, we recommend MAT223H1 or MAT240H1 from the options in second year.

Second year (3.5 FCEs):

2. CSC207H1, CSC209H1, CSC236H1/CSC240H1, CSC258H1, CSC263H1/CSC265H1; MAT221H1/MAT223H1/ MAT240H1/MAT221H1; STA247H1/STA255H1/STA257H1

Later years (6.0 FCEs):

3. CSC369H1, CSC373H1

4. 5.0 FCEs from the following:

- Any 300-/400-level CSC course;
- BCB410H1, BCB420H1, BCB330Y1/BCB430Y1;
- ECE385H1, ECE489H1;
- MAT224H1/MAT247H1, MAT235Y1/MAT237Y1/MAT257Y1, any 300-/400-level MAT course except MAT329Y1, MAT390H1, MAT391H1;
- STA248H1/STA261H1, any 300-/400-level STA course

with at most 2.0 FCEs from APM or MAT or STA courses, and at least 1.5 FCEs from 400-level CSC, BCB, or ECE courses.

No more than 1.0 FCE from CSC490H1, CSC491H1, CSC494H1, CSC495H1, BCB330Y1/BCB430Y1 may be used to fulfill program requirements.

The choices in 4 must satisfy the requirement for an integrative, inquiry-based activity by including one of the following half-courses: CSC301H1, CSC318H1, CSC404H1, CSC311H1/CSC411H1, CSC418H1, CSC420H1, CSC428H1, CSC454H1, CSC485H1, CSC490H1, CSC491H1, CSC494H1, CSC495H1. This requirement may also be met by participating in the PEY (Professional Experience Year) program. Transfer credits cannot comprise more than 1.0 FCE at the 300-/400-level, and cannot be used to satisfy the requirement for an integrative, inquiry-based activity. In addition, transfer credits cannot comprise more than 0.5 FCE of the 400-level CSC, BCB, or ECE courses required.

Choosing courses

This program offers considerable freedom to choose courses at the 300-/400-level, and you are free to make those choices
on your own. We are eager to offer guidance, however, and both our Undergraduate Office and individual faculty members are a rich source of advice.

### Description of Proposed Changes:

Adjustments to account for changes in some course numbers (notably, CSC411H1 becoming CSC311H1). Added a note about choosing MAT courses from the various options provided. Added a note about transfer credits.

### Rationale:

We want to ensure students complete a majority of their 300-/400-level CSC credits at UofT, which they could have avoided in the past.

### Impact:

### Consultation:

Discussed and approved by CS UGC October 2018.

### Resource Implications:

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## Data Science Specialist

### Completion Requirements:

**13.0-13.5 Full Course Equivalents [FCEs], including at least 1.5 FCEs at the 400-level**

<table>
<thead>
<tr>
<th>First year (3.0 FCEs)</th>
<th>MAT137Y1/MAT157Y1; MAT223H1/MAT240H1 (MAT240H1 is recommended); STA130H1; CSC108H1; CSC148H1;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>Students with a strong background in an object-oriented language such as Python, Java or C++ may omit CSC108H1 and proceed directly with CSC148H1. There is no need to replace the missing half-credit for program completion; however, please base your course choice on what you are ready to take, not on &quot;saving&quot; a half-credit. Consult with the Computer Science Undergraduate Office for advice on choosing between CSC108H1 and CSC148H1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second year (3.5-4.0 FCEs)</th>
<th>MAT237Y1/MAT257Y1; STA257H1; STA261H1; CSC207H1; (CSC165H1, CSC236H1)/CSC240H1 (CSC240H1 is recommended); JSC270H1 (Data Science I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>CSC240H1 is an accelerated and enriched version of CSC165H1 plus CSC236H1, intended for students with a strong mathematical background, or who develop an interest after taking CSC165H1. If you take CSC240H1 without CSC165H1, there is no need to replace the missing half-credit for program completion; however, please base your course choice on what you are ready to take, not on &quot;saving&quot; a half-credit. Consult the Computer Science Undergraduate Office for advice on choosing between CSC165H1 and CSC240H1.</td>
</tr>
</tbody>
</table>

| Third year (3.5 FCEs) | STA302H1; one of STA303H1 or STA305H1; STA355H1; CSC209H1; CSC263H1/CSC265H1 (CSC265H1 is recommended); CSC343H1; JSC370H1 (Methods of Data Science II) |

| Fourth year (3.0 FCEs) | 1. CSC373H1; 2. STA314H1/CSC311H1/one of STA414H1, CSC411H1; 3. JSC470H1 (Data Science III); 4. 1.5 FCEs from the following list, including at least 1.0 FCE at the 400 level: STA303H1/STA305H1 (whichever one was not taken in third year), STA347H1, CSC401H1, STA414H1/CSC412H1, CSC413H1/CSC421H1, any 400-level STA course |

Students will be advised to develop domain expertise in at least one area where Data Science is applicable, by taking a sequence of courses in that area throughout their program. Examples of such areas will be provided to students by program
Computer Science (FAS), Department of

advisors and will form the basis for a later proposal for program Focuses (to be approved through internal Arts & Science governance procedures).

**Description of Proposed Changes:**
Revisions to course requirements in fourth year, to take into account recent additions and changes to 300-/400-level STA and CSC courses in Machine Learning; minor formatting changes.

**Rationale:**

**Impact:**

**Consultation:**
Discussion between François Pitt (Computer Science) and Nathan Taback (Statistical Sciences) on December 19, 2018.

**Resource Implications:**

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**2 New Courses:**

**JSC370H1: Data Science II**

**Contact Hours:**
- **Lecture:** 24  
- **Practical:** 24

**Description:**
This course is **restricted to** students in the Data Science Specialist program. Students will learn to identify and answer questions through the application of exploratory data analysis, data visualization, statistical methods or machine learning algorithms to complex data. Software development for data science and reproducible workflows. Communication of statistical information at various technical levels, ethical practice of data analysis and software development, and teamwork skills. Topics will be explored through case studies and collaboration with researchers in other fields.

**Prerequisites:**
- JSC270H1, STA261H1, MAT237Y1/MAT257Y1, CSC263H1, STA302H1, CSC343H1

**Corequisites:**
- STA303H1/STA305H1

**Exclusions:**

**Recommended Preparation:**

**Breadth Requirements:**
- The Physical and Mathematical Universes (5)

**Distribution Requirements:**
- Science

**Competencies:**
- **Communication:** notably; **Critical and Creative Thinking:** extensively; **Information Literacy:** none
- **Quantitative Reasoning:** extensively; **Social and Ethical Responsibility:** slightly

**Experiential Learning:**
### Rationale:
The National Academies of Sciences, Engineering, Medicine interim report on “Envisioning the Data Science Discipline: The Undergraduate Perspective” states that, in addition to foundational skills (e.g., mathematics, computational and statistical thinking), translational skills are valuable for data science students.

It is important for data science education to incorporate real data, broad impact applications, and commonly deployed methods. (page 16)

Training as a data scientist involves more than completing courses in computer science and statistics. A double major, for example, will not give students the benefit of an integrated pathway of courses designed explicitly to teach data science theories and methods. A key aspect of The Data Science Specialist program is to provide students with a rich, integrated experiential learning component, which will develop students’ translational skills in topics such as data preparation, computational considerations involved in the statistical analysis of large-scale data sets, and the theory of data science. These experiential learning outcomes will be achieved through the integrative courses.

This course is the second in a series of three courses that will scaffold experiential learning within the Data Science specialist program, and integrate ideas and techniques from computer science and statistics. “These courses will make this program unique among Data Science-focused programs currently available at other Canadian universities”. (Appraisal Report for Undergraduate Specialist in Data Science, September 25, 2017).

### Consultation:
A committee was formed in June 2015 to advise on the development of the data science program. Committee members included seven U of T faculty members from both Statistical Sciences and Computer Science, and data scientists working at U of T affiliated institutions and private industry. An advisory committee of nine faculty members from Statistical Sciences and Computer Science, and data scientists working in industry was also established to help the committee in developing this specialist program.

An early draft of the data science proposal was circulated to all chairs sitting on the Sciences Curriculum Committee, and received favourable feedback. The brief was also circulating to all units within Arts and Science that have a potential interest in Data Science.

### Resources:
**Instructors:**
The course be co-taught by computer science and statistics.

**TAs:** A TA with statistical expertise and a TA with expertise in computer science will be required. Two TAs @ 60 hrs per TA.

**Computing:**
- Computer Science undergraduate computing resources will be sufficient to support the course.
- The course may also use cloud computing from a provider that offers programs for education such as Microsoft Azure or Amazon Web Services (AWS). Prof. Taback currently has a grant from Microsoft Azure that would meet the needs of this course.

**Budget Implications:** The academic unit will provide the resources required for this course from existing budget.

### Overlap with Existing Courses:
None.

### Programs of Study for Which This Course Might be Suitable:
Data Science Specialist.

### Estimated Enrolment:
30-45

### Instructor:
Nathan Taback
### JSC470H1: Data Science III

**Contact Hours:**  
**Lecture:** 24  /  **Practical:** 24

**Description:**

This course is restricted to students in the Data Science Specialist program. Research topics and applications of data science methods will be explored through case studies and collaboration with researchers in other fields. Data analysis, visualization, and communication of statistical information at various technical levels, ethical practice of data analysis and software development, and teamwork skills.

**Prerequisites:**  
JSC370H1, STA314/CSC411/CSC311, STA303H1/STA305H1

**Corequisites:**

**Exclusions:**  
STA490Y1

**Recommended Preparation:**

**Breadth Requirements:**

The Physical and Mathematical Universes (5)

**Distribution Requirements:**

Science

**Competencies:**

*Communication:* notably; *Critical and Creative Thinking:* extensively; *Information Literacy:* none  
*Quantitative Reasoning:* extensively; *Social and Ethical Responsibility:* slightly

**Experiential Learning:**

*Research:* notably; *Other:* notably;  
*Nature of "Other" Experiential Learning:* Distinctive Practicals or Laboratories

**Rationale:**

The National Academies of Sciences, Engineering, Medicine interim report on “Envisioning the Data Science Discipline: The Undergraduate Perspective” states that, in addition to foundational skills (e.g., mathematics, computational and statistical thinking), translational skills are valuable for data science students.

It is important for data science education to incorporate real data, broad impact applications, and commonly deployed methods. (page 16)

Training as a data scientist involves more than completing courses in computer science and statistics. A double major, for example, will not give students the benefit of an integrated pathway of courses designed explicitly to teach data science theories and methods. A key aspect of The Data Science Specialist program is to provide students with a rich, integrated experiential learning component, which will develop students’ translational skills in topics such as data preparation, computational considerations involved in the statistical analysis of large-scale data sets, and the theory of data science. These experiential learning outcomes will be achieved through the integrative courses.

This course is the third in a series of three courses that will scaffold experiential learning within the Data Science specialist program, and integrate ideas and techniques from computer science and statistics. “These courses will make this program unique among Data Science-focused programs currently available at other Canadian universities”. (Appraisal Report for Undergraduate Specialist in Data Science, September 25, 2017).
Consultation:
A committee was formed in June 2015 to advise on the development of the data science program. Committee members included seven U of T faculty members from both Statistical Sciences and Computer Science, and data scientists working at U of T affiliated institutions and private industry. An advisory committee of nine faculty members from Statistical Sciences and Computer Science, and data scientists working in industry was also established to help the committee in developing this specialist program.

An early draft of the data science proposal was circulated to all chairs sitting on the Sciences Curriculum Committee, and received favourable feedback. The brief was also circulating to all units within Arts and Science that have a potential interest in Data Science.

Resources:
Instructors:
The course be co-taught by computer science and statistics.
TAs: A TA with statistical expertise and a TA with expertise in computer science will be required. Two TAs @ 60 hrs per TA.
Computing:
- Computer Science undergraduate computing resources will be sufficient to support the course.
The course may also use cloud computing from a provider that offers programs for education such as Microsoft Azure or Amazon Web Services (AWS). Prof. Taback currently has a grant from Microsoft Azure that would meet the needs of this course.

Budget Implications: The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses:
None.

Programs of Study for Which This Course Might be Suitable:
Data Science Specialist.

Estimated Enrolment:
30-45.

Instructor:
Nathan Taback

1 Course Modification:

CSC258H1: Computer Organization

Prerequisites:
60% 70% or higher in CSC148H1, 60% 70% or higher in CSC165H1/CSC240H1 (Please note: The minimum prerequisite grades in CSC148H1 and CSC165H1/CSC240H1 are lower than the minimum grades for program admission in Computer Science. If you take this course when your grade in CSC148H1 or CSC165H1/CSC240H1 is lower than the requirement for program admission, you will be unable to enrol in a Computer Science program. If you hope to enrol in a Computer Science program in future, please ensure that you satisfy the program admission grade requirements in CSC148H1 and CSC165H1/CSC240H1 before completing CSC258H1.)

Rationale:
Harmonizing the prerequisites (and the accompanying note) with those of CSC207H1 and CSC236H1, given that all three courses occupy the same position in Computer Science programs: the first 200-level CSC courses taken after CSC148H1 and CSC165H1/CSC240H1.

Consultation:
Discussion at departmental Undergraduate Committee, which includes both graduate and undergraduate students.

Resources:
2 Minor Program Modifications:

Biology Major

Completion Requirements:

The Biology Specialist, Major, and Minor programs are administered through the Department of Ecology & Evolutionary Biology. Contact: undergrad.eeb@utoronto.ca

(8 FCEs including at least 1.5 FCEs at the 300+ series and 0.5 FCE at the 400 series)

First Year (2.0 FCEs): BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/CHM151Y1

Higher Years:
1. 2.5 FCEs: BIO220H1; BIO230H1/BIO255H1; BIO251H1; BIO270H1/PSL300H1; BIO260H1/HMB265H1
2. 1.5 FCE from: BCH; BIO; CJH332H1; CSB (excluding CSB200Y1, CSB201H1, CSB202H1); EEB (excluding EEB202H1, EEB208H1, EEB214H1, EEB215H1); EHJ352H1; ENV234H1, ENV334H1; IMM250H1; JHE353H1, JHE355H1; MGY200H1, MGY277H1; NFS284H1; PSY397H1, PSY497H1
3. 1.5 FCEs at 300+ series from: ANA; ANT333Y1, ANT338H1, ANT430H1, ANT436H1; BCH; CJH332H1; CSB; EEB; EHJ352H1; ENV334H1, ENV432H1; HMB; IMM; JHE353H1, JHE355H1; MGY; NUS; PCL; PSL; PSY397H1, PSY497H1
4. 0.5 FCE at 400-series from: CSB; EEB; ENV432H1

NOTE: Students who wish to focus on either plant or microbial biology, or animal biology should take courses in 2., 3., and 4. that concentrate in these subject areas (as listed below).

CSB and EEB courses in plant or microbial biology: CSB340H1, CSB350H1, CSB351Y1, CSB353H1, CSB450H1, CSB452H1, CSB454H1, CSB459H1, CSB460H1, CSB475H1; EEB268H1, EEB328H1, EEB330H1, EEB331H1, EEB340H1, EEB405H0, EEB405H1, EEB428H1, EEB440H1

CSB and EEB courses in animal biology: BIO271H1/PSL301H1; CJH332H1; CSB325H1, CSB327H1, CSB328H1, CSB329H1, CSB330H1, CSB331H1, CSB343H1, CSB345H1, CSB346H1, CSB348H1, CSB426H1, CSB427H1, CSB428H1, CSB429H1, CSB430H1, CSB431H1, CSB432H1, CSB435H1, CSB445H1, CSB447H1, CSB483H1; EEB263H1, EEB266H1, EEB267H1, EEB322H1, EEB380H1, EEB382H1, EEB384H1, EEB386H1, EEB388H1, EEB390H1, EEB440H1; EHJ352H1. (BIO271H1/PSL301H1 is highly recommended for students concentrating in animal biology and is a prerequisite for 300+ series CSB courses in physiology.)

Description of Proposed Changes:

New courses were created and should be listed with the other elective courses, so students now have more choice within the requirements for the program.

Rationale:

New courses were created and should be listed with the other elective courses, so students now have more choice within the requirements for the program.

Impact:

Consultation:
Biology Specialist

Completion Requirements:

The Biology Specialist, Major, and Minor programs are administered through the Department of Ecology & Evolutionary Biology. Contact: undergrad.eeb@utoronto.ca

(12 FCEs including at least 1.0 FCE at the 400 series)

First Year (3.0 FCEs): BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/CHM151Y1; (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1

Higher Years:

1. 2.5 FCEs: BIO220H1; BIO230H1/BIO255H1; BIO251H1; BIO270H1/PSL300H1; BIO260H1/HMB265H1

2. 0.5 FCE statistics from: EEB225H1, PSY201H1, STA220H1, STA257H1, GGR270H1, STA288H1

3. 0.5 FCE from chemistry, physics or statistics: CHM220H1, CHM247H1/CHM249H1; PHY131H1, PHY151H1; PSY202H1; STA221H1, STA255H1, STA261H1

4. 1.5 FCE at the 200+ series from: BCH; BIO; CJH332H1; CSB (excluding CSB200Y1, CSB201H1, CSB202H1); EEB (excluding EEB202H1, EEB208H1, EEB214H1, EEB215H1); EJH352H1; ENV234H1, ENV334H1; ENY432H1; IMM250H1; JHE353H1, JHE355H1; MGY200H1, MGY277H1; NOS284H1; PSY397H1, PSY497H1

5. 0.5 FCE at 300+ series in plant or microbial biology from: CSB340H1, CSB350H1, CSB351Y1, CSB353H1, CSB450H1, CSB452H1, CSB454H1, CSB459H1, CSB460H1, CSB475H1; EEB328H1, EEB330H1, EEB331H1, EEB340H1, EEB403H0, EEB403H1, EEB405H0, EEB405H1, EEB428H1, EEB440H1

6. 0.5 FCE at 300+ series in animal biology from: CJH332H1; CSB325H1, CSB327H1, CSB328H1, CSB329H1, CSB330H1, CSB331H1, CSB332H1, CSB343H1, CSB345H1, CSB346H1, CSB348H1, CSB426H1, CSB427H1, CSB428H1, CSB429H1, CSB430H1, CSB431H1, CSB432H1, CSB435H1, CSB445H1, CSB447H1, CSB483H1; EEB322H1, EEB380H1, EEB382H1, EEB384H1, EEB386H1, EEB388H1, EEB390H1, EEB440H1; EHJ352H1

NOTE: BIO270H1 and BIO271H1 are prerequisites for 300+ series CSB courses in physiology.

7. 2.0 FCEs at 300+ series (at least 1.0 FCE must be from Group 1) from:
   Group 1: CJH332H1; CSB; EEB; EJH352H1; ENV334H1, ENV432H1; JHE353H1, JHE355H1; NUS; PSY397H1, PSY497H1
   Group 2: ANA; ANT333Y1, ANT338H1, ANT430H1, ANT436H1; BCH; HMB; IMM; NFS; MGY; PCL; PSL

8. 1.0 FCE at 400-series from: CSB; EEB

NOTE: Students who wish to focus on either plant or microbial biology , or animal biology should take courses in 7. and 8. that concentrate in these subject areas as listed in 5. and 6., respectively. BIO271H1/PSL301H1 is highly recommended for students concentrating in animal biology and is a prerequisite for 300+ series CSB courses in physiology.

Description of Proposed Changes:

New courses were created and should be listed with the other elective courses, so students now have more choice within the requirements for the program.

Rationale:
Ecology and Evolutionary Biology (FAS), Department of

New courses were created and should be listed with the other elective courses, so students now have more choice within the requirements for the program.

| Impact: |
| Consultation: |
| Resource Implications: |
3 Minor Program Modifications:

Environment & Health Major

Description:

Previous:

New:

From air pollution and water contamination to climate change, the anthropogenic impact on our environment has significant repercussions on human health. A collaboration between the School of the Environment and Human Biology, the objective of the Environment and Health program is to provide students with instruction in fundamental biological sciences and to integrate a broad understanding of the environmental determinants of health.

For more information, please email the School of the Environment’s Undergraduate Student Advisor, David Powell, at ug.office.env@utoronto.ca.

Completion Requirements:

Required Courses (8.0 FCE)

Year 1: Students must complete Year 1 requirements 1 and 2 prior to entering POSl:

1. BIO120H1; BIO130H1

2. (CHM136H1/CHM138H1; CHM135H1/CHM139H1)/CHM151Y1 (Only transfer credits that carry exclusions to CHM136H1/CHM138H1 and/or CHM135H1/CHM139H1 will be accepted)

3. GGR100H1/JEG100H1/GGR101H1/ESS102H1/GLG102H1/MAT135H1/PHY131H1/PSY100H1

Year 2: Foundations in environment and health

4. BCH210H1/CHM247H1

5. BIO220H1; BIO230H1/BIO255H1

6. HMB265H1/BIO260H1

7. 1.0 FCE from environmental core courses: ENV221H1/ENV222H1/ENV234H1/ENV337H1/JEE337H1

Year 3: Third year core courses

8. ENV341H1

9. PSL300H1; PSL301H1

Years 3 or 4:

10. 0.5 FCE from environment and health relevant courses: HMB302H1/HMB303H1/HMB312H1/HMB314H1/HMB322H1/HMB390H1/HMB496Y1/HMB499Y1/ANA300Y1/ANA301H1/BCH311H1/CSB349H1/PRL350H1/BCH370H1/CHM310H1/CSB325H1/CSB327H1/CSB328H1/CSB331H1/CSB346H1/CSB347H1/CSB350H1/CSB351Y1/EEB318H1/EEB319H1/EEB321H1/EEB328H1/EEB362H1/EEB375H1/EEB428H1/ENV315H1/ESS425H1/ENV316H1/ENV336H1/GGR303H1/GGR305H1/GGR409H1/GGR347H1/GGR348H1/HIS423H1/HST405H1/JEE347H1/JEE348H1/ESS311H1/ESS312H1/ESS463H1/IMM334Y1/LMP301H1/LMP363H1/MGY377H1/NFS382H1/NFS386H1/NFS488H1/PSL372H1/PSL420H1/PSY435H1
11. JEH455H1

**Description of Proposed Changes:**
Adding a relevant elective course to the program.

**Rationale:**
The course provides an additional choice to students in the program which has a significantly different focus from other program electives.

**Impact:**
Provides an additional elective course to students in the program.

**Consultation:**
Received permission from the Director of the Health Studies program to add the elective course.

**Resource Implications:**
None.

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**Environment & Health Specialist**

**Description:**
From air pollution and water contamination to climate change, the anthropogenic impact on our environment has significant repercussions on human health. A collaboration between the School of the Environment and Human Biology, the objective of the Environment and Health program is to provide students with instruction in fundamental biological sciences and to integrate a broad understanding of the environmental determinants of health.

For more information, please email consult the School of the Environment’s School’s Undergraduate Student Advisor, David Powell, at ug.office.env@utoronto.ca (see above).

**Completion Requirements:**

(14 full courses or their equivalent which includes fulfillment of the Faculty’s Distribution requirements; must include at least four 300+-series courses, one of which must be at the 400-level)

**Year 1:** Students must complete Year 1 requirements 1 and 2 prior to entering POS:

1. BIO120H1; BIO130H1
2. (CHM136H1/CHM138H1; CHM135H1/CHM139H1)/CHM151Y1 (Only transfer credits that carry exclusions to CHM136H1/CHM138H1 and/or CHM135H1/CHM139H1 will be accepted)
3. 1 full course or its equivalent in half courses from among: GGR100H1/JEG100H1/GGR101H1/MAT135H1/ MAT136H1/JMB170Y1/PHY131H1/PHY132H1/PHY151H1/PHY152H1/PSY100H1

**Year 2:** Foundations of environment and health

4. BCH210H1/CHM247H1
5. BIO220H1; BIO230H1/BIO255H1
6. HMB265H1/BIO260H1
Environment (FAS), School of

7. ENV221H1; ENV222H1
8. ENV234H1; ENV337H1/JEE337H1
9. PHL273H1

Year 3: Selected topics in environment and health with greater depth.

10. STA220H1/STA288H1; STA221H1
11. BCH311H1/CSB349H1/LMP363H1/NFS284H1/(PSL300H1, PSL301H1)/PSL350H1
12. JGE321H1; ENV341H1
13. 1.0 FCE from: CHM210H1/ENV334H1/(only one from ENV233H1/ESS261H1/GGR203H1/GGR303H1/GGR314H1/PHY231H1)

Years 3 & 4:

14. 1.5 FCE from environment and health relevant courses: HMB302H1/HMB303H1/HMB312H1/HMB314H1/HMB322H1/HMB390H1/HMB496Y1/HMB499Y1/ANA300Y1/ANA301H1/BCH311H1/CSB349H1/PSL350H1/BCH370H1/CHM310H1/CSB325H1/CSB327H1/CSB328H1/CSB331H1/CSB346H1/CSB347H1/CSB350H1/CSB351Y1/EEB318H1/EEB319H1/EEB321H1/EEB328H1/EEB362H1/EEB375H1/EEB428H1/ENV315H1/ESS425H1/ENV316H1/ENV336H1/ESS463H1/GGR303H1/GGR305H1/GGR347H1/GGR348H1/HIS423H1/HST405H1/JGE347H1/JGE348H1/ESS311H1/ESS312H1/IMM334Y1/LMP301H1/LMP363H1/MEG377H1/NFS382H1/NFS386H1/NFS488H1/PFL372H1/PFL420H1/PSY455H1 or any other approved course for which the student has appropriate prerequisites. The 1.5 FCE can be chosen to reflect the particular academic interests of each student.

Year 4: Advanced topics in environment and health with emphasis on primary research and critical analysis

15. ENV421H1/HMB396Y0/HMB496Y1/HMB499Y1 or a minimum of 0.5 FCE from any approved departmental or college independent research project
16. JEH455H1

E&H Specialist Program Note Notes:

1. Many second, third and fourth year courses in this program have specific prerequisites. Students should check prerequisites for the higher level courses they are interested in prior to making first year course selections, and on through higher years.
2. EEB225H is no longer equivalent to STA221H, as of the 2011–12 academic year.

Description of Proposed Changes:

Addition of a relevant elective course to the program.

Rationale:
The course has significant environment and health content.

Impact:
Provides an additional elective course for students in the program, that is very different from the focus of other program electives.

Consultation:
Received permission from Director of the Health Studies program to include this course as a program elective.

Resource Implications:
None.
Environment & Toxicology Specialist

Completion Requirements:

(15 full courses or their equivalent, including 4.0 300+-level courses, 1.0 of which must be at the 400-level).

First Year: BIO120H1; BIO130H1; CHM135H1; CHM136H1; and at least 0.5 FCE from PHY131H1; MAT135H1; JEG100H1

First or Second Year: At least 1.5 FCE from JEG100H1 GGR100H1 (if not counted in First Year, above); GGR101H1; MAT135H1 (if not counted in First Year, above); MAT136H1/JMB170Y1; PHY131H1 (if not counted in First Year, above); PHY132H1

Second Year: BCH210H1; BIO230H1/BIO255H1 (BIO240H1; BIO241H1); ENV221H1; ENV222H1, PCL201H1 and CHM247H1. One FCE from (BIO270H1, BIO271H1)/(PSL300H1, PSL301H1)/PSL302Y (see NOTE 1)

Third and Fourth Years: BIO220H1; ENV234H1; JGE321H1; ENV334H1; CHM210H1; PCL302H1; PCL362H1; (PCL482H1, PCL483H1)/PCL473Y1.
One from STA220H1/STA221H1/STA288H1/EEB225H1 (see NOTE 2).
One from ENV421H1/PCL367H1 PCL366H1/PCL474Y1 (see NOTE 2).
At least 1.0 FCE from: ENV341H1; ENV235H1/PHY231H1; ENV337H1 JGE236H1/JEE337H1; CHM310H1; ESS463H1; JPM300H1; PCL477H1; PCL481H1; PCL484H1; PCL486H1; PCL490H1; LMP301H1; LMP363H1 (see NOTE 3)

An Integrative, Inquiry-Based Activity Requirement must be satisfied.

The requirement for an integrative, inquiry-based and/or experiential activity must be met by completing at least one of the following: PCL297H1, PCL367H1 PCL366H1, PCL397Y0, ENV421H1, PCL474Y1, Professional Experience Year

NOTES:
1. PSL300H1 and PSL301H1 require MAT100/PHY100 -series courses.
2. PCL302H1 is a required co-requisite of PCL366H1 ; STA288H1, PCL201H1, and PCL302H1 are pre-requisites for students intending to take PCL474Y1. Students intending to take PCL474Y1 must obtain permission from the Undergraduate Student Advisor of the School of the Environment 3 months prior to the intended date of enrolment. Students must also consult with the Department of Pharmacology and Toxicology at least 3 months prior to the intended date of enrolment.
3. Students taking PCL481H1 must take BCH210H1, PCL302H1 and PCL362H1 as prerequisites. Students taking PCL477H1 must take BCH210H1 prior. Students taking ENV421H1 or PCL367H1 PCL366H1 must take 1.5 FCE from program electives requirement list of courses (group 7) to ensure 15 FCE program credits.

Description of Proposed Changes:

Rationale:
Updating pre-requisite notes and changing PCL473Y into PCL482H1 and PCL483H1.

Impact:

Consultation:

Resource Implications:

2 Course Modifications:
**ENV341H1: Environment and Human Health**

**Prerequisites:**
- \((\text{ENV221H1} \lor \text{ENV222H1}) \lor (\text{BIO230H1} \lor \text{BIO255H1})\) (\text{BIO240H1} \lor \text{BIO241H1}) / (\text{BIO250Y1} \lor \text{BIO255Y1})\) and enrolment in the HMB Specialist in Health and Disease/HMB Specialist in Global Health, and completion of at least 8 FCE of courses; or permission of the Undergraduate Associate Director.

**Exclusions:**
- Previous: INI341H1 (2005-06 academic year and before)
- New:

**Rationale:**
- Removing long-retired prerequisite and exclusion courses. INI341H1 was retired in 2006. Inserted the correct combination of BIO courses.

**Consultation:**

**Resources:**

**ENV450H1: Energy and Environment Solutions**

**Prerequisites:**
- Previous: ENV346H1, ENV350H1; (GGR347H1, GGR348H1) / (JGE347H1, JGE348H1) / (GGR314H1, GGR333H1)
- New: ENV346H1, ENV350H1 and any two of FOR310H1 / GGR310H1/GGR314H1/GGR347H1/GGR348H1

**Rationale:**

**Consultation:**

**Resources:**
2 Minor Program Modifications:

Immunology Major

Completion Requirements:

(8 full courses or their equivalents, including two 400-series courses)

First Year:
BIO120H1; BIO130H1; [CHM135H1 (formerly CHM139H1); CHM136H1 (formerly CHM138H1)]/CHM151Y1

Second Year:
1. BCH210H1; BIO230H1; IMM250H1; BIO260H1/HMB265H1
2. 0.5 full-course equivalent (0.5 FCE) from the following list: BIO220H1/STA220H1/TRN225Y1/TRN236H1/CHM247H1/CHM249H1

Third Year:
IMM340H1; IMM350H1; CSB349H1/BCH311H1; One full-course equivalent from the following list: BCH370H1/MGY377H1/MGY378H1/PHL281H1

Fourth Year:
One full-course equivalent from the following list: IMM428H1/IMM429H1/IMM430H1/IMM431H1/IMM435H1/MIJ485H1

Notes:

1. Students considering graduate school are encouraged to add the additional non-compulsory IMM450Y1 research course, if space permits.
2. MIJ485H1 requires MGY377H1 & MGY378H1 as pre-requisites.
3. IMM435H1 is capped at 40 students. Priority will be given to Immunology Specialist students, followed by Immunology Major students.

Description of Proposed Changes:
Addition of the brand new course IMM431H1 to this program.

Rationale:
We would like to include the brand new course IMM431H1 course on immunotherapy that students could take as a program requirement.

Impact:
This change would give more flexibility for students to build their program.

Consultation:
1. Department of Immunology faculty consultation.
2. Department of Immunology External Review (2016), which included a consultation with Undergraduate Students. The Associate Chair has also engaged with students on various occasions, and this course proposal is received very favorably by the student body.
3. Consultation with the Life Sciences Planning Committee (5 October 2018): The Committee discussed and approved the proposal.
4. Consultation with the Trinity College Arts and Science Committee (28 September 2018): The Committee approved this proposal, which will be proposed to the Trinity College Senate.
5. Consultation with the Faculty of Arts and Science.

Resource Implications:
# Immunology Specialist

## Completion Requirements:

(13.5 full courses or their equivalents)

**First Year:**
- BIO120H1; BIO130H1; [CHM135H1 (formerly CHM139H1); CHM136H1 (formerly CHM138H1)]/CHM151Y1; (MAT135H1; MAT136H1)/MAT137Y1

**First Year or upper years:**
- (PHY131H1; PHY132H1)/(PHY151H1; PHY152H1)

**Second Year:**
1. + BCH242Y1; BIO230H1; BIO260H1/HMB265H1; CHM220H1; IMM250H1
2. One course from the following list: BIO220H1/STA220H1/TRN225Y1/TRN236H1/CHM247H1/CHM249H1

**Third Year:**
- BCH377H1; IMM341H1; IMM351H1; MGY311Y1; MGY377H1; MGY378H1

**Fourth Year:**
1. + IMM435H1
2. Two courses from the following list: IMM428H1/IMM429H1/IMM430H1/IMM431H1/MIJ485H1
3. IMM450Y1 or one full course equivalent at the 400-series in ANA, BCH, IMM, LMP, MGY, CSB.

**Notes:**
1. (PHY131H1; PHY132H1)/(PHY151H1; PHY152H1) may be taken in the first year or subsequent years and are not required for entrance into the specialist program.
2. IMM435H1 is capped at 40 students. Priority will be given to Immunology Specialist students, followed by Immunology Major students.

## Description of Proposed Changes:

Addition of the brand new course IMM431H1 to this program.

## Rationale:

We would like to include the brand new course IMM431H1 course on immunotherapy that students could take as a program requirement.

## Impact:

This change would give more flexibility for students to build their program.

## Consultation:

1. Department of Immunology faculty consultation.
2. Department of Immunology External Review (2016), which included a consultation with Undergraduate Students. The Associate Chair has also engaged with students on various occasions, and this course proposal is received very favorably by the student body.
3. Consultation with the Life Sciences Planning Committee (5 October 2018): The Committee discussed and approved the proposal.
4. Consultation with the Trinity College Arts and Science Committee (28 September 2018): The Committee approved this proposal, which will be proposed to the Trinity College Senate.
5. Consultation with the Faculty of Arts and Science.

## Resource Implications:
2 New Courses:

**IMM385Y1: Special Research Project in Immunology**

<table>
<thead>
<tr>
<th>Contact Hours:</th>
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<tr>
<td>Practical: 180</td>
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**Description:**

This course provides an opportunity for students to conduct a research project under the supervision of a member of the Faculty. Students are expected to devote a minimum of seven hours per week to the course from the week the fall term lectures begin to the last week of the spring term. Research projects will involve experimental design and work, data analyses, literature reading etc.

**Prerequisites:**

IMM250H1

**Corequisites:**

IMM340H1/IMM341H1

**Exclusions:**

**Recommended Preparation:**

**Breadth Requirements:**

Living Things and Their Environment (4)

**Distribution Requirements:**

Science

**Competencies:**

*Communication:* notably; *Critical and Creative Thinking:* extensively; *Information Literacy:* notably

*Quantitative Reasoning:* extensively; *Social and Ethical Responsibility:* notably

**Experiential Learning:**

*Research:* extensively; *Other:* none

**Rationale:**

The Department of Immunology currently offers its students a Summer Research Program (typically for students at the end of their 3rd year) as well as an optional 4th year research project course (IMM450Y1). With this new course, our goal is to give a selected group of students an earlier exposure to research in Immunology, from the generation of hypothesis, to the design and conduction of experiments, and finally analysis and interpretation of the results. This course will also reinforce immunological concepts taught in other courses, such as IMM250H1, IMM340H1 and IMM350H1. We would like to favor students enrolled in the Immunology Specialist program. Enrollment will be at the level of the Department. Interested students will submit a ballot to the Immunology Office.

Through this course, student will gain practical skills, but also invaluable experiential learning and troubleshooting skills that will make them more competitive for application to graduate, medical or professional schools.

**Consultation:**

1. Department of Immunology faculty consultation.
2. Department of Immunology External Review (2016), which included a consultation with Undergraduate Students. The Associate Chair has also engaged with students on various occasions, and this course proposal is received very favorably by the student body.
3. Consultation with the Life Sciences Planning Committee (5 October 2018): The Committee discussed and approved the proposal.
4. Consultation with the Trinity College Arts and Science Committee (28 September 2018): The Committee approved.
this proposal, which will be proposed to the Trinity College Senate.
5. Consultation with the Faculty of Arts and Science.

Resources:
This is a research project course. The hosting laboratory will provide the necessary resources to conduct the research. The Department of Immunology has over 60 research Faculty, that can host students.

Budget Implications: The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses:
Many Arts and Science Units offer research courses. Due to the unique nature of every research project, there is no overlap with other current courses.

Programs of Study for Which This Course Might be Suitable:
Immunology Specialist (ASSPE1002)

Estimated Enrolment:
15

Instructor:
Arthur Mortha

IMM431H1: Immunotherapy

Impact on Programs:
This proposal triggers modifications in the unit's program(s)

Contact Hours:
  Lecture: 24  /  Tutorial: 12

Description:
Therapies that enhance, or suppress, the body’s immune response have proven remarkably efficient for the treatment of human diseases such as cancer, autoimmunity and chronic inflammation. Some of these therapies, such as the so-called checkpoint inhibitors and CAR-T cell therapies have recently leaped from bench to bedside. This course will cover the fundamental immune principles at play, how they were discovered, as well as the existing and future immune therapies to treat these diseases.

Prerequisites:
IMM350H1/IMM351H1

Corequisites:

Exclusions:

Recommended Preparation:
IMM428H1

Breadth Requirements:
Living Things and Their Environment (4)

Distribution Requirements:
Science

Competencies:
  Communication: extensively; Critical and Creative Thinking: extensively; Information Literacy: notably
  Quantitative Reasoning: notably; Social and Ethical Responsibility: notably
Immunology (MED), Department of

<table>
<thead>
<tr>
<th>Experiential Learning:</th>
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<tbody>
<tr>
<td><strong>Research:</strong> none; <strong>Other:</strong> none</td>
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<table>
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<tr>
<th>Rationale:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The academic relevance of this course is:</td>
</tr>
<tr>
<td>1. Fill a gap in content: This course will educate students on an extremely relevant and timely immunological and health-related topic that has transformed the way we treat certain diseases. This course will fill a gap in our Immunology Specialist and Major Programs and our course portfolio.</td>
</tr>
<tr>
<td>2. Strengthen critical thinking through discussion of the relevant literature.</td>
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<tr>
<td>3. Further develop presentation skills through the presentation of the relevant literature.</td>
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<tr>
<td>4. Foster interactions with Faculty and Graduate Students</td>
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<tr>
<th>Consultation:</th>
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<tbody>
<tr>
<td>1. Department of Immunology faculty consultation.</td>
</tr>
<tr>
<td>2. Department of Immunology External Review (2016), which included a consultation with Undergraduate Students. The Associate Chair has also engaged with students on various occasions, and this course proposal is received very favorably by the student body.</td>
</tr>
<tr>
<td>3. Consultation with the Life Sciences Planning Committee (5 October 2018): The Committee discussed and approved the proposal.</td>
</tr>
<tr>
<td>4. Consultation with the Trinity College Arts and Science Committee (28 September 2018): The Committee approved this proposal, which will be proposed to the Trinity College Senate.</td>
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<tr>
<td>5. Consultation with the Faculty of Arts and Science.</td>
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<th>Resources:</th>
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<tr>
<td>Classroom with teaching station.</td>
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<tr>
<th>Budget Implications:</th>
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<tr>
<td>The academic unit will provide the resources required for this course from existing budget.</td>
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<tr>
<th>Overlap with Existing Courses:</th>
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<tr>
<td>To the best of our knowledge, the following Arts and Science Units do not offer courses with overlapping content: Laboratory Medicine and Pathology, Molecular Genetics, Biochemistry, Nutritional Sciences, Cell and Systems Biology, Physiology, Biology, Human Biology.</td>
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<tr>
<td>PCL470H1-F contains 4h (out of 36h) of lecture during which biologics (such as neutralizing antibodies) are discussed in the context of the immune system. Upon discussions with the Associate Chair Undergraduate Studies of the Pharmacology and Toxicology Department, we estimate there is less than 10% overlap. In addition, PCL469H1-S briefly discussed therapies for gastrointestinal diseases and asthma, but we estimate the overlap to be negligible. No other potential overlap was raised upon consultation with the Life Sciences Planning Committee, and the Trinity College Arts and Science Committee.</td>
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<table>
<thead>
<tr>
<th>Programs of Study for Which This Course Might Be Suitable:</th>
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<tbody>
<tr>
<td>Immunology Specialist (ASSPE1002)</td>
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<tr>
<td>Immunology Major (ASMAJ1002)</td>
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<tr>
<td>Biological Physics Specialist: Immunology Stream (ASSPE2740)</td>
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<tr>
<td>Pathobiology Specialist (ASSPE2025)</td>
</tr>
<tr>
<td>Molecular Genetics and Microbiology Specialist (ASSPE1387)</td>
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<tr>
<td>Human Biology: Health and Disease Specialist (ASSPE2013)</td>
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<tr>
<th>Estimated Enrolment:</th>
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<tr>
<td>We propose an initial enrollment cap at 25 students.</td>
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<tr>
<th>Instructor:</th>
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<tr>
<td>Tracy McGaha</td>
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### 1 Course Modification:

**IMM340H1: Fundamental Immunology**

<table>
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<tr>
<th>Contact Hours:</th>
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<tr>
<td><strong>Previous:</strong> Lecture: 24</td>
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</table>
Immunology (MED), Department of

**New: Lecture: 24 / Tutorial: 12**

**Description:**

This course introduces the basic principles and key players of the immune system: differences and interplay between innate and adaptive immunity, how immune cells develop and function, how immune cells recognize threats and danger and mount an appropriate and measured response. **This course is offered in the Fall term with in-class lectures and tutorials, as well as in the Summer term with hybrid delivery (online lectures and in-class tutorials).**

**Mode of Delivery:**

*Previous:* Online  
*New:* In Class

**Rationale:**

This course constitute an in depth introduction to the immune system, and it has been offered for over 20 years (in the past as IMM334Y1) through the Faculty of Arts and Science. The Department of Immunology has developed online lecture modules that mirror the content of this course. These lectures have been developed by Dr. Wendy Tamminen, in coordination with, and taped by several expert members of the Faculty, with the assistance of Discovery Commons. The result is of professional quality and pedagogically equivalent to the in-class lecture material.

The Department of Immunology wishes to continue offering IMM340H1 in class during the Fall term, and add an offering in the Summer term with a hybrid delivery mode (online lectures, in-class tutorials). We propose to run the Summer offering as a pilot. We will monitor student success and compare to the current In Class Fall offering. We will also monitor students success in their 4th year, comparing students that took In Class vs. Hybrid offering.

The goal is to free some space in the Fall offering, and offer students with more flexibility.

**Note:**

The existing IMM340H1 course on CM contains mistakes that do not reflect what this course actually is.

These mistakes are:

- **Total Instructional Hours:** Lecture 24 - It should be Lecture 24 and Tutorial 12
- **Intended Offering Term:** Summer - It should be Fall
- **Mode of Delivery:** Online - It should be In Class
- **Social and Ethical Responsibility:** None - It should be Slightly

I have incorporated these corrections as part of this proposal.

**Consultation:**

1. Department of Immunology faculty consultation.
2. Department of Immunology External Review (2016), which included a consultation with Undergraduate Students. The Associate Chair has also engaged with students on various occasions, and this course proposal is received very favorably by the student body.
3. Consultation with the GLSE Life Sciences Planning Committee (5 October 2018) chaired by Dr. Allan Kaplan: The Committee discussed and approved the proposal.
4. Consultation with the Trinity College Arts and Science Committee (28 September 2018): Both the Committee and the Trinity College Senate approved this proposal.
5. Consultation with The Faculty of Arts and Science.

**Resources:**

The Department of Immunology will provide the resources for this course.

Dr. Clemenza will coordinate and teach (tutorials) the summer offering.

**Budget Implications:** The academic unit will provide the resources required for this course from existing budget.
# 3 Course Modifications:

## IMC200H1: Innovation and Entrepreneurship

**Description:**

How do innovations become useful in society? What is needed for a company to use such innovations successfully? Why and how do individuals and companies commercialize a technology? This course gives an introduction to the skills needed by entrepreneurs in order to start a new venture based on an innovative idea. This course is Pass/Fail. Not eligible for CR/NCR option.

**Exclusions:**

<table>
<thead>
<tr>
<th>Previous</th>
<th>New</th>
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<tbody>
<tr>
<td></td>
<td>RSM100H1</td>
</tr>
</tbody>
</table>

**Rationale:**

The proposed exclusion will exclude Rotman Commerce from this course. Given that Commerce students study business in much greater depth, a course such as this one is not appropriate for them.

**Consultation:**

**Resources:**

## IMC391H1: Exploring New Ventures

**Prerequisites:**

IMC200H1/RSM100H1/MGT100H1: 8.0 FCEs in any subject.

**Corequisites:**

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<th>Previous</th>
<th>New</th>
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<tbody>
<tr>
<td></td>
<td>IMC200H1/ RSM100H1/ MGT100H1</td>
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</tbody>
</table>

**Rationale:**

Since many students decide to look at entrepreneurship in upper years, it will be difficult for them to satisfy the prerequisites before enrolling in this Experiential Learning course. This change from pre-requisite to co-requisite makes it possible for students who only take IMC200 in 4th year, to also do the Experiential Learning part.

**Consultation:**

**Resources:**

## IMC392Y1: Exploring New Ventures

**Prerequisites:**

IMC200H1/RSM100H1/MGT100H1: 8.0 FCEs in any subject.

**Corequisites:**

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<th>Previous</th>
<th>New</th>
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<tbody>
<tr>
<td></td>
<td>IMC200H1/ RSM100H1/ MGT100H1</td>
</tr>
</tbody>
</table>

**Rationale:**
Since many students decide to look at entrepreneurship in upper years, it will be difficult for them to satisfy the prerequisites before enrolling in this Experiential Learning course. This change from pre-requisite to co-requisite makes it possible for students who only take IMC200 in 4th year, to also do the Experiential Learning part.

Consultation:

Resources:
3 Minor Program Modifications:

Molecular Genetics And Microbiology Specialist: Microbiology Stream

Enrolment Requirements:

This is a limited enrolment program that can only accommodate a limited number of students. Eligibility will be competitive and based on a student’s marks in the 3.0 required first-year courses:

BIO120H1, BIO130H1,(CHM135H1, CHM136H1)/CHM151Y1, and (MAT135H1, MAT136H1)/MAT137Y1 with an average of at least 80% on these 3.0 full-course equivalents (FCEs) and a final mark of at least 75% in each course.

While it is difficult to predict what will constitute "competitive" course marks in a given year, based on previous years the estimate is: course marks = mid 80s; average = mid 80s.

Achieving these estimated marks does not guarantee admission to the program in any given year.

Note: Students must apply to this program on the Arts & Science Faculty Registrar’s Office website (see the Arts & Science Program Enrolment web site for application procedures). At later times, contact the Undergraduate Coordinator.

Completion Requirements:

(14 full courses or their equivalent)

First Year: (BIO120H1, BIO130H1), (CHM135H1, CHM136H1)/CHM151Y1, (MAT135H1, MAT136H1)/MAT137Y1

First or Second Year: (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Second Year: BCH242Y1, BIO230H1/BIO255H1, HMB265H1, MGY280H1, CHM247H1, STA220H1

Third Year (Microbiology Stream):

1. IMM341H1, IMM351H1, MGY311Y1, MGY377H1, MGY378H1, MGY379Y1/(MGY380H1 + MGY381H1)

Fourth Year (Microbiology Stream):

2.5 credits from Microbiology Lists 1 and 2, distributed as follows:

1. At least 1.5 full-course equivalent must be taken from list 1: MGY428H1, MGY434H1, MGY440H1, MII485H1, BCH449H1, IMM428H1, IMM430H1, IMM435H1, LMP402H1, LMP403H1, LMP436H1, NFS485H1

2. Up to 1.0 full-course equivalent may be taken from list 2: MGY360H1, MGY420H1, MGY425H1, MGY470H1, MGY480Y1, BCH350H1, BCH428H1, BCH441H1/CSB472H1, BCH445H1

Description of Proposed Changes:

Update to completion requirements, reflecting the change to MGY379Y1 to two half-courses (MGY380H1, MGY381H1). Removing a long-retired first-year math course (MAT135Y1) from enrolment requirements and completion requirements.

Rationale:

Impact: 38
### Molecular Genetics and Microbiology Major

#### Enrolment Requirements:

This is a limited enrolment program that can only accommodate a limited number of students. Eligibility will be competitive and based on a student’s marks in the 3.0 required first-year courses:

- BIO120H1, BIO130H1, (CHM135H1, CHM136H1)/CHM151Y1, and (MAT135H1, MAT136H1)/MAT135Y1/MAT137Y1/MAT157Y1, with an average of at least 70% on these 3.0 full-course equivalents (FCEs) and a final mark of at least 60% in each course.

While it is difficult to predict what will be competitive course marks and average in a given year, based on previous years, the estimate is: course marks = mid 70s; average = mid 70s.

Achieving these estimated marks does not guarantee admission to the program in any given year.

Note: Students must apply to this program on the Arts & Science Faculty Registrar’s Office website (see the Arts & Science Program Enrolment web site for application procedures).

At later times, contact the Undergraduate Coordinator.

#### Completion Requirements:

(8 full courses or their equivalent)

First Year:
- BIO120H1, BIO130H1; (CHM135H1, CHM136H1)/CHM151Y1; (MAT135H1, MAT136H1)/MAT135Y1/MAT137Y1

Second Year:
- BCH210H1; BIO230H1/BIO255H1, BIO260H1/HMB265H1, MGY200H1

Third and Fourth Years:
- BCH311H1/CSB349H1/MGY311Y1; 2.5 full-course equivalents from MGY314H1, MGY315H1, MGY340H1, MGY350H1, MGY360H1, MGY377H1, MGY378H1, MGY379Y1/MGY380H1, MGY381H1, MGY420H1, MGY425H1, MGY428H1, MGY434H1, MGY440H1, MGY460H1, MGY470H1, MIJ485H1, BCH428H1 (at least 0.5 FCE must be a laboratory course and at least 0.5 FCE must be a 400-level course, 0.5 credit additional are given if taking MGY311Y1 in lieu of BCH311H1/CSB349H1)

#### Description of Proposed Changes:

Update to completion requirements, reflecting the change to MGY379Y1 to two half-courses (MGY380H1, MGY381H1). Removing a long-retired first-year math course (MAT135Y1) from the enrolment requirements and completion requirements.

#### Rationale:

#### Impact:
<table>
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<th>Consultation:</th>
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<tr>
<th>Resource Implications:</th>
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</thead>
</table>

**Molecular Genetics and Microbiology Specialist**

**Enrolment Requirements:**

This is a limited enrolment program that can only accommodate a limited number of students. Eligibility will be competitive and based on a student’s marks in the 3.0 required first-year courses:

BIO120H1, BIO130H1, (CHM135H1, CHM136H1)/CHM151Y1, and (MAT135H1, MAT136H1)/MAT135Y1/MAT137Y1 with an average of at least 80% on these 3.0 full-course equivalents (FCEs) and a final mark of at least 75% in each course.

While it is difficult to predict what will constitute "competitive" course marks in a given year, based on previous years the estimate is: course marks = mid 80s; average = mid 80s.

Achieving these estimated marks does not guarantee admission to the program in any given year.

Note: Students must apply to this program on the Arts & Science Faculty Registrar’s Office website (see the Arts & Science Program Enrolment web site for application procedures).

At later times, contact the Undergraduate Coordinator.

**Completion Requirements:**

(14 full courses or their equivalent)

**First Year:**
BIO120H1, BIO130H1; (CHM135H1, CHM136H1)/CHM151Y1; (MAT135H1, MAT136H1)/MAT135Y1/MAT137Y1

**First or Second Year:**
(PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

**Second Year:**
BCH242Y1; BIO230H1/BIO255H1, HMB265H1; MGY280H1, CHM247H1, STA220H1

**Third Year:**
Genetics Stream:
1. + MGY340H1, MGY350H1, MGY311Y1, MGY314H1, MGY315H1
2. One (0.5 full-course equivalent) from BCH340H1, BCH377H1; MGY360H1, MGY377H1, MGY378H1

Microbiology Stream
1. + IMM341H1, IMM351H1; MGY311Y1, MGY377H1, MGY378H1, MGY379Y1/(MGY380H1 + MGY381H1)

**Fourth Year:**
Genetics Stream:
Molecular Genetics (MED), Department of

1. + MGY420H1
   plus 2.5 credits from Genetics Lists 1 and 2, distributed as follows:
2. At least 1.5 full-course equivalent must be taken from list 1: MGY425H1, MGY428H1, MGY460H1, MGY470H1
3. Up to 1.0 full-course equivalent may be taken from list 2: MGY434H1, MGY440H1, MGY480Y1, BCH428H1, BCH440H1, BCH441H1/CSB472H1, BCH447H1, BCH448H1, EEB460H1

Microbiology Stream:
2.5 credits from Microbiology Lists 1 and 2, distributed as follows:
1. + At least 1.5 full-course equivalent must be taken from list 1: BCH449H1; IMM428H1, IMM430H1, IMM435H1; LMP402H1, LMP403H1, LMP436H1; MGY428H1, MGY434H1, MGY440H1, MIJ485H1; NFS485H1
2. Up to 1.0 full-course equivalent may be taken from list 2: MGY360H1, MGY420H1, MGY425H1, MGY470H1, MGY480Y1, BCH350H1, BCH428H1, BCH441H1/CSB472H1, BCH445H1,

Description of Proposed Changes:
Update to completion requirements, reflecting the change to MGY379Y1 to two half-courses (MGY380H1, MGY381H1). Removing a long-retired first-year math course (MAT135Y1) from the enrolment requirements and completion requirements.

Rationale:

Impact:

Consultation:

Resource Implications:

2 New Courses:

MGY380H1: Microbiology Laboratory I: Bacteria

Impact on Programs:
This proposal triggers modifications in the unit's program(s)

Contact Hours:

Lecture: 12 / Practical: 36

Description:
A laboratory course in bacteriology. Students will perform a variety of genetic and biochemical experiments to identify and characterize unknown organisms, and learn how bacteria live together in biofilm and become resistance to antibiotics. Students will also learn important research tools and concepts including CRISPRi, transduction, and conjugation through experiments. Valuable not only for advanced work in microbiology but also in related fields that make use of bacteria and bacteriophages as research tools.

Prerequisites:
BIO120H1, BIO230H1/BIO255H1, HMB265H1/BIO260H1

Corequisites:
MGY377H1
### Exclusions:
- MGY379Y1

### Recommended Preparation:

### Breadth Requirements:
- Living Things and Their Environment (4)

### Distribution Requirements:
- Science

### Competencies:
- **Communication:** notably; **Critical and Creative Thinking:** extensively; **Information Literacy:** slightly
- **Quantitative Reasoning:** slightly; **Social and Ethical Responsibility:** none

### Experiential Learning:
- **Research:** none; **Other:** none

### Rationale:
We propose to split the current full-year MGY379Y microbiology laboratory course into two half-courses: MGY380H and MGY381H. The intent is to make it easier for students in the MGY major program to fit their lab course requirement (a minimum of 0.5 FCE) into their schedules, and to allow student who want both courses to take MGY381H in 4th year when they have fewer required courses to fit into their schedule. MGY380H and MGY381H would also be open to appropriately prepared students in other POSs, pending space available: as a 0.5FCE courses they would be easier to fit into schedules.

### Consultation:
The proposal to split MGY379Y into two H courses was discussed at the meeting of the Faculty of Medicine Undergrad Life Science Coordinators on Oct. 5, 2018. A complete draft of the current proposal was circulated to the Undergrad Chairs of BCH, IMM, and LMP on Dec 3, 2018.

### Resources:
Collectively, MGY380H1 and MGY381H1 will require the same resources as with the current full-year version of this lab course. We will be limited by the number of biological containment cabinets in which experiments with certain bacteria and viruses will be performed.

### Overlap with Existing Courses:
There are no other microbiology lab courses offered at UofT.

### Programs of Study for Which This Course Might be Suitable:
- MGY, BCH, IMM, LMP

### Estimated Enrolment:
- 24

### Instructor:
- Dr. Jun Liu

### MGY381H1: Microbiology Laboratory II: Viruses

### Impact on Programs:
This proposal triggers modifications in the unit's program(s)

### Contact Hours:
- **Lecture:** 12  /  **Practical:** 36

### Description:
Hands-on experiments provide the opportunity to develop skills in working safely with human viruses. Important concepts are learned through analysis of results. Topics include propagation and assay of viruses, examination of viruses by electron microscopy, replication kinetics, host response to infection and viral vectors. Valuable not only in microbiology but in fields using viruses as vectors.

Prerequisites:
BIO120H1, BIO230H1/BIO255H1, HMB265H1/BIO260H1, MGY380H1

Corequisites:
MGY378H1

Exclusions:
MGY379Y1

Recommended Preparation:

Breadth Requirements:
Living Things and Their Environment (4)

Distribution Requirements:
Science

Competencies:
Communication: notably; Critical and Creative Thinking: extensively; Information Literacy: slightly
Quantitative Reasoning: slightly; Social and Ethical Responsibility: none

Experiential Learning:
Research: none; Other: none

Rationale:
We propose to split the current full-year MGY379Y microbiology laboratory course into two half-courses: MGY380H and MGY381H. The intent is to make it easier for students in the MGY major program to fit their lab course requirement (a minimum of 0.5 FCE) into their schedules, and to allow student who want both courses to take MGY381H in 4th year when they have fewer required courses to fit into their schedule. MGY380H and MGY381H would also be open to appropriately prepared students in other POSts, pending space available: as a 0.5FCE courses they would be easier to fit into schedules.

Consultation:
The proposal to split MGY379Y into two H courses was discussed at the meeting of the Faculty of Medicine Undergrad Life Science Coordinators on Oct. 5, 2018. A complete draft of the current proposal was circulated to the Undergrad Chairs of BCH, IMM, and LMP on Dec 3, 2018.

Resources:
Collectively, MGY380H and MGY381H will require the same resources as with the current full-year version of this lab course (MGY379Y). We will be limited by the number of biological containment cabinets in which experiments with certain bacteria and viruses will be performed.

Overlap with Existing Courses:
There are no other microbiology lab courses offered at UofT.

Programs of Study for Which This Course Might be Suitable:
MGY, BCH, IMM, LMP

Estimated Enrolment:
12 to 24; max 26

Instructor:
Dr. Martha Brown
1 Course Modification:

MGY480Y1: Special Research Project

Prerequisites:
(BCH371H1/MGY312H1/MGY314H1/MGY315H1/MGY376H1/MGY379Y1/MGY380H1/MGY381H1), (MGY311Y1/BCH311H1/CSB349H1)

Rationale:
Update to prerequisites, reflecting the split of MGY379Y1 to two half-credit courses (MGY380H1, MGY381H1). Removing long-retired BCH and MGY courses. BCH371H1 was retired in 2013. MGY312H1 and MGY376H1 were retired in 2012.

Consultation:

Resources:

1 Retired Course:

MGY379Y1: Microbiology Laboratory

Rationale:
We propose to split the current full-year MGY379Y microbiology laboratory course into two half-courses: MGY380H and MGY381H. The intent is to make it easier for students in the MGY major program to fit their lab course requirement (a minimum of 0.5 FCE) into their schedules, and to allow student who want both courses to take MGY381H in 4th year when they have fewer required courses to fit into their schedule.
3 New Courses:

PCL218H1: Cannabis the Drug

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<th>Contact Hours:</th>
<th>Lecture: 24</th>
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| Description: |

There is a critical need for a breadth of understanding regarding its mechanism of action, pharmacological effects and its potential benefits and harms (short and long-term). Students will gain a breadth of understanding in cannabis related topics including pharmacology and toxicology, its role in mental health and addictions, medical use, drug policy and new drug development that stems from increased access to cannabis constituents. They will learn to differentiate myths and anecdotes from evidence-based knowledge. Going forward it is imperative that students spanning basic sciences through business, arts and engineering have a comprehensive understanding of these topics. PCL218H1 will give students for a variety of academic backgrounds a basic understanding of the health implications of cannabis which have broad implications for both our professional and personal lives.

| Prerequisites: |

none

| Corequisites: |

Exclusions:

Recommended Preparation:

Breadth Requirements:

Living Things and Their Environment (4)

Distribution Requirements:

Science

Competencies:

- **Communication**: notably;
- **Critical and Creative Thinking**: notably;
- **Information Literacy**: slightly
- **Quantitative Reasoning**: none;
- **Social and Ethical Responsibility**: slightly

Experiential Learning:

- **Research**: none;
- **Other**: notably;
- **Nature of "Other" Experiential Learning**: Service Learning

Rationale:

Cannabis is now legal in Canada and recreational and medical use is increasing. There is a critical need for a breadth of understanding regarding its mechanism of action, pharmacological effects and its potential benefits and harms (short and long-term). As the first G7 country to undertake legalization, Canada is in the spotlight regarding areas related to legalized cannabis including effects on individual’s health, increased understanding of its pharmacology and toxicology, and potential for new drug development.

Course goals/objectives:

• Provide a breadth of understanding of cannabis from a health and medical perspective
• Improve comprehension that will enhance professional development in a wide range of careers that intersect the cannabis field. These include science, medicine, health policy, business, engineering, harm reduction, mental health, medical writing, communications and economics.
Pharmacology & Toxicology (MED), Department of

- Develop critical evaluation and inquiry skills that enable skill required to access appropriate sources and of information regarding cannabis.

**Consultation:**
Discussed with Departmental Undergrad Education Committee. Proposal sent to Basic Medical Sciences Assoc Chairs UG and HMB for input/consultation.

**Resources:**
- TAs, Instructor

**Budget Implications:**
The academic unit will provide the resources required for this course from existing budget.

**Overlap with Existing Courses:**
Some of the topics introduced are expanded upon in much more depth in a more discipline specific manner in our upper year Pharmacology courses.

**Programs of Study for Which This Course Might be Suitable:**
Any student wishing to gain a breadth of knowledge regarding cannabis and its effects as a recreational drug, as the therapeutic agent, and as a potential for economic, and drug development

**Estimated Enrolment:**
- 120

**Instructor:**
- R.A. Ross

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**PCL475H1: Neuropsychopharmacology 1**

**Impact on Programs:**
This proposal triggers modifications in the unit's program(s)

**Contact Hours:**
- **Lecture:** 36  
- **Tutorial:** 12

**Description:**
Students will explore the major CNS neurological syndromes, examples include pain, epilepsy, the sleep-wake cycle and relate neurological abnormalities. Lectures will discuss major classes of drugs used to mitigate and treat these disorder, their mechanisms of action, clinical use and unwanted effects. This course was previously offered as PCL475Y1.

**Prerequisites:**
Completion of at least 9.0 FCE

**Corequisites:**

**Exclusions:**
- PCL475Y1; PSY396H1

**Recommended Preparation:**

**Breadth Requirements:**
- Living Things and Their Environment (4)

**Distribution Requirements:**
- Science

**Competencies:**
- *Communication:* slightly; *Critical and Creative Thinking:* notably; *Information Literacy:* none
Rationale:
This course is the result of changing our currently offered PCL475Y course, Neuropsychopharmacology, which has been offered for over 30 years into two 0.5 FCE courses. This increases flexibility for students and faculty involvement.

This elective course expands on some CNS drug topics introduced in our core Pharmacology (PCL470H1F) and Biomedical Toxicology (PCL473Y1) courses. Students interested continuing research in neurosciences and pharmacology/toxicology or drug development will gain a strong background on what currently available drugs and some of the issues associated with the pharmacotherapy used for these disorder.

Consultation:
Discussed with Pharm and Tox Undergrad Committee. Discussed with basic medical science advisory committee in Fall 2018

Resources:
Instructor (same individual that has been teaching PCL475Y) and TA

Budget Implications: The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses:
Some topics covered in this course may be introduced in PCL470H1 or PCL473Y but this course goes much deeper into both brain and drug mechanisms than what is covered in our core courses.

There is one hour of overlap between PCL475Y and PCL389H on drug tolerance and withdrawal. PSY396H1 is excluded due to their teaching similar concepts in neuropsychopharmacology to their psychology students.

Programs of Study for Which This Course Might be Suitable:
Students in our Pharmacology and Biomedical Toxicology Specialist and Major programs; Neuroscience Major and Specialist students; students in other life sciences interested in gaining appreciation for drugs that act in the brain.

Estimated Enrolment:
50

Instructor:
W. M Burnham

PCL476H1: Neuropsychopharmacology 2

Impact on Programs:
This proposal triggers modifications in the unit's program(s)

Contact Hours:
Lecture: 36 / Tutorial: 12

Description:
Students will explore the major CNS neurological syndromes which may include anxiety, schizophrenia and depression/mania and their relate neurological abnormalities. Lectures will discuss major classes of drugs used to mitigate and treat these disorders, their mechanisms of action, clinical use and unwanted effects.

Prerequisites:
Completion of at least 9.0 FCE
Pharmacology & Toxicology (MED), Department of

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<th>Corequisites:</th>
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<tr>
<td>Exclusions:</td>
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<tr>
<td>PCL475Y1; PSY396H1</td>
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<tr>
<td>Recommended Preparation:</td>
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<td>Breadth Requirements:</td>
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<td>Living Things and Their Environment (4)</td>
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<td>Distribution Requirements:</td>
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<td>Science</td>
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<tr>
<td>Competencies:</td>
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<tr>
<td>Communication: none; Critical and Creative Thinking: notably; Information Literacy: slightly</td>
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<tr>
<td>Quantitative Reasoning: none; Social and Ethical Responsibility: notably</td>
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<tr>
<td>Experiential Learning:</td>
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<tr>
<td>Research: none; Other: none</td>
</tr>
<tr>
<td>Rationale:</td>
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</tbody>
</table>
This course is the result of changing our currently offered PCL475Y course, Neuropsychopharmacology, which has been offered for over 30 years into two 0.5 FCE courses. This increases flexibility for students and faculty involvement.

This elective course expands on some CNS drug topics introduced in our core Pharmacology (PCL470H1F) and Biomedical Toxicology (PCL473Y1) courses. Students interested continuing research in neurosciences and pharmacology/toxicology or drug development will gain a strong background on what currently available drugs and some of the issues associated with the pharmacotherapy used for these disorder.

Consultation: |
Discussed with Pharm and Tox Undergrad Committee. Discussed at Basic Medical Science Committee.

Resources: |
Instructor (same individual who taught PCL475Y) and TA

Budget Implications: |
The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses: |
Some topics covered in this course may be introduced in PCL470H1 or PCL473Y but this course goes much deeper into both brain and drug mechanisms than what is covered in our core courses.

There is one hour of overlap between PCL475Y and PCL389H on drug tolerance and withdrawal. PSY396H1 is excluded due to their teaching similar concepts in neuropsychopharmacology to their psychology students.

Programs of Study for Which This Course Might be Suitable: |

Estimated Enrolment: |

Instructor: |

1 Retired Course:
PCL475Y1: Neuropsychopharmacology

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<th>Rationale:</th>
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5 Program Revisions:

Biomedical Toxicology Major

Completion Requirements:

Students will follow the calendar year in which they initially enter one of our programs (ie for the majority of students that will be ASMAJ2675).

(8 full courses or their equivalent)

First Year: BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1

Second Year: BCH210H1; BIO230H1/BIO255H1; PCL201H1; CHM247H1/CHM249H1; (PSL300H1, PSL301H1)/PSL302Y (NOTE: PSL201Y1 is not acceptable).

Third Year: PCL302H1; PCL362H1.

Third or Fourth Year: 1.0 full-credit equivalent with at least one-half credit equivalent from PCL courses: JPM300H1/JPM400Y1/PCL345H1/PCL367H1/PCL368H1/PCL389H1/PCL402H1/PCL475H1/PCL476H1/PCL475Y1/PCL477H1/PCL481H1/PCL483H1/PCL486H1/PCL490H1/ANA301H1/LMP301H1/LMP363H1.

Fourth Year: (PCL482H1, PCL483H1)/PCL473Y1

NOTES

1. Students are not allowed to enroll concurrently in the Major Program in Pharmacology and the Major Program in Toxicology

2. Students are not allowed to enroll concurrently in the Major Program in Pharmacology and a Specialist Program in Toxicology.

3. Students are not permitted to take PCL472Y1 or PCL474Y1.

Description of Proposed Changes:

Reflecting split in PCL475Y1 to two half-credit courses: PCL475H1 and PCL476H1

Rationale:

Impact:

Consultation:

Resource Implications:

Biomedical Toxicology Specialist

Completion Requirements:
Students will follow the calendar year in which they initially enter one of our programs (ie for the majority of students that will be ASSPE2340).

(14.5 full courses or their equivalent)

First Year: BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1; and 1 FCE from any combination of (MAT135H1, MAT136H1); PHY131H1/PHY151H1; PHY132H1/PHY152H1 (see NOTE 1)

Second Year: BCH210H1; BIO230H1/BIO255H1; BIO260H1/HMB265H1; CHM247H1/CHM249H1; STA288H1; PCL201H1; (PSL300H1, PSL301H1)/PSL302Y (NOTE: PSL201Y1 is not acceptable).

Third Year: PCL302H1; PCL362H1; at least 0.5 FCE from PCL367H1 or PCL368H1

Third or Fourth Year: LMP363H1 and two and a half (2.5 FCE) full-credit equivalent with at least 1.5 full credit equivalent from PCL courses: JPM300H1/PCL345H1/PCL367H1 or PCL368H1 (see NOTE 2)/PCL389H1/PCL475H1/PCL476H1/PCL475Y1/PCL477H1/PCL484H1/PCL486H1/PCL490H1/JPM400Y1/ANA301H1/CHM310H1/ESS463H1/LMP301H1.

Fourth Year: PCL402H1; (PCL482H1, PCL483H1)/PCL473Y1; PCL474Y1/JPM400Y1 (see NOTE 3); PCL481H1.

An Integrative, Inquiry-Based Activity Requirement must be satisfied.

The requirement for an integrative, inquiry-based and/or experiential activity must be met by completing at least one of the following: PCL297H1, PCL389H1, PCL397Y0, PCL472Y1, PCL474Y1, JPM400Y1, Professional Experience Year

NOTES
1. Any PHY/MAT courses should be completed during the first year and included for program enrollment.

2. At least 0.5 FCE from PCL367H1 or PCL368H1 is required for the program, however if desired the alternative course can be taken as a program elective.

3. Enrollment in any of PCL474Y1 or JPM400Y1 is limited and requires permission from the Department of Pharmacology and Toxicology. Students must receive prior consent from the course coordinator according to Departmental guidelines before the Department will register them in the course. Students can take either course as their required independent project, or may take JPM400Y1 as an additional elective. It is the student’s responsibility to make all necessary preparations before the session starts (see course description).

**Professional Experience Year:**

The Professional Experience Year (PEY) internship program is a 12-16 month paid employment placement within pharmaceutical/biotechnology/chemical companies, university research laboratories, university-affiliated organizations, consulting companies or government research agencies. The PEY takes place between the 3rd and 4th years of undergraduate study and is open to Specialists in Biomedical Toxicology who have a CGPA of at least 3.0. Students who participate in this program agree to return to their SPE program in the Department to complete their 4th year and their degree. The PEY internship provides an excellent opportunity for real-world experience in drug development, project management, client relations, basic and clinical research, information management and regulatory affairs.

**Description of Proposed Changes:**

- Reflecting split in PCL475Y1 to two half-credit courses: PCL475H1 and PCL476H1

**Rationale:**

**Impact:**

**Consultation:**

**Resource Implications:**
Pharmacology & Toxicology (MED), Department of

Pharmacology Major

Completion Requirements:

Students will follow the calendar year in which they initially enter one of our programs (i.e. for the majority of students that will be ASMAJ2675).

(8 full courses or their equivalent)

First Year: BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1

Second Year: BCH210H1; BIO230H1/BIO255H1; PCL201H1; CHM247H1/CHM249H1; (PSL300H1, PSL301H1)/PSL302Y (NOTE: PSL201Y1 is not acceptable).

Third Year: PCL302H1; BCH311H1/PSL350H1

Third or Fourth Year: PCL469H1 and 1.0 full course equivalent from: JPM300H1/JPM400Y1/PCL345H1/PCL367H1/PCL368H1/PCL389H1/PCL402H1/PCL475H1/PCL476H1/PCL475Y1/PCL477H1/PCL484H1/PCL486H1/PCL490H1

Fourth Year: PCL470H1/PCL470Y1

NOTES
1. Students are not allowed to enroll concurrently in the Major Program in Pharmacology and the Major Program in Toxicology.
2. Students are not allowed to enroll concurrently in the Major Program in Pharmacology and a Specialist Program in Toxicology.
3. Students are not permitted to take PCL472Y1 or PCL474Y1.

Description of Proposed Changes:
Reflecting split in PCL475Y1 to two half-credit courses: PCL475H1 and PCL476H1

Rationale:

Impact:

Consultation:

Resource Implications:

Pharmacology Specialist

Completion Requirements:

Students will follow the calendar year in which they initially enter one of our programs (i.e. for the majority of students that will be ASSPE2340).

(14.5 full courses or their equivalent)

First Year: BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1; and 1 FCE from
any combination of (MAT135H1, MAT136H1); PHY131H1/PHY151H1; PHY132H1/PHY152H1 (see NOTE 1)

Second Year: BCH210H1; BIO230H1/BIO255H1; BIO260H1/HMB265H1; CHM247H1/CHM249H1; STA288H1; PCL201H1; (PSL300H1, PSL301H1)/PSL302Y (NOTE: PSL201Y1 is not acceptable).

Third Year: BCH311H1/PSL350H1; PCL302H1; at least 0.5 FCE from PCL367H1 or PCL368H1

Third or Fourth Year: PCL469H1 and 3.5 full-course equivalents with at least 1.5 full credit equivalents from PCL courses: JPM300H1/PCL345H1/PCL367H1 or PCL368H1 (see NOTE 2)/PCL389H1/PCL475H1/PCL476H1/PCL475Y1/PCL477H1/PCL484H1/PCL486H1/PCL490H1/JPM400Y1/ANA300Y1/BCH340H1/BCH350H1

Fourth Year: PCL402H1; PCL470H1/PCL470Y1; PCL472Y1/JPM400Y1 (see NOTE 3)

An Integrative, Inquiry-Based Activity Requirement must be satisfied.

The requirement for an integrative, inquiry-based and/or experiential activity must be met by completing at least one of the following: PCL297H1, PCL389H1, PCL397Y0, PCL472Y1, PCL474Y1, JPM400Y1, Professional Experience Year

Notes

1. Any PHY/MAT courses should be completed during the first year and included for program enrollment.

2. At least 0.5 FCE from PCL367H1 or PCL368H1 is required for the program, however if desired the alternative course can be taken as a program elective.

3. Enrollment in either PCL472Y1 or JPM400Y1 is limited and requires permission from the Department of Pharmacology and Toxicology. Students must receive prior consent from course coordinator according to Departmental guidelines before the Department will register them in the course. Students can take either course as their required independent project, or may take JPM400Y1 as an additional elective. It is the student’s responsibility to make all necessary preparations before the session starts (see course description).

Professional Experience Year:

The Professional Experience Year (PEY) internship program is a 12-16 month paid employment placement within pharmaceutical/biotechnology/chemical companies, university research laboratories, university-affiliated organizations, consulting companies or government research agencies. The PEY takes place between the 3rd and 4th years of undergraduate study and is open to Specialists in Pharmacology who have a cGPA of at least 3.0. Students who participate in this program agree to return to their SPE program in the Department to complete their 4th year and their degree. The PEY internship provides an excellent opportunity for real-world experience in drug development, project management, client relations, basic and clinical research, information management and regulatory affairs.

Description of Proposed Changes:
Reflecting split in PCL475Y1 to two half-credit courses: PCL475H1 and PCL476H1

Rationale:

Impact:

Consultation:

Resource Implications:
Pharmacology & Toxicology (MED), Department of

Specialist in Pharmacology and Biomedical Toxicology

Completion Requirements:

Students will follow the calendar year in which they initially enter one of our programs (ie for the majority of students that will be ASSPE2340).

(15 full courses or their equivalent)

First Year: BIO120H1; BIO130H1; (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1; and 1 FCE from any combination of (MAT135H1, MAT136H1); PHY131H1/PHY151H1; PHY132H1/PHY152H1 (see NOTE 1)

Second Year: BCH210H1; BIO230H1/BIO255H1; BIO260H1/HMB265H1; CHM247H1/CHM249H1; STA288H1; PCL201H1; (PSL300H1, PSL301H1)/PSL302Y (NOTE: PSL201Y1 is not acceptable).

Third Year: BCH311H1/PSL350H1; PCL302H1; PCL362H1; at least 0.5 FCE from PCL367H1 or PCL368H1 (see NOTE 2)

Third or Fourth Year: LMP363H1, PCL469H1, and a one and half (1.5 FCE) full-credit equivalent from the following courses: JPM300H1/PCL345H1/PCL367H1 or PCL368H1 (see NOTE 2)/PCL389H1/PCL475H1/PCL476H1/PCL475Y1/PCL477H1/PCL484H1/PCL486H1/PCL490H1/JPM400Y1/LMP301H1. Additional courses that may strengthen your background in this program can be taken, but will not count towards your program: ANA300Y1/ANA301H1/BCH340H1/CHM310H1/ESS463H1

Fourth Year: PCL402H1; PCL470H1/PCL470Y1; (PCL482H1, PCL483H1)/PCL473Y1; PCL472Y1/PCL474Y1/JPM400Y1 (see NOTE 3); PCL481H1.

An Integrative, Inquiry-Based Activity Requirement must be satisfied.

The requirement for an integrative, inquiry-based and/or experiential activity must be met by completing at least one of the following: PCL297H1, PCL389H1, PCL397Y0, PCL472Y1, PCL474Y1, JPM400Y1, Professional Experience Year.

NOTES
1. Any PHY/MAT courses should be completed during the first year and included for program enrollment.
2. At least 0.5 FCE from PCL367H1 or PCL368H1 is required for the program, however if desired the alternative course can be taken as a program elective.
3. Enrollment in any of PCL472Y1/PCL474Y1 or JPM400Y1 is limited and requires permission from the Department of Pharmacology and Toxicology. Students must receive prior consent from the course coordinator according to Departmental guidelines before the Department will register them in the course. Students can take either course as their required independent project, or may take JPM400Y1 as an additional elective. It is the student’s responsibility to make all necessary preparations before the session starts (see course description).

Professional Experience Year:

The Professional Experience Year (PEY) internship program is a 12-16 month paid employment placement within pharmaceutical/biotechnology/chemical companies, university research laboratories, university-affiliated organizations, consulting companies or government research agencies. The PEY takes place between the 3rd and 4th years of undergraduate study and is open to Specialists in Pharmacology and Biomedical Toxicology who have a cGPA of at least 3.0. Students who participate in this program agree to return to their SPE program in the Department to complete their 4th year and their degree. The PEY internship provides an excellent opportunity for real-world experience in drug development, project management, client relations, basic and clinical research, information management and regulatory affairs.
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5 Minor Program Modifications:

Biological Physics Specialist: Biochemistry Stream

Completion Requirements:

Core Biological Physics Courses (11.5 FCE):

First Year (3.0 FCE): (CHM138H1/CHM136H1, CHM139H1/CHM135H1)/CHM151Y1, (MAT135H1, MAT136H1)/MAT137Y1, PHY131H1/PHY151H1, PHY132H1/PHY152H1 (PHY151H1, PHY152H1 recommended)

First or Second Year (1.0 FCE): BIO130H1, MAT223H1

Second Year (3.0 FCE): BCH210H1, (MAT235Y1/MAT237Y1), MAT244H1, PHY250H1, PHY252H1

Second or Third Year (0.5 FCE): BIO230H1/BIO255H1

Third Year (2.0 FCE): PHY224H1, PHY254H1, PHY256H1, PHY354H1

Third or Fourth Year (2.0 FCE):
1. PHY331H1
2. PHY324H1/BCH370H1/CHM327H1/PSL372H1
3. 1.0 FCE, including at least 0.5 FCE at the 400 level, from APM346H1/MAT334H1/MAT354H1/PHY-300 level courses/PHY-400 level courses.

Additional Courses for the Biochemistry Stream (2.5 FCE):

1. BCH311H1, BCH340H1
2. 1.5 FCE from BCH370H1/CSB428H1/BCH400-level BCH courses. Excludes BCH472Y1, BCH473Y1, BCH478H1, BCH479H1

Integrative, Inquiry-Based Activity Requirement

The choices in the program must satisfy the requirement for an integrative, inquiry-based activity by including at least one of the following courses: IMM435H1, PHY371Y1, PHY372H1, PHY396Y0, PHY397Y0, PHY398H0, PHY399Y0, PHY407H1, PHY424H1, PHY426H1, PHY428H1, PHY429H1, PHY471Y1, PHY472H1, PHY478H1, PHY479Y1, PSL304H1, PSL305H1, and PSL372H1

Notes:

Students are encouraged but not required to enroll in the independent project courses PHY478H1/PHY479Y1. These students may be supervised by faculty in the Departments of Physics, Biochemistry, Chemistry, Immunology, and Physiology. Students are required to have a B average in the program courses, identify a supervisor, and consult the Associate Chair of Physics (Undergraduate Studies) before enrolling in PHY478H1/PHY479Y1.

Students might wish to enroll in 300- and 400-level courses in the partner life science departments that are not listed above. These students will need approval to take these courses from the Associate Chair (Undergraduate Studies) prior to enrollment in the course.

On approval of the Department of Physics, students who enroll in CHM222H1/CHM225Y1 will not have to take PHY252H1. PHY 252H1 is required for the Life Science and Advanced Physics Stream.
Physics (FAS), Department of

Description of Proposed Changes:

Rationale:

Impact:

Consultation:

Resource Implications:

Biological Physics Specialist: Immunology Stream

Completion Requirements:

Core Biological Physics Courses (11.5 FCE)

First Year (3.0 FCE): (CHM138H1/CHM136H1, CHM139H1/CHM135H1)/CHM151Y1, (MAT135H1, MAT136H1)/MAT137Y1, PHY131H1/PHY151H1, PHY132H1/PHY152H1 (PHY151H1, PHY152H1 recommended)

First or Second Year (1.0 FCE): BIO130H1, MAT223H1

Second Year (3.0 FCE): BCH210H1, (MAT235Y1/MAT237Y1), MAT244H1, PHY250H1, PHY252H1

Second or Third Year (0.5 FCE): BIO230H1/BIO255H1

Third Year (2.0 FCE): PHY224H1, PHY254H1, PHY256H1, PHY354H1

Third or Fourth Year (2.0 FCE):
1. PHY331H1
2. PHY324H1/BCH370H1/CHM327H1/PSL372H1
3. 1.0 FCE, including at least 0.5 FCE at the 400 level, from APM346H1/MAT334H1/MAT354H1/PHY-300 level courses/PHY-400 level courses.

Additional Courses for the Immunology Stream (2.0-2.5 FCE):

1. BIO230H1: IMM341H1, IMM351H1 (Students in the Biological Physics Specialist Immunology Stream are permitted to take BIO230H1 as a co-requisite to IMM341H1, instead of as a prerequisite, by permission of the Department of Immunology)
2. 1.0 FCE from IMM400-level courses.

Integrative, Inquiry-Based Activity Requirement

The choices in the program must satisfy the requirement for an integrative, inquiry-based activity by including at least one of the following courses: IMM435H1, PHY371Y1, PHY372H1, PHY396Y0, PHY397Y0, PHY398H0, PHY399Y0, PHY407H1, PHY424H1, PHY426H1, PHY428H1, PHY429H1, PHY471Y1, PHY472H1, PHY478H1, PHY479Y1, PSL304H1, PSL305H1, and PSL372H1

Notes:

Students are encouraged but not required to enroll in the independent project courses PHY478H1/PHY479Y1. These students may be supervised by faculty in the Departments of Physics, Biochemistry, Chemistry, Immunology, and Physiology. Students are required to have a B average in the program courses, identify a supervisor, and consult the
Physics (FAS), Department of

Associate Chair of Physics (Undergraduate Studies) before enrolling in PHY478H1/PHY479Y1.

Students might wish to enroll in 300- and 400-level courses in the partner life science departments that are not listed above. These students will need approval to take these courses from the Associate Chair (Undergraduate Studies) prior to enrollment in the course.

On approval of the Department of Physics, students who enroll in CHM222H1/CHM225Y1 will not have to take PHY252H1. PHY 252H1 is required for the Life Science and Advanced Physics Stream.

Description of Proposed Changes:

Rationale:

Impact:

Consultation:

Resource Implications:

Physics Major

Description:

Previous:

New:

A Physics Major program is appropriate for students interested in a more flexible and diverse undergraduate physics program. A Physics Major may be tailored to be a natural counterpart to a second Major in mathematics, astronomy, computer science, environmental science, geology or the life sciences. Students should consult the Associate Chairs (Undergraduate Studies) of Physics and the respective departments for advice on course selections.

Completion Requirements:

(8.0 FCE including at least 2.0 FCE at the 300+ level, with at least 0.5 FCE at the 400 level)

A Physics Major program is appropriate for students interested in a more flexible and diverse undergraduate physics program. A Physics Major may be tailored to be a natural counterpart to a second Major in mathematics, astronomy, computer science, environmental science, geology or the life sciences. Students should consult the Associate Chairs (Undergraduate Studies) of Physics and the respective departments for advice on course selections.

First Year: (2.0 FCE)

(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1, PHY131H1/PHY151H1, PHY132H1/PHY152H1

Second Year: (3.0 FCE)

1. MAT235Y1/MAT237Y1/MAT257Y1, MAT223H1/MAT240H1, PHY224H1
2. 1.0 FCE from PHY231H1, PHY331H1, PHY250H1, PHY252H1, PHY254H1, PHY256H1

Third Year: (2.5 FCE)
Physics (FAS), Department of

1. MAT244H1/MAT267H1, PHY324H1/PHY405H1/PHY407H1/PHY408H1

2. 1.5 FCE, including at least 0.5 FCE at the PHY400 level, from APM346H1/MAT334H1/MAT354H1; PHY-300 level courses/PHY-400 level courses/JPE395H1/JPE493H1, excluding JPH311H1, JPH441H1

Third or Fourth Year: (0.5 FCE)

1. Ethics and Social Responsibility Requirement: The Physics course JPH441H1 meets this requirement as well as any of the following courses: ETH201H1/ETH210H1/ETH220H1/ ETH230H1/HPS200H1/PHL233H1 PHL265H1/ PHL273H1/PHL275H1/PHL281H1/IMC200H1/VIC172Y1/ENV333H1. See Note 2.

Notes:

1. Students in the Physics Major program who are intending to pursue graduate studies in Physics should consult with the Associate Chair (Undergraduate Studies).

2. Requirement 1 in Third or Fourth Year represents 0.5 FCE with a significant emphasis on "Ethics and Social Responsibility". Students may use the CR/NCR option towards any of the courses listed in Requirement 1. Another Arts & Science course with a significant emphasis on "Ethics and Social Responsibility" may be substituted subject to approval from the Associate Chair (Undergraduate Studies).

Description of Proposed Changes:

Rationale:

Impact:

Consultation:

Resource Implications:

Physics Specialist

Description:

Previous:

New:

The Physics Specialist Program offers rigorous training in the full spectrum of core physics subfields, as well as their numerous important applications. Practical courses treat the experimental and computational aspects and complement the lecture courses. Physics concerns many of the most fundamental questions in our scientific understanding of the universe. What is the nature of matter and energy at the smallest scales? What are the physical processes that govern the Earth’s climate? What is the nature of light and how can it be controlled? How do the collective properties of solids emerge from those of individual atoms? How do biological processes organize themselves to maintain their survival? What is the structure and evolution of the Earth and the other planets? How can quantum information be used for computation? Physics seeks answers to these questions using a combination of theory, computation and precise experimental work, and the results find application across all of science .

Consult the Associate Chair (Undergraduate Studies), Department of Physics .

Completion Requirements:
The Physics Specialist Program offers rigorous training in the full spectrum of core physics subfields; as well as their numerous important applications: Practical courses treat the experimental and computational aspects and complement the lecture courses: Physics concerns many of the most fundamental questions in our scientific understanding of the universe: What is the nature of matter and energy at the smallest scales? What are the physical processes that govern the Earth’s climate? What is the nature of light and how can it be controlled? How do the collective properties of solids emerge from those of individual atoms? How do biological processes organize themselves to maintain their survival? What is the structure and evolution of the Earth and the other planets? How can quantum information be used for computation? Physics seeks answers to these questions using a combination of theory, computation and precise experimental work; and the results find application across all of science:

Consult the Associate Chair (Undergraduate Studies); Department of Physics:

(13.5 FCE, including at least one full course at the 400 level)

First Year: (2.5 FCE)

(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, PHY131H1/PHY151H1, PHY132H1/PHY152H1

(The courses MAT137Y1, MAT223H1, PHY151H1, PHY152H1 are recommended.)

Second Year: (4.0 FCE)

MAT237Y1/MAT257Y1/MAT235Y1, MAT244H1/MAT267H1, PHY224H1, PHY250H1, PHY252H1, PHY254H1, PHY256H1

(The courses MAT237Y1, MAT244H1 are recommended.)

Second or Third Year: (0.5 FCE)

PHY324H1

Third Year: (3.0 FCE)

1. APM346H1, MAT334H1/MAT354H1, PHY350H1, PHY354H1, PHY356H1
2. Additional 0.5 FCE from PHY-300 level courses/PHY-400 level courses/JPE395H1/JPE493H1, excluding JPH311H1, JPH441H1

Third or Fourth Year: (3.5 FCE)

1. PHY424H1
2. 1.0 FCE from PHY450H1, PHY452H1, PHY454H1, PHY456H1, PHY460H1
3. PHY405H1/PHY407H1/PHY408H1/PHY426H1/PHY478H1. See Note 2.
4. 1.0 FCE, including at least 0.5 FCE at the PHY-400 level, from PHY-300 level courses/PHY-400 level courses/JPE395H1/JPE493H1, excluding JPH311H1, JPH441H1
5. Ethics and Social Responsibility Requirement: The Physics course JPH441H1 meets this requirement as well as any of the following courses: ETH201H1/ETH210H1/ETH220H1/ETH230H1/HPS200H1/PHL233H1/PHL265H1/PHL273H1/PHL275H1/PHL281H1/IMC200H1/VIC172Y1/ENV333H1. See Note 3.
Notes:

1. Students are encouraged but not required to enrol in the independent study and project courses such as PHY371Y1, PHY478H1, etc.

2. PHY479Y1 (Undergraduate Research Project) satisfies Requirement 3 in Third or Fourth Year and counts as 0.5 FCE at the PHY–400 level for Requirement 4 in Third or Fourth Year. Students may use MAT351Y1 instead of APM346H1 for Requirement 1 in Third Year.

3. Requirement 5 in Third or Fourth Year represents 0.5 FCE with a significant emphasis on "Ethics and Social Responsibility". Students may use the CR/NCR option towards any of the courses listed in Requirement 5. Another Arts & Science course with a significant emphasis on "Ethics and Social Responsibility" may be substituted subject to approval from the Associate Chair (Undergraduate Studies).

4. The requirement for an integrative, inquiry-based activity is satisfied by the required course PHY424H1.

Description of Proposed Changes:

Rationale:

Impact:

Consultation:

Resource Implications:

Physics and Philosophy Specialist

Description:

Previous: 

New:

Physics has deep historical roots in natural philosophy and many aspects of contemporary Physics raise profound philosophical questions about the nature of reality. The interdisciplinary Physics and Philosophy Program allows the student to engage with both Physics and Philosophy at their deepest levels, and to more fully explore the connections between them.

Consult Associate Chair (Undergraduate Studies), Department of Physics or Philosophy.

Completion Requirements:

Physics has deep historical roots in natural philosophy and many aspects of contemporary Physics raise profound philosophical questions about the nature of reality. The interdisciplinary Physics and Philosophy Program allows the student to engage with both Physics and Philosophy at their deepest levels, and to more fully explore the connections between them.

Consult Associate Chair (Undergraduate Studies), Department of Physics or Philosophy.

(15.0 ±6.0 full courses or their equivalent (FCE), including at least 1.5 FCE ±6.0 full courses at the 400 level)

First Year: (2.5 ±3.5 FCE)
(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, PHY131H1/PHY151H1, PHY132H1/PHY152H1; PHL100Y1/PHL101Y1

(The courses MAT137Y1, MAT223H1, PHY151H1, PHY152H1 are recommended.)

First or Second Year: (1.5 FCE)

1.5 FCE of: PHL232H1/PHL233H1/PHL240H1/PHL245H1/HPS250H1 (PHL245H1 may only be counted here if MAT157Y1 is not taken)

Second Year: (3.0 3.5 FCE)

MAT237Y1/MAT257Y1/MAT235Y1, MAT244H1/MAT267H1, PHY250H1, PHY254H1, PHY256H1; HPS250H1

(The courses MAT237Y1, MAT244H1 are recommended.)

Third Year: (2.0 2.5 FCE)

MAT334H1/MAT354H1, PHY252H1; PHY354H1, (PHY350H1/PHY354H1), PHY356H1

Fourth Year: (1.0 1.5 FCE)

PHY456H1; (PHY483H1/PHY452H1), PHY491H1

Any Year: (5.0 FCE)

PHL245H1; (PHL345H1/PHL347H1/PHL348H1/PHL349H1), PHL355H1, PHL356H1, (PHL415H1/PHL482H1), plus 1.0 FCE of (PHL325H1/PHL331H1/PHL332H1/PHL346H1/PHL357H1) plus 2.0 2.5 FCE additional PHL courses, including at least 0.5 FCE of which must be from at the Philosophy Value Theory Course Group (The courses PHL265H1, PHL275H1 are recommended.) 300+ level

Description of Proposed Changes:

Rationale:
The changes were meant to make the philosophy requirements for P&P more sensible, focusing more on philosophy of science and metaphysics, and to streamline the physics requirements to focus on relativity and quantum mechanics, the areas of physics most of concern to philosophers.

Impact:

Consultation:

Resource Implications:
1 Minor Program Modification:

Physiology Specialist

Completion Requirements:

(14 full courses or their equivalent)

First Year:
BIO120H1/PSL190H1, BIO130H1; ((CHM135H1/CHM139H), (CHM136H1/CHM138H))/CHM151Y1 ; [(PHY131H1, PHY132H1)])/PHY151H1, PHY152H1)

First Year or Upper Years:
(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1

Second Year:
1. + 2.5 full course equivalents from BCH210H1; BIO230H1/BIO255H1; CHM220H1/CHM247H1/CHM249H1; PSL300H1, PSL301H1
2. 1.5 full course equivalents from BIO220H1, BIO260H1/HMB265H1; MAT235Y1, PHY231H1, PSL299Y1/PSL399Y1, STA220H1/STA250H1

Third Year:
1. + 3 full course equivalents from BCH370H1; PSL304H1, PSL305H1, PSL350H1/CSB349H1/BCH311H1, PSL372H1, PSL374H1
2. 1 full course equivalent from the following list: ANA300Y1, ANA301H1; BME498Y1; CSB325H1, CSB332H/CJH332H1, CSB343H1, CSB345H1/CSB445H1, CSB346H1, CSB347H1; IMM340H1/IMM341H1, IMM350H1/IMM351H1 ; JPM300H1; PCL201H1, PCL285H, PCL302H1; PHY331H1, PSL310H1; PSL378H1/PSL379H1/ PSL398H1; PSY397H1

Fourth Year: (at least 2 FCEs at 400-level)
1. + PSL496Y/PSL497H1/PSL498Y1/PSL499H1/JPM400Y1
2. 1-1.5 full course equivalents from PSL400-series or HMB430H1/HMB470H1/HMB472H1

*These courses may be taken in the first year or subsequent years, and are not required for entrance into the specialist program.

Description of Proposed Changes:
New courses added

Rationale:

Impact:

Consultation:

Resource Implications:
1 Minor Program Modification:

Data Science Specialist

Completion Requirements:

(13.0–13.5 Full Course Equivalents [FCEs], including at least 1.5 FCEs at the 400-level)

First year (3.0 FCEs)
MAT137Y1/MAT157Y1; MAT223H1/MAT240H1 (MAT240H1 is recommended); STA130H1; CSC108H1; CSC148H1;
Note: Students with a strong background in an object-oriented language such as Python, Java or C++ may omit
CSC108H1 and proceed directly with CSC148H1. There is no need to replace the missing half-credit for program
completion; however, please base your course choice on what you are ready to take, not on "saving" a half-credit. Consult
with the Computer Science Undergraduate Office for advice on choosing between CSC108H1 and CSC148H1.

Second year (3.5–4.0 FCEs)
MAT237Y1/MAT257Y1; STA257H1; STA261H1; CSC207H1; (CSC165H1, CSC236H1)/CSC240H1 (CSC240H1 is
recommended); JSC270H1 (Data Science I)
Note: CSC240H1 is an accelerated and enriched version of CSC165H1 plus CSC236H1, intended for students with a
strong mathematical background, or who develop an interest after taking CSC165H1. If you take CSC240H1 without
CSC165H1, there is no need to replace the missing half-credit for program completion; however, please base your course
choice on what you are ready to take, not on "saving" a half-credit. Consult the Computer Science Undergraduate Office
for advice on choosing between CSC165H1 and CSC240H1.

Third year (3.5 FCEs)
STA302H1; one of STA303H1 or STA305H1; STA355H1; CSC209H1; CSC263H1/CSC265H1 (CSC265H1 is
recommended); CSC343H1; JSC370H1 (Methods of Data Science II)

Fourth year (3.0 FCEs)
1. CSC373H1;
2. STA314H1/CSC311H1/one of STA414H1, CSC411H1;
3. JSC470H1 (Data Science III);
4. 1.5 FCEs from the following list, including at least 1.0 FCE at the 400 level: STA303H1/STA305H1 (whichever one
was not taken in third year), STA347H1, CSC401H1, STA414H1/CSC412H1, CSC413H1/CSC421H1, any 400-level
STA course

Students will be advised to develop domain expertise in at least one area where Data Science is applicable, by taking a
sequence of courses in that area throughout their program. Examples of such areas will be provided to students by program
advisors and will form the basis for a later proposal for program Focuses (to be approved through internal Arts & Science
governance procedures).

Description of Proposed Changes:

Revisions to course requirements in fourth year, to take into account recent additions and changes to 300-/400-level
STA and CSC courses in Machine Learning; minor formatting changes.

Rationale:

Impact:

Consultation:
Discussion between François Pitt (Computer Science) and Nathan Taback (Statistical Sciences) on December 19, 2018.
3 New Courses:

JSC370H1: Data Science II

Contact Hours:
- Lecture: 24
- Practical: 24

Description:
This course is restricted to students in the Data Science Specialist program. Students will learn to identify and answer questions through the application of exploratory data analysis, data visualization, statistical methods or machine learning algorithms to complex data. Software development for data science and reproducible workflows. Communication of statistical information at various technical levels, ethical practice of data analysis and software development, and teamwork skills. Topics will be explored through case studies and collaboration with researchers in other fields.

Prerequisites:
- JSC270H1, STA261H1, MAT237Y1/MAT257Y1, CSC263H1, STA302H1, CSC343H1

Corequisites:
- STA303H1/STA305H1

Exclusions:

Recommended Preparation:

Breadth Requirements:
The Physical and Mathematical Universes (5)

Distribution Requirements:
- Science

Competencies:
- Communication: notably; Critical and Creative Thinking: extensively; Information Literacy: none
- Quantitative Reasoning: extensively; Social and Ethical Responsibility: slightly

Experiential Learning:
- Research: notably; Other: notably;
- Nature of "Other" Experiential Learning: Distinctive Practicals or Laboratories

Rationale:
The National Academies of Sciences, Engineering, Medicine interim report on “Envisioning the Data Science Discipline: The Undergraduate Perspective” states that, in addition to foundational skills (e.g., mathematics, computational and statistical thinking), translational skills are valuable for data science students.

It is important for data science education to incorporate real data, broad impact applications, and commonly deployed methods. (page 16)

Training as a data scientist involves more than completing courses in computer science and statistics. A double major, for example, will not give students the benefit of an integrated pathway of courses designed explicitly to teach data science theories and methods. A key aspect of The Data Science Specialist program is to provide students with a rich, integrated experiential learning component, which will develop students’ translational skills in topics such as data
preparation, computational considerations involved in the statistical analysis of large-scale data sets, and the theory of data science. These experiential learning outcomes will be achieved through the integrative courses.

This course is the second in a series of three courses that will scaffold experiential learning within the Data Science specialist program, and integrate ideas and techniques from computer science and statistics. “These courses will make this program unique among Data Science-focused programs currently available at other Canadian universities”. (Appraisal Report for Undergraduate Specialist in Data Science, September 25, 2017).

Consultation:
A committee was formed in June 2015 to advise on the development of the data science program. Committee members included seven U of T faculty members from both Statistical Sciences and Computer Science, and data scientists working at U of T affiliated institutions and private industry. An advisory committee of nine faculty members from Statistical Sciences and Computer Science, and data scientists working in industry was also established to help the committee in developing this specialist program.

An early draft of the data science proposal was circulated to all chairs sitting on the Sciences Curriculum Committee, and received favourable feedback. The brief was also circulating to all units within Arts and Science that have a potential interest in Data Science.

Resources:
Instructors:
The course be co-taught by computer science and statistics.
TAs: A TA with statistical expertise and a TA with expertise in computer science will be required. Two TAs @ 60 hrs per TA.
Computing:
-Computer Science undergraduate computing resources will be sufficient to support the course.
The course may also use cloud computing from a provider that offers programs for education such as Microsoft Azure or Amazon Web Services (AWS). Prof. Taback currently has a grant from Microsoft Azure that would meet the needs of this course.

Budget Implications: The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses:
None.

Programs of Study for Which This Course Might be Suitable:
Data Science Specialist.

Estimated Enrolment:
30-45

Instructor:
Nathan Taback

JSC470H1: Data Science III

Contact Hours:
Lecture: 24 / Practical: 24

Description:
This course is restricted to students in the Data Science Specialist program. Research topics and applications of data science methods will be explored through case studies and collaboration with researchers in other fields. Data analysis, visualization, and communication of statistical information at various technical levels, ethical practice of data analysis and software development, and teamwork skills.

Prerequisites:
JSC370H1, STA314/CSC411/CSC311, STA303H1/STA305H1
Corequisites:

Exclusions:
STA490Y1

Recommended Preparation:

Breadth Requirements:
The Physical and Mathematical Universes (5)

Distribution Requirements:
Science

Competencies:

Communication: notably; Critical and Creative Thinking: extensively; Information Literacy: none

Quantitative Reasoning: extensively; Social and Ethical Responsibility: slightly

Experiential Learning:

Research: notably; Other: notably;
Nature of "Other" Experiential Learning: Distinctive Practicals or Laboratories

Rationale:
The National Academies of Sciences, Engineering, Medicine interim report on “Envisioning the Data Science Discipline: The Undergraduate Perspective” states that, in addition to foundational skills (e.g., mathematics, computational and statistical thinking), translational skills are valuable for data science students.

It is important for data science education to incorporate real data, broad impact applications, and commonly deployed methods. (page 16)

Training as a data scientist involves more than completing courses in computer science and statistics. A double major, for example, will not give students the benefit of an integrated pathway of courses designed explicitly to teach data science theories and methods. A key aspect of The Data Science Specialist program is to provide students with a rich, integrated experiential learning component, which will develop students’ translational skills in topics such as data preparation, computational considerations involved in the statistical analysis of large-scale data sets, and the theory of data science. These experiential learning outcomes will be achieved through the integrative courses.

This course is the third in a series of three courses that will scaffold experiential learning within the Data Science specialist program, and integrate ideas and techniques from computer science and statistics. “These courses will make this program unique among Data Science-focused programs currently available at other Canadian universities”. (Appraisal Report for Undergraduate Specialist in Data Science, September 25, 2017)

Consultation:
A committee was formed in June 2015 to advise on the development of the data science program. Committee members included seven U of T faculty members from both Statistical Sciences and Computer Science, and data scientists working at U of T affiliated institutions and private industry. An advisory committee of nine faculty members from Statistical Sciences and Computer Science, and data scientists working in industry was also established to help the committee in developing this specialist program.

An early draft of the data science proposal was circulated to all chairs sitting on the Sciences Curriculum Committee, and received favourable feedback. The brief was also circulating to all units within Arts and Science that have a potential interest in Data Science.

Resources:

Instructors:
The course be co-taught by computer science and statistics.
TAs: A TA with statistical expertise and a TA with expertise in computer science will be required. Two TAs @ 60 hrs per TA.
Computing:
Computer Science undergraduate computing resources will be sufficient to support the course. The course may also use cloud computing from a provider that offers programs for education such as Microsoft Azure or Amazon Web Services (AWS). Prof. Taback currently has a grant from Microsoft Azure that would meet the needs of this course.

**Budget Implications:** The academic unit will provide the resources required for this course from existing budget.

<table>
<thead>
<tr>
<th>Overlap with Existing Courses:</th>
<th>None.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programs of Study for Which This Course Might be Suitable:</strong></td>
<td>Data Science Specialist.</td>
</tr>
<tr>
<td><strong>Estimated Enrolment:</strong></td>
<td>30-45.</td>
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<tr>
<td><strong>Instructor:</strong></td>
<td>Nathan Taback</td>
</tr>
</tbody>
</table>

### STA492H1: Seminar in Statistical Science

| **Contact Hours:** |  
| **Seminar:** | 36 |
| **Description:** | This course is intended for students completing the Statistical Science: Theory and Methods Specialist program. Novel influential ideas and current research topics in statistics will be explored through readings and discussion. Content will generally vary from semester to semester. Student presentations and written reports will be required. |
| **Prerequisites:** | STA355H1 (Permission of instructor. Priority is given to students completing all requirements of the Statistical Science: Theory and Methods specialist program.) |
| **Corequisites:** | |
| **Exclusions:** | |
| **Recommended Preparation:** | |
| **Breadth Requirements:** | The Physical and Mathematical Universes (5) |
| **Distribution Requirements:** | Science |
| **Competencies:** |  
| **Communication:** | extensively; **Critical and Creative Thinking:** notably; **Information Literacy:** notably |
| **Quantitative Reasoning:** | extensively; **Social and Ethical Responsibility:** slightly |
| **Experiential Learning:** |  
| **Research:** | notably; **Other:** none |
| **Rationale:** | The Seminar in Statistics will become a capstone experience for students in our Specialist program in Statistical Science: Theory and Methods. This program emphasizes probability and the theory of statistical inference as underlying mathematical frameworks for statistical data analysis. This course will build on the expertise acquired in the |
Statistical Sciences (FAS), Department of

program. Through the study of pioneering, historically influential and recent research, students will explore how core ideas, mathematical frameworks, and advances in computation have been used to develop and evaluate new statistical methods. They will develop an understanding of how new ideas are presented and tested. They will use critical reasoning to analyse and synthesize the contributions of scholarly work in the discipline. They will present an investigation and synthesis of the literature in a particular area in oral and written form.

Consultation:
The idea for this course was proposed during our two-year curriculum renewal exercise. This exercise began in September 2016 with a department workshop, surveys of students and alumni, followed by a departmental learning outcomes development workshop. Proposed new programs and courses were discussed by the department in meetings throughout 2017-18.

Students in Statistics programs of study have been extensively consulted throughout this curriculum renewal project (through a survey, a town hall, and through students serving on our curriculum committee). All changes have been approved by the Statistics undergraduate committee and by the department faculty at a department meeting.

This course does not affect programs in other units.

Resources:

Budget Implications: The academic unit will provide the resources required for this course from existing budget.

Overlap with Existing Courses:
None.

Programs of Study for Which This Course Might be Suitable:
Specialist in Statistical Science: Theory and Methods

Estimated Enrolment:
25

Instructor:
Any DoSS Faculty Member.

4 Course Modifications:

STA238H1: Probability, Statistics and Data Analysis II

Impact on Programs:
This proposal triggers modifications in the unit's program(s)

Prerequisites:
Previous: (MAT135H1, MAT136H1) / MAT137Y1/MAT157Y1
New: STA237H1 / STA247H1/STA257H1/STAB52H3/STA256H5

Exclusions:
STA248H1, STA255H1, STA261H1, ECO227Y1, STAB57H3, STA258H5, STA260H5, ECO227Y5

Rationale:
Consultation:

Resources:

STA314H1: Statistical Methods for Machine Learning I

Prerequisites:
STA238H1/STA248H1/STA255H1/STA261H1/STAB57H3/STA260H5; CSC108H1/CSC120H1/CSC121H5
### Statistical Sciences (FAS), Department of


#### Corequisites:
- **Previous:** STA302H1/STA302H5

#### Exclusions:
- CSC411H1, CSC311H1, STA314H5, STA315H5, CSCC11H3, CSC411H5

#### Recommended Preparation:
- **Previous:** MAT235Y1/MAT237Y1/MAT257Y1
- **New:**

#### Rationale:

#### Consultation:

#### Resources:

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### STA414H1: Statistical Methods for Machine Learning II

#### Prerequisites:

#### Rationale:

#### Consultation:

#### Resources:

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### STA447H1: Stochastic Processes (formerly STA348H1)

#### Title:
- Stochastic Processes (formerly STA348H1)

#### Prerequisites:
- STA347H1/MAT377H1/STAC62H3

#### Exclusions:
- **Previous:**
  - New: STA348H5, STAC63H5

#### Rationale:

#### Consultation:

#### Resources:
4 Minor Program Modifications:

Cognitive Science Major - Arts

Completion Requirements:

(8 FCEs)

Where noted below, please consult the Faculty of Arts & Science Course Calendar on prerequisites. Note that those interested in taking upper-level computer science courses should begin with CSC108H1, not CSC104H1.

First Year:

*CSC104H1/CSC108H1/CSC120H1; LIN102H1 (note: LIN200H1 does not serve as prerequisite for upper year LIN courses); COG250Y1

Second Year:

COG250Y1 (may be taken in Year 1); STA220H1/PSY201H1; PSY270H1

Second Year and Higher:

PHL342H1; PSY473H1/PSY493H1 or PSY473H1 (for those with the appropriate prerequisites); COG341H1/COG342H1; and 3 FCEs from one of Stream 1, 2, or 3:

Stream 1: Perception and Attention

PHL232H1; PSY280H1; and 2 FCEs of any of the following: COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/PSY210H1/PSY312H1/PSY380H1/PSY475H1/PHL340H1/PHL405H1/JLP374H1/NEW333H1/NEW438H1

For those with the appropriate prerequisites: CSC207H1; CSC320H1; CSC420H1

Stream 2: Language and Cognition

±5 FCEs of any of the following: LIN232H1; LIN241H1; JLP315H1; LIN331H1; LIN341H1; JLP374H1; and 2

±5 FCEs of any of the following (at least 0.5 FCE must be from LIN): COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/LIN232H1/LIN241H1/LIN331H1/LIN341H1/JLP315H1/JLP374H1/JLP471H1/JLS472H1/JLS473H1/PSY312H1/PHL245H1/PHL340H1/PHL345H1/PHL351H1/PHL451H1/PSY210H1/PSY312H1

For those with the appropriate prerequisites: CSC401H1; CSC485H1

Stream 3: Thinking and Reasoning

PHL245H1; PSY260H1; and 2 FCEs of any of the following: COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/JLP374H1/PSY312H1/JLP471H1/PSY370H1/JLS472H1/PSY371H1/JLS473H1/NEW333H1/NEW438H1

For those with the appropriate prerequisites: CSC207H1; CSC304H1/CSC311H1; CSC328H1; CSC384H1; CSC486H1

Fourth Year: COG401H1
### Description of Proposed Changes:

Stream 2 – Language and Cognition: We are aligning the structure with that of other streams by specifying a fixed component, and an elective portion.

Eliminating a lighter intro to computer science option as it does not allow progression to CSC148H1.

Added PSY210H1 as an elective choice for all three streams.

### Rationale:

These are mostly housecleaning changes.

### Impact:

### Consultation:

CSC and PSY were consulted and all have approved.

### Resource Implications:

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### Cognitive Science Major - Science

#### Completion Requirements:

(8 FCEs)

Note that some Computer Science courses included below under Streams 1 and 2 have unlisted co- or prerequisites. Please consult the Faculty of Arts and Science Course Calendar. Those interested in the Science Major are advised to consider also registering for a Computer Science Specialist, Major, or Minor (for Stream 1) or a Human Biology Neuroscience Specialist or Major (for Stream 2).

**First Year:**

CSC108H1/CSC120H1 (recommended option); CSC148H1; MAT135H1 and MAT136H1 (or MAT137Y1)

**Second Year:**

† COG250Y1 (may be taken as a corequisite in Year 1 2);

**Second Year:**

STA220H1/STA257H1/PSY201H1; PSY270H1

**Second Year and Higher:**

PHL342H1; PSY473H1/PSY493H1 or PSY473H1 (for those with the appropriate prerequisites); and 2.5 3 FCEs from one of Stream 1 or 2:

**Stream 1: Computational Cognition**

Computational cognition is the interdisciplinary study of the information-processing underpinnings of cognitive mental processes. It seeks an understanding of cognition in mathematical terms and to apply this understanding to debates in artificial intelligence, cognitive psychology, and beyond.

No more than 1.5 FCEs of the 2.5 3 FCEs required from this list of options may come from any single 3-letter course designator, except for CSC courses. For CSC courses, a minimum of 1 FCE and up to 2 FCEs may be chosen. At least 1 FCE of the 2.5 3 FCEs must be at the 300-level. COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/CSC207H1/CSC304H1/CSC311H1/CSC321H1/CSC322H1/CSC324H1/CSC330H1/CSC384H1/CSC401H1/CSC413H1/CSC420H1/CSC485H1/CSC486H1/JLP315H1/JLP374H1/JLP471H1/LIN102H1/LIN228H1/LIN232H1/
Stream 2: Cognition and the Brain

Today’s cognitive scientists are more interested than ever before in the way the brain implements the information-processing underpinnings of cognitive mental processes. The study of cognition and the brain is the study, grounded in cognitive neuroscience, of those aspects of brain activity directly relevant to the performance of cognitive functions.

**Description of Proposed Changes:**
- Replacing BIO120H1 and BIO220H1 with BIO130H1 for Stream 2 – Cognition and the Brain.
- Added PSY270H1 as a required course and reduced electives by 0.5 FCE.
- Added PSY210H1 as an elective choice for both streams.

**Rationale:**
- A cell biology course is deemed to be a more appropriate preparation for Stream 2.
- PSY493H1 requires the completion of PSY270H1. PSY270H1 was only included in the Cognitive Science Major – Arts initially.

**Impact:**

**Consultation:**
- Consulted with CSB and HMB. CSB agreed to the addition of BIO130H1 to Stream 2. PSY was also consulted re: the addition of PSY210H1 and PSY270H1, and the department has approved.

**Resource Implications:**
Completion Requirements:

(8.0 FCEs, including at least 1.5 FCE at the 400 level.)

1. 1.0 FCE of the following courses: ANT100Y1, BIO130H1, GGR107H1, HPS100H1, HPS110H1, HPS120H1, PCL102H1, PHS100Y1, PHL100Y1, POL101Y1, PSY100H1, SOC100H1, TRN135Y1, UNI103H1, UNI103Y1, WGS160Y1
2. HST209H1, HST211H1, HST250H1
3. PHL281H1, INS200H1
4. STA220H1 or equivalent
5. 0.5 FCE of the following courses: ANT208H1, HMB202H1, HMB203H1, INS205H1, JSU237H1, NFS284H1, SOC204H1, SOC243H1, STA221H1, TRN235H1, TRN236H1
6. HST310H1
7. HST373H1, HMB342H1
8. 1.0 FCE of the following courses: HST307H1, HST308H1, HST309H1, HST330H1, HST350Y1, ANT345H1, ANT348H1, ANT358H1, GGR340H1, HPS319H1, HMB303H1, HMB323H1, INS340Y1, INS350H1, PHL380H1, PHL381H1, PHL383H1, PHS300H1, SOC309H1, SOC316H1, SOC363H1, SOC364H1, WGS367H1
9. 1.5 FCE of the following courses: HST400Y1, HST405H1, HST408H1, HST409H1, HST410H1, HST411H1, HST440H1, HST451Y1, HST464H1, HST480H1
10. The remaining 0.5 FCE can include any courses not previously taken from the lists above, or any of the following: ANT460H1, ENV430H1, JFP450H1, HMB406H1, HMB433H1, HMB462H1, IRE378H1, NEW344Y1, SOC412H1, SOC488H1

Description of Proposed Changes:
Some housekeeping changes. Sorted enrolment requirement courses alphabetically. Added HMB342H1 as a required course choice. Added new HST course approved in November 2018.

Rationale:
For the inclusion of HMB342H1, this course was flagged by HMB because it’s an exclusion to HST373H1 (Epidemiology). HST students are required to take HST373H1 and now they have another option if the course is full.

Impact:

Consultation:
Health Studies Specialist

Enrolment Requirements:

Students requesting enrolment for 2018-19 who do not meet the enrolment criteria as stated may be eligible for admission. Please consult the Health Studies program office for more information.

This is a Type 2L limited enrolment program that can only accommodate a certain number of students. Consult the Arts & Science Program Enrolment website for application procedures.

Applying with fewer than 8 FCEs completed requires:

• Completion of at least 4.0 FCEs
• Obtaining 77% or higher in at least 1.0 FCE of the following courses: ANT100Y1, BIO130H1, GGR107H1, HPS100H1, HPS110H1, HPS120H1, PCL102H1, PHS100H1, PHL100Y1, PHL101Y1, POL101Y1, PSY100H1, SOC100H1, TRN135Y1, UNI103H1, UNI103Y1, WGS160Y1.

Applying with 8 FCEs or more completed requires:

• Obtaining 77% or higher in at least 1.5 FCE of the following courses: ANT100Y1, BIO130H1, GGR107H1, HPS100H1, HPS110H1, HPS120H1, HST209H1, HST211H1, HST250H1, PCL102H1, PHS100H1, PHL101Y1, PHL101Y1, POL101Y1, PSY100H1, SOC100H1, TRN135Y1, UNI103H1, UNI103Y1, WGS160Y1, HST209H1, HST211H1, HST250H1.

Note that the actual grades required for admittance may be higher than the requirement, depending on the current capacity of the program and the pool of applicants. For more information, please visit http://www.uc.utoronto.ca/healthstudies.

Completion Requirements:

(12.0 FCEs, including at least 2.0 FCE at the 400 level.)

1. 1.0 FCE of the following courses: ANT100Y1, BIO130H1, GGR107H1, HPS100H1, HPS110H1, HPS120H1, PCL102H1, PHS100H1, PHL100Y1, PHL101Y1, POL101Y1, PSY100H1, SOC100H1, TRN135Y1, UNI103H1, UNI103Y1, WGS160Y1
2. HST209H1, HST211H1, and HST250H1
3. PHL281H1 or INS200H1
4. STA220H1 or equivalent
5. 1.0 FCE of the following courses: ANT208H1, HMB202H1, HMB203H1, INS205H1, JSU237H1, NFS284H1, PHL281H1, SOC204H1, SOC243H1, STA221H1, TRN235H1, TRN236H1
6. HST310H1
7. HST373H1/HMB342H1
8. HST350Y1
9. 1.5 FCE of the following courses: HST307H1, HST308H1, HST309H1, HST330H1, HST350Y1, ANT345H1, ANT348H1, ANT358H1, GGR340H1, HPS319H1, HMB303H1, HMB323H1, INS340Y1, INS350H1, PHL380H1, PHL381H1, PHL383H1, PHS300H1, SOC309H1, SOC316H1, SOC363H1, SOC364H1, WGS367H1
10. HST450Y1
11. 1.0 FCE of the following courses: HST405H1; HST408H1; HST409H1; HST410H1; HST411H1; HST440H1; HST451Y1; HST464H1; HST480H1
12. The remaining 2.0 FCEs can include any courses not previously taken from the lists above, or any of the following: ANT460H1; ENV430H1; JFP450H1; HMB406H1; HMB433H1; HMB462H1; HST400Y1; IRE378H1; NEW344Y1; SOC412H1; SOC488H1

Description of Proposed Changes:
Some housekeeping changes. Sorted enrolment requirement courses alphabetically. Added HMB342H1 as a required course choice. Added new HST course approved in November 2018.

Rationale:
For the inclusion of HMB342H1, this course was flagged by HMB because it’s an exclusion to HST373H1 (Epidemiology). HST students are required to take HST373H1 and now they have another option if the course is full.

Impact:

Consultation:

Resource Implications:

1 Course Modification:

COG401H1: Seminar in Cognitive Science

Description:

Advanced An advanced treatment of cognitive science topics for arts majors. Possible topics include: concepts, consciousness, the mind-body problem, cognitive science and the arts.

Prerequisites:
Previous: 5.0 credits in courses listed in the cognitive science major.
New: PHL342H1; 14.0 credits

Exclusions:
COG402H1, COG403H1

Rationale:
To ensure students are adequately prepared for a senior-level seminar.

Consultation:

Resources:
## VIC242H1: Scientific Worldviews of the Renaissance

<table>
<thead>
<tr>
<th>Contact Hours:</th>
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<tbody>
<tr>
<td>Lecture: 24</td>
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</table>

### Description:
An in-depth study of late medieval and early modern scientific worldviews, with a focus on interconnections between natural philosophy, cosmology, theology, astronomy, optics, medicine, natural history, and ethics. Through a consideration of early modern ideas including free will and determinism, the finite and infinite universe, teleology and mechanism, theism and deism, and deduction and intuition, this course investigates some of the period’s key metaphysical and methodological assumptions, and reveals how an evolving scientific understanding informed the Renaissance worldview.

### Prerequisites:

### Corequisites:

### Exclusions:
HPS309H1

### Recommended Preparation:
4.0 FCE's

### Breadth Requirements:
The Physical and Mathematical Universes (5)

### Distribution Requirements:
Social Science

### Competencies:

- Communication: notably; Critical and Creative Thinking: extensively; Information Literacy: extensively
- Quantitative Reasoning: notably; Social and Ethical Responsibility: slightly

### Experiential Learning:

- Research: none; Other: none

### Rationale:
This course broadens the scope and contributes important new interdisciplinary dimensions to Science & Society and Renaissance Studies, two Victoria College programs. Situated at the intersection of the history of science and early modern cosmology and metaphysics, this course strengthens Renaissance Studies and Science and Society by encouraging students to explore mutually illuminating dimensions of both programs.

### Consultation:
Victoria College Academic Committee, Renaissance Studies, IHPST, English

### Resources:

- Instructor: 0.5FCE
- Budget Implications: The academic unit will provide the resources required for this course from existing budget.

### Overlap with Existing Courses:
None

### Programs of Study for Which This Course Might be Suitable:

- Renaissance Studies, Science and Society
<table>
<thead>
<tr>
<th>Victoria College</th>
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<tbody>
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<td><strong>Estimated Enrolment:</strong></td>
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<td><strong>Instructor:</strong></td>
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