3 New Courses:

**CHM194H1: Science and Human Values**

<table>
<thead>
<tr>
<th>Contact Hours:</th>
<th>Seminar: 24</th>
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</thead>
<tbody>
<tr>
<td>Description:</td>
<td>There is a tension between creativity and the search for truth, which in science can be looking for patterns in nature. With examples drawn particularly from reports of scientific discoveries that have generated controversy, this seminar course will introduce the underlying principles and history of science, as well as how science and its boundaries are evolving, and how these influence human values.</td>
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<tr>
<td>Prerequisites:</td>
<td>None</td>
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<tr>
<td>Corequisites:</td>
<td>None</td>
</tr>
<tr>
<td>Exclusions:</td>
<td>Other First-year Seminars</td>
</tr>
<tr>
<td>Recommended Preparation:</td>
<td>Minimum level of high school science and mathematics</td>
</tr>
<tr>
<td>Breadth Requirements:</td>
<td>The Physical and Mathematical Universes (5)</td>
</tr>
<tr>
<td>Distribution Requirements:</td>
<td>Science</td>
</tr>
<tr>
<td>Competencies:</td>
<td>Communication: extensively; Critical and Creative Thinking: extensively; Information Literacy: notably Quantitative Reasoning: extensively; Social and Ethical Responsibility: slightly</td>
</tr>
<tr>
<td>Experiential Learning:</td>
<td>Research: none; Other: none</td>
</tr>
<tr>
<td>Rationale:</td>
<td>This course aims to introduce students to the foundations of science, the connections between human imagination and scientific discovery, and how human dignity can be challenged by scientific discovery. The course use of discoveries that have been controversial aims stimulate informed discussion of what it means for an idea to be new, how the idea is disseminated, and sometimes misused. It should attract students with many areas of interest, e.g., from philosophy, religion, history, and public policy.</td>
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<tr>
<td>Consultation:</td>
<td>Unit governance identified this course topic as a particular target area for instruction.</td>
</tr>
<tr>
<td>Resources:</td>
<td>Nothing beyond a classroom.</td>
</tr>
<tr>
<td>Budget Implications:</td>
<td>The academic unit will provide the resources required for this course from existing budget.</td>
</tr>
</tbody>
</table>
| Overlap with Existing Courses: | We are not aware of another first-year seminar course on the topic of science and human values. Other PMU199 courses offered this year with distantly related content are “Resources and Sustainability” and “Energy, Water, and Carbon Dioxide”; this course is more focused on the nature of ideas in science.
Programs of Study for Which This Course Might be Suitable:
First year seminar, largely for non-scientists. Science students many be interested in the content of the class as well.

Estimated Enrolment:
30

Instructor:
Gilbert Walker

CHM195H1: Innovative Teaching Methods in Chemistry

Contact Hours:
Seminar: 24

Description:
Good teaching is effective communication that engages the audience. In this breadth course, we'll explore innovative teaching in science, through an examination of the nature of science, how scientific knowledge is built, and what makes certain concepts in science problematic to the learner. Students will read and discuss relevant articles in newsmagazines, popular science sources, and educational literature. They will design and deliver mini-lessons to communicate specified scientific concepts. As a major course project, students will develop a communication tool that integrates pedagogical know-how with leading-edge chemical discoveries to produce a teaching unit for use by Ontario teachers. Restricted to newly admitted first-year students. Not eligible for CR/NCR option.

Prerequisites:
None

Corequisites:
None

Exclusions:
Other First-year Seminars

Recommended Preparation:
Minimum level of high school science and mathematics

Breadth Requirements:
Thought, Belief and Behaviour (2)

Distribution Requirements:
Humanities

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

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

Rationale:
This course is evolving from the TBB199 of the same name offered in previous years.

Consultation:
None

Resources:
classroom and laboratory.

Budget Implications: The academic unit will provide the resources required for this course from existing budget.
Overlap with Existing Courses:
As far as we know, there are not other first-year seminars that are offered which focus on the teaching of science, or chemistry in particular.

Programs of Study for Which This Course Might be Suitable:
First year seminar, largely for non-scientists. Science students many be interested in the content of the class as well.

Estimated Enrolment:
30

Instructor:
Professor Cecilia Kutas

CHM395Y1: Research Project in Chemistry

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

Contact Hours:
Practical: 180

Description:
Independent research under the direction of a faculty member in the Department of Chemistry. Not eligible for CR/NCR option.

Prerequisites:
Minimum GPA of 3.3 in CHM courses. Completion of at least 2.5 FCEs of CHM courses. Permission of the Associate Chair for Undergraduate Studies and of the prospective supervisor

Corequisites:

Exclusions:

Recommended Preparation:

Breadth Requirements:
The Physical and Mathematical Universes (5)

Distribution Requirements:
Science

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

Experiential Learning:
Research: extensively; Other: none

Rationale:
This course provides students with the opportunity to receive credit for chemistry research at the 3rd year level. While it is similar to a ROP399 course, it has a bit more flexibility than CHM399 since it will be handled at the Department level. Thus, this will make it possible for strong students who come to realize their interest in research in the spring term of their 2nd year to become involved in chemistry research.

This course will not be listed explicitly in our specialist programs, but may be used to fulfill the requirements in our
specialist programs of “further 300/400 level CHM courses to make a total of 14 full-course equivalents.” It will not be eligible to fulfill program requirements for the Chemistry Major or Chemistry Minors.

**Consultation:**
Consultation with Chemistry Faculty at a Departmental Meeting showed broad support. We have not consulted with other units, but note that the proposed wording for the calendar entry is based on that for MAT397.

**Resources:**
Placements in research laboratories will be provided by the Department.

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

**Overlap with Existing Courses:**

**Programs of Study for Which This Course Might be Suitable:**
Biological Chemistry Specialist, Chemical Physics Specialist, Chemistry Specialist, Environmental Chemistry Specialist, Synthetic & Catalytic Chemistry Specialist, Pharmaceutical Chemistry Specialist

**Estimated Enrolment:**
3

**Instructor:**
Chemistry Faculty
1 Minor Program Modification:

Chemistry Minor

Completion Requirements:

Consult Associate Chair, Undergraduate Studies, Department of Chemistry.

(4 full courses or their equivalent, including at least one CHM full-course equivalent at the 300+ level)

First Year: CHM151Y1/(CHM135H1/CHM139H1, CHM136H1/CHM138H1)

Second Year: At least one of CHM217H1, CHM220H1/CHM222H1/CHM225Y1, CHM238Y1, (CHM249H1 strongly recommended)/CHM247H1

Third Year: At least one of CHM317H1, CHM327H1, CHM338H1, CHM343H1, CHM348H1, CHM379H1

Fourth Year: Further 200/300/400-level CHM courses to make a total of four CHM full course equivalents (CHM299Y1, CHM395Y1, CHM396Y0, CHM397H0, CHM398H0, CHM398Y0, CHM399Y1 excluded)

Description of Proposed Changes:

The new CHM395Y1 (Research Project in Chemistry) course being proposed will not be eligible to fulfill program requirements for the Chemistry Major or Chemistry Minors. As a result, this course needs to be stated explicitly in the completion requirements.

Rationale:

Impact:

Consultation:

Resource Implications:
# 2 Program Revisions:

## Chemical Physics Specialist

### Completion Requirements:

(14 full courses or their equivalent, including at least 1.5 400-series courses)

First Year: (CHM151Y1 strongly recommended)/(CHM135H1/CHM139H1, CHM136H1/CHM138H1), (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1; (PHY131H1, PHY132H1)/(PHY151H1, PHY152H1)

Higher Years:

1. APM346H1; (CHM222H1, CHM223H1), CHM326H1/PHY356H1, CHM327H1, CHM328H1; MAT223H1/MAT240H1, MAT235Y1/MAT237Y1, MAT244H1, MAT334H1; PHY250H1, PHY254H1, PHY354H1, PHY350H1; CHM423H1/PHY456H1
2. Two full course equivalents from CHM210H1, CHM217H1, CHM238Y1, (CHM249H1 strongly recommended)/CHM247H1, CHM310H1, CHM317H1, CHM338H1, CHM348H1, CHM415H1
3. Further 400-series half-courses in CHM/PHY to make a total of 14 full courses

### Description of Proposed Changes:

We would like to add the following course options to our students in this program:

3rd year: CHM326/PHY356
4th year: CHM423/PHY456

### Rationale:

The Physics department made some changes to their courses. They made CHM326H a course exclusion for PHY356 a while back. The Chemistry Department didn't consider these two courses to be exclusions and allowed the students to take both courses toward the Chemical Physics Specialist. Once the exclusion was added, it was no longer possible for them to do so. To give the students a little bit more flexibility, we would like them to be able to take either CHM326 or PHY356 and have it count towards their program requirement. Likewise, we would like them to be able to take CHM423 or PHY456 and have them count towards their program requirements.

### Impact:

### Consultation:

### Resource Implications:

## Chemistry Major

### Completion Requirements:

(8 full courses or their equivalent, including at least one CHM half course equivalent at the 400-level)

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

Second Year: At least two of CHM217H1, CHM220H1/CHM222H1, CHM238Y1, (CHM249H1 strongly recommended)/
**Chemistry (FAS), Department of**

<table>
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<tr>
<th>Course</th>
<th>Description</th>
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<tr>
<td>CHM247H1</td>
<td>Third Year: At least two of CHM317H1, CHM327H1, CHM338H1, CHM343H1, CHM348H1, CHM379H1</td>
</tr>
<tr>
<td></td>
<td>Fourth Year: Further 200/300/400-level CHM courses to make a total of seven CHM full course equivalents (CHM299Y1, CHM395Y1, CHM396Y0, CHM397H0, CHM398H0, CHM398Y0, CHM399Y1 excluded)</td>
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**Description of Proposed Changes:**

The new CHM395Y1 (Research Project in Chemistry) course being proposed will not be eligible to fulfill program requirements for the Chemistry Major or Chemistry Minors. As a result, this course needs to be stated explicitly in the completion requirements.

**Rationale:**

**Impact:**

**Consultation:**

**Resource Implications:**
1 Program Revision:

Data Science Specialist

Enrolment Requirements:

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 MAT137Y1/MAT157Y1 (with a minimum grade of 70%) and STA130H1 (with a minimum grade of 70%), AND

B. An average of a student’s grades in CSC148H1 and MAT137Y1/MAT157Y1 and STA130H1 that meets the program’s annual cutoff. (MAT157Y1 grades will be adjusted to account for the course’s greater difficulty.)

In addition, students must have completed at least 4.0 FCEs and achieved a minimum grade of 70% in each of CSC148H1, MAT137Y1/MAT157Y1 and STA130H1.

It is difficult to predict the minimum average required for admission in any given year as it depends on the current capacity of the program and the pool of applicants.

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.

Later years

Third year (6.5-7.5 FCEs)

1. STA302H1; one of STA303H1 or STA305H1; STA355H1; CSC209H1; CSC263H1/CSC265H1 (CSC265H1 is recommended); CSC343H1; CSC373H1; JSC370H1 (Data Science II)

Fourth year (3.0 FCEs)
2. 
   1. CSC373H1; 
   2. STA314H1/CSC311H1/CSC411H1; 
   3. JSC470H1 (Data Science III); 
3. 2.0 
   4. 1.5 FCEs from the following list, including at least 1.0 FCE at the 400 level (see below for additional conditions): STA303H1/STA305H1 (whichever one was not taken previously in third year), STA347H1, CSC401H1, STA414H1/ CSC412H1, CSC413H1/CSC421H1, any 400-level STA course; JSC470H1 (Data Science III). 

The choices from 3 must satisfy the requirement for an integrative, inquiry-based activity by including at least 0.5 FCE from the following: JSC470H1 (Data Science III); CSC454H1, CSC490H1, CSC491H1, CSC494H1, CSC495H1, STA490Y1, STA496H1, STA497H1, STA498Y1, STA499Y1. This requirement may also be met by participating in the PEY (Professional Experience Year) program.

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).

<table>
<thead>
<tr>
<th>Description of Proposed Changes:</th>
</tr>
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<tbody>
<tr>
<td>Adjustments to program requirements to take into account multiple revisions to course offerings in CSC and STA at the 300-/400-level, and to allow PEY to satisfy a program requirement.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rationale:</th>
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<table>
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<tr>
<th>Impact:</th>
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<tr>
<th>Consultation:</th>
</tr>
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</table>

| Resource Implications: |
2 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 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. 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/PSL350H1/BCH370H1/CHM310H1/CSB325H1/CSB327H1/CSB328H1/CSB331H1/CSB346H1/CSB347H1/CSB350H1/CSB351H1/CSB351Y1/EEB318H1/EEB319H1/EEB321H1/EEB328H1/EEB362H1/EEB375H1/EEB428H1/ENV315H1/ESS425H1/ENV316H1/ENV336H1/GGR303H1/GGR305H1/GGR409H1/GGR347H1/GGR348H1/HIS423H1/HST405H1/JEE347H1/JGE348H1/ESS311H1/ESS312H1/ESS463H1/IMM334Y1/LMP301H1/LMP363H1/MGY377H1/NFS382H1/NFS386H1/NFS488H1/PSL372H1/PSL420H1/PSY435H1
Year 4: Environment & Health Capstone Course

11. JEH455H1

E&H Major Program Note:

- Not all non-ENV courses listed in requirement 10 above have priority enrolment for the Environment & Health Major. Students are responsible for checking the priority of courses, as well as meeting course prerequisites for courses they wish to take.

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

Rationale:
HST405H1 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.

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).

Enrolment Requirements:

This is a Type 1 unlimited enrolment program. All students who have completed at least 4.0 courses, including the Year 1 requirements below, are eligible to enrol.

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 POST:

1. BIO120H1; BIO130H1
Environment (FAS), School of

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

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/GGR409H1/GGR347H1/GGR348H1/HIS423H1/HST405H1/JGE347H1/JGE348H1/ESS311H1/ESS312H1/IMM334Y1/LMP301H1/LMP363H1/MGY377H1/NFS382H1/NFS386H1/NFS488H1/PSL372H1/PSL420H1/PSY435H1 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/HMB396Y1/ENV492H1 * HMB496Y1/ENV493H1 * HMB499Y1 or a minimum of 0.5 FCE from any approved departmental or college independent research project (* the research topic for these courses must be related to environment and health)

16. JEH455H1

E&H Specialist Program Note: Notes:
Environment (FAS), School of

- Not all non-ENV courses listed in requirement 14 above this program have priority enrolment for the Environment & Health Specialist specific prerequisites. Students are responsible should check prerequisites for checking the priority of higher level courses they are interested in prior to making first year course selections; and on through higher years
- EEB225H is no longer equivalent to STA221H, as well as meeting course prerequisites for courses they wish to take of the 2011-12 academic year.

Description of Proposed Changes:
Addition of a relevant elective course to the program. Replacement of HMB independent research courses with ENV independent research courses offered by the School.

Rationale:
HST405H1 has significant environment and health content.

The reason behind the replacement of HMB independent research courses is that non-HMB students do not have access to these HMB independent research courses, so we substituted the School’s independent research courses for the HMB courses.

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.

2 Course Modifications:

ENV341H1: Environment and Human Health

Prerequisites:
(ENV221H1/ ENV222H1) or (BIO230H1/BIO255H1 (BIO240H1, BIO241H1)/BIO250Y1/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
Program Revision:

Environment & Toxicology Specialist

Description:

This program is jointly sponsored by the Department of Pharmacology and Toxicology and the School of the Environment. For additional information see “School of the Environment” (www.environment.utoronto.ca) or consult our website: www.pharmtox.utoronto.ca.

The Environment and Toxicology Specialist program is an interdisciplinary program which spans the social, physical and life sciences and integrates study of the effects of chemicals not only on the health and behaviour of human beings but on whole ecosystems as the adverse effects associated with therapeutic and environmental chemicals are discussed. This program emphasizes the application of knowledge of environmental toxicology and risk assessment and prepares students for a variety of job opportunities following its completion. Graduates of the Environment and Toxicology program may pursue careers in scientific research, environmental science, conservation science, governmental agencies, consulting agencies, and within chemical, manufacturing or agriculture industries. Students learn to integrate basic environmental and life science with particular aspects of clinical toxicology and related areas through lectures, tutorials, and laboratory and independent research project experience. The senior independent research project course enables students to gain valuable research experience while working under the supervision of an individual faculty member in either a laboratory-based or a non-laboratory-based setting.

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.

Enrolment Requirements:

The Environment and Toxicology Specialist is a Type 2L program and can only accommodate a limited number of students. Admission into this program is determined by a student’s average in the following courses: BIO120H1, BIO130H1, CHM138H1, CHM135H1, CHM139H1, CHM136H1 and one full course equivalent from any of PHY131H1, PHY132H1, MAT135H1, MAT136H1 or GGR100H1. It is expected that a cumulative average 70% in the selected courses will be required for admission; however, achieving that mark does not necessarily guarantee admission to the program in any given year. Entry into the program requires completion of BIO120H1, BIO130H1, CHM135H1, CHM136H1, CHM136H1; one FCE from any of PHY131H1, PHY132H1, MAT135H1, or MAT136H1 GGR100H1 and 0.5 FCE from among the other first year course requirements. Completion of the program requires completion of all 4 FCE of the first year required courses. See the Arts & Science Program Enrolment website for application procedures.

NOTE: Students cannot combine a Biomedical Toxicology Major program with an Environment and Toxicology Specialist program for their degree.

Students who wish to enroll in the program after their second year will be considered on a case-by-case basis. Successful completion of required prerequisite courses is required to enroll in further upper-level program courses.

Completion Requirements:
Environment (FAS), School of

(14.5 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 1.0 0.5 FCE from PHY131H1; MAT135H1; JEG100H1

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

Second Year: BCH210H1; BIO230H1/BIO255H1; 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/PCL474Y1 (see NOTE 2);
At least 1.0 FCE from: ENV341H1; PHY231H1; ENV337H1/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, PCL397Y0, ENV421H1, PCL474Y1, Professional Experience Year
NOTES:
1. PSL300H1 and PSL301H1 require MAT100/PHY100 -series courses.
2. 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 PCL302H1 and PCL362H1 as prerequisites. Students taking PCL477H1 must take BCH210H1 prior. Students taking ENV421H1 or PCL367H1 must take 1.5 FCE from program electives requirement list of courses to ensure 15 FCE program credits.

Description of Proposed Changes:

Minor editorial changes and removal of retired courses (CHM138, CHM139, PSL302)
March 11, 2019: replaced GGR100H1 (no longer offered) with JEG100H1)
March 12, 2019: revisions based on discussions with M. Arnot and D. Powell in order to enhance clarity of enrolment and admissions requirements for the program. Result is revisions to 1st year course requirements to make information clearer to students and to better align with other PCL programs. Reduction of full course equivalents for program completion from 15 to 14.

Upon review with D.Powell neither of us understood why JEG100H1 was included in the program, and since we have overseen the program for many many years, it was decided to align with the other programs offered in P&T. (MA)

Rationale:

Impact:

Consultation:

Resource Implications:
2 Minor Program Modifications:

Neuroscience Major

Completion Requirements:

Required Courses (8.0 FCE, including at least 0.5 FCE at the 400-level)

Chemical and Physical Foundations of Biological Systems

1. (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1
   Transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion or equivalency to a pre-approved chemistry course.
2. MAT135H1/PHY131H1/PHY151H1/CSC120H1/CSC148H1
3. BCH210H1

Biological Foundations of Living Systems

4. BIO120H1, BIO130H1
5. BIO230H1/BIO255H1
6. HMB265H1/BIO260H1
7. PSL300H1

Neuroscience Concentration Courses

8. HMB200H1
9. HMB300H1
10. CJH332H1
11. 0.5 FCE from HMB320H1/JHA410H1/ANA300Y1
12. 0.5 FCE from HMB360H1/HMB420H1/HMB430H1/HMB440H1/HMB450H1/HMB471H1/HMB473H1/HMB496Y1*/HMB499Y1*/JHA410H1/CSB345H1/CSB346H1/CSB347H1/CSB432H1/CSB445H1/CSC321H1/LMP410H1/NEW335H1/NFS489H1/PCL475H1/PSL374H1/PSL432H1/PSL440Y1/PSL445H1/PSL446H1 PSL447H1 PSL448Y1 PSL450H1/PSL452H1/PSL472H1/PSY342H1/PSY371H1/PSY372H1/PSY390H1/PSY395H1/PSY460H1/PSY470H1/PSY471H1/PSY473H1/PSY475Y1/PSY480H1/PSY490H1/PSY492H1/PSY493H1/PSY494H1/PSY496H1

Data Analysis and Research-Based Courses

13. 0.5 FCE in statistics: HMB325H1/STA220H1/STA288H1/PSY201H1
14. 0.5 FCE from a higher-year lab course: HMB310H1/HMB314H1/PSY369H1 PSY399H1

*A research project from a different unit may be accepted with prior written approval from Human Biology if the course is not counting toward a different program.

Neuroscience Major Notes:

1. Courses can only count toward one requirement, even if listed as options to multiple requisites of the program.
2. Not all courses listed have priority enrolment for Neuroscience majors. Students are responsible for checking priority of courses and meeting course prerequisites for courses they wish to take.
3. The Neuroscience major cannot be paired with any other Human Biology Program managed major program.
Proposals Pertaining to Freestanding Programs

Description of Proposed Changes:
Added our new joint course JHA410H1 as an option; renamed PSL444Y1 to the two half credits that replaced it; removed HMB325, course doesn’t exist anymore; Psychology renamed their lab course, so PSY399H1 became PSY369H1.

Rationale:
Added our new joint course JHA410H1 as an option; renamed PSL444Y1 to the two half credits that replaced it; removed HMB325, course doesn’t exist anymore; Psychology renamed their lab course, so PSY399H1 became PSY369H1.

Impact:

Consultation:

Resource Implications:

Neuroscience Specialist

Completion Requirements:

Required Courses (12.0 FCE, including at least 1.0 FCE at the 400-level)

Chemical and Physical Foundations of Biological Systems

1. (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1
   Transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion or equivalency to a pre-approved chemistry course.
2. MAT135H1/PHY131H1/PHY151H1/CSC120H1/CSC148H1
3. BCH210H1

Biological Foundations of Living Systems

4. BIO120H1, BIO130H1
5. BIO230H1/BIO255H1
6. HMB265H1/BIO260H1
7. PSL300H1

Neuroscience Concentration Courses

8. PSY100H1 Transfer credits from AP and IB Psychology are not accepted
9. HMB200H1
10. HMB300H1
11. CJH332H1
12. HMB320H1
13. JHA410H1/ANA300Y1
14. 2.0 FCE from HMB360H1/HMB420H1/HMB430H1/HMB440H1/HMB450H1/HMB471H1/HMB473H1/CSB345H1/CSB346H1/CSB430H1/CSB432H1/CSB445H1/CSC321H1/LMP410H1/NEW335H1/NFS489H1/PCL475H1/PSL374H1/PSL432H1/PSL440Y1/PSL445H1/PSL446H1/PSL447Y1/PSL450H1/PSL452H1/PSL472H1/PSY342H1/PSY371H1/PSY372H1/PSY390H1/PSY395H1/PSY460H1/PSY470H1/PSY471H1/PSY473H1/PSY475Y1/PSY480H1/PSY490H1/PSY492H1/PSY493H1/PSY492H1/PSY493H1/PSY494H1/PSY496H1
# Proposals Pertaining to Freestanding Programs

## Data Analysis and Research-Based Courses

15. 0.5 FCE in statistics: HMB325H1/STA220H1/STA288H1/PSY201H1
16. 0.5 FCE from bioethics: HMB306H1/HMB406H1/PHL281H1
17. 0.5 FCE from upper-year lab course: HMB310H1/HMB314H1/PSY369H1/PSY399H1
18. 1.0 FCE from research project course: HMB496Y1 */HMB499Y1*

*A research project from a different unit may be accepted with prior written approval from Human Biology if the course is not counting toward a different program.

### Neuroscience Specialists Notes:

1. Courses can only count toward one requirement, even if listed as options to multiple requisites of the program.
2. Not all courses listed have priority enrolment for Neuroscience specialists. Students are responsible for checking priority of courses and meeting course prerequisites for courses they wish to take.

## Description of Proposed Changes:

Renamed PSL444Y1 to the two half credits that replaced it; removed HMB325, course doesn’t exist anymore; Psychology renamed their lab course, so PSY399H1 became PSY369H1.

### Rationale:

Renamed PSL444Y1 to the two half credits that replaced it; removed HMB325, course doesn’t exist anymore; Psychology renamed their lab course, so PSY399H1 became PSY369H1.

### Impact:

### Consultation:

### Resource Implications:

---

## 1 New Course:

### HMB490Y1: Health in Community

#### Contact Hours:

- **Lecture:** 24
- **Tutorial:** 24

#### Description:

An experiential learning course exploring health-related challenges and social determinants of health in partnership with local community organizations. Lectures and tutorials will support learning of selected biological and social aspects of health and disease, neuroscience, genetics or population health, and the development of scientific knowledge translation skills relevant to the community agencies.

#### Prerequisites:

BIO230H1/BIO255H1, HMB265H1/BIO260H1, BCH210H1, PSL300H1, PSL301H1, HMB200H1/HMB201H1/HMB202H1/HMB203H1/HMB204H1

#### Corequisites:

#### Exclusions:
**Proposals Pertaining to Freestanding Programs**

<table>
<thead>
<tr>
<th><strong>Recommended Preparation:</strong></th>
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<tbody>
<tr>
<td>a 300-level science lab course</td>
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<tr>
<th><strong>Breadth Requirements:</strong></th>
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<tr>
<td>Living Things and Their Environment (4), Society and its Institutions (3)</td>
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<tr>
<th><strong>Distribution Requirements:</strong></th>
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<tbody>
<tr>
<td>Science</td>
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<tr>
<th><strong>Competencies:</strong></th>
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<tr>
<td><strong>Communication:</strong> extensively; <strong>Critical and Creative Thinking:</strong> extensively; <strong>Information Literacy:</strong> notably</td>
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<tr>
<td><strong>Quantitative Reasoning:</strong> notably; <strong>Social and Ethical Responsibility:</strong> extensively</td>
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<tr>
<th><strong>Experiential Learning:</strong></th>
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<tbody>
<tr>
<td><strong>Research:</strong> extensively; <strong>Other:</strong> extensively;</td>
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<tr>
<td><strong>Nature of &quot;Other&quot; Experiential Learning:</strong> Community Involvement</td>
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<th><strong>Rationale:</strong></th>
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<tr>
<td>The University of Toronto has acknowledged the need to implement more experience-based learning opportunities as a strategy for enhancing undergraduate education in alignment with President Gertler’s Three Priorities Discussion Paper. One of the University’s goals is “preparing students for success” while recognizing the great student demand for experienced-based learning. HMB490Y1 will provide students opportunities to gain valuable hands-on experience in a community workplace environment; while maintaining the University’s academic values. This course is designed, through strategic instruction, regular meeting times, scaffolded assignments, and support for teamwork, communication and collaboration with all stakeholders to provide students with the tools, knowledge base, opportunity and full resources of the University to make a significant impact in the community. Students will have the opportunity to further develop both academic and career development skills to better equip them to be future leaders in their field of study while creating and maintaining meaningful connections with important communities.</td>
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<tr>
<th><strong>Consultation:</strong></th>
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<tr>
<td>Consultation has occurred with the following:</td>
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<tr>
<td>-HMB Faculty</td>
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<td>-Isabel Kim, Director, Centre for Community Partners</td>
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<tr>
<td>-Shauna Brail, Associate Director, School of Cities, Urban Studies Program, Innis College</td>
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<tr>
<td>-Fok-Han Leung, Assistant Professor in the Faculty of Medicine responsible for the second-year medical school community based service learning curriculum.</td>
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<tr>
<td>-Linzi Manicom, Coordinator of Community Engaged Learning at New College</td>
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<tr>
<td>-Ashley Stirling, Vice Dean of Academic Affairs in the Faculty of Kinesiology and Physical Education</td>
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<tr>
<td>-Jessie Richards, Curriculum Development Specialist, Office of the Vice-Provost, Innovations in Undergraduate Education</td>
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<tr>
<td>-John Robinson, Presidential Advisor, Environment, Climate Change and Sustainability</td>
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<th><strong>Consultation:</strong></th>
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<tr>
<td>Further consultations are in process with:</td>
</tr>
<tr>
<td>-Michelle Arnot, Undergraduate Coordinator, Department of Pharmacology &amp; Toxicology</td>
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<tr>
<td>-Alana Boland, Associate Dean, Teaching and Learning, Faculty of Arts &amp; Science</td>
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<tr>
<td>-Michelle French, Vice Chair, Academic - Undergraduate, Department of Physiology</td>
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<tr>
<td>-Alan Kaplan, Vice Dean, Graduate and Academic Affairs, Faculty of Medicine</td>
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<tr>
<td>-Melanie Woodin, Vice-Dean, Interdivisional Partnerships, Faculty of Arts &amp; Learning</td>
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Consulted with FAS units with placement-type courses to ensure no overlap: 21
Proposals Pertaining to Freestanding Programs

The following responded with support:
- Department of Chemistry
  "I am happy to support this course moving forward. I see no overlap with our Chemistry programs and it sounds like an excellent opportunity for some students and, hopefully, the wider community." - Rebecca Jockush
- School of the Environment
  "David and I have discussed the issue and there are no conflicts with any ENV programs. We definitely support this course. It sounds amazing!!" - Jessica D'eon
- Buddhism, Psychology and Mental Health (New College)
  "I am very supportive of this course" - Tony Toneatto
- Impact Centre
  "This sounds like a very worthwhile course to put together and thank you for letting us know about it. We hope that it will be very successful." - Emanuel Istrate
- Department of Linguistics
  "I've reviewed the proposal and it sounds fine. The type of placement doesn’t overlap, as far as I can tell, with the placements for JLP476. Sounds like a good opportunity for students." - Naomi Nagy
- Victoria College programs
  "Thank you for sharing the course proposal for HMB490Y1. It sounds like a wonderful opportunity for students and we are happy to support the course as it moves ahead." - Ira Wells
- Health Studies (University College)
  "I am not concerned about overlap, as there are generally few opportunities for experiential learning and I’m sure the demand is there." - Sarah Wakefield

As is customary, the following units were contacted to let them know that HMB is submitting a course proposal in advance of the next Science Curriculum meeting as we share many or most of our students with these units:
The following responded with support:
- Department of Cell and Systems Biology
  "Thank you for sending this information. I see no concerns from the perspective of CSB. It looks like a very interesting course." - Tony Harris
- Department of Ecology and Evolutionary Biology
  "Thanks for sending this along. This does not overlap with anything we currently offer in EEB." - Asher Cutter
- Department of Psychology
  "No obvious objections from Psych." - Nicholas Rule
- Department of Molecular Genetics
  "We would support that." - Richard Collins
No response at the time of submission:
- Department of Immunology
- Department of Biochemistry

Resources:
1 Instructor

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

Overlap with Existing Courses:
The program office has identified other courses that have placements and work-experience experiential learning components and currently are consulting with these units to ensure there is no placement overlap (full list of consultations below). While this experiential learning course may have some minor content overlap with other life science courses, it is intended to provide HMB students with the opportunity to apply and extend the knowledge they have gained in their classroom-based courses to these individual projects.

Programs of Study for Which This Course Might be Suitable:
Human Biology Programs: Human Biology, Health & Disease, Neuroscience, Fundamental Genetics and its Applications, Global Health

Estimated Enrolment:
40

Instructor:
Franco Taverna
7 Minor Program Modifications:

Applied Mathematics Specialist

Completion Requirements:

(13.0-13.5 FCE, including at least 1.5 FCE at the 400-level)

The Specialist Program in Applied Mathematics is directed toward students who hope to pursue applied mathematical research as a career.

First Year:
MAT157Y1, MAT240H1, MAT247H1, (CSC108H1, CSC148H1)/CSC150H1

Second Year:
MAT257Y1, MAT267H1, STA257H1, STA261H1

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HPS200H1/IMC200H1/JPH441H1/PHL265H1/PHL273H1/PHL275H1/PHL281H1 or another H course approved by the Department.

NOTE: Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

Third and Fourth Years:
1. MAT351Y1, MAT327H1, MAT347Y1, MAT354H1, MAT357H1, MAT363H1/MAT367H1 (MAT363H1 can be taken in the second year, if desired), STA302H1, STA457H1, CSC336H1, CSC436H1, CSC446H1, CSC456H1
2. At least 1.5 FCE chosen from: MAT332H1, MAT344H1, MAT454H1, MAT457H1, MAT458H1, MAT464H1, STA302H1, STA457H1, CSC336H1, CSC436H1, CSC446H1, CSC456H1
3. 1.0 FCE from: APM421H1, APM426H1, APM441H1, APM446H1, APM461H1, APM462H1, APM466H1
4. MAT477H1

NOTE:
1. The Department recommends that PHY151H1 and PHY152H1 be taken in the First Year, and that CSC148H1 and STA257H1 be taken during the program. If you do not have a year-long course in programming from high school, the Department strongly recommends that you take CSC108H1 prior to CSC148H1.
2. Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.
3. Students with a CGPA of 3.5 and above may apply to have graduate level math courses count towards their 400-level course requirements.

Description of Proposed Changes:

Rationale:
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:
Mathematical Applications in Economics and Finance Specialist

Completion Requirements:

(12-12.5 FCE, including at least 1.5 FCE at the 400-level)

First Year:
ECO100Y/(ECO101H1, ECO102H1); MAT137Y1/MAT157Y1, MAT223H1, MAT224H1

(Please check the requirements for ECO206Y1 to ensure that you pass these first year courses with grades that allow registration in ECO206Y1)

Second Year:
ECO206Y1; MAT237Y1, MAT244H1, MAT246H1 (waived for students taking MAT157Y1); STA257H1, STA261H1

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HPS200H1/IMC200H1/PHL441H1/PHL265H1/PHL273H1/PHL275H1/PHL281H1 or another H course approved by the Department. Note: Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

Third Year:
1. APM346H1; ECO358H1; ECO359H1; MAT337H1; STA302H1/ECO375H1; STA347H1
2. One of: MAT332H1, MAT344H1, MAT334H1, MAT475H1

Fourth Year:
APM462H1, APM466H1; STA457H1

NOTE:
1. Students planning to take specific fourth year courses should ensure that they have the necessary third year prerequisites.
2. Please note that STA457H1 lists STA302H1 as one of the prerequisites so you are encouraged to plan ahead.

Description of Proposed Changes:

Rationale:
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:

Consultation:

Resource Implications:
Mathematics & Its Applications Specialist (Physical Science)

Completion Requirements:

(13.5-14.5 FCE, including at least 1.0 FCE at the 400 level)

Core Courses:

First Year:
(CSC108H1, CSC148H1)/CSC150H1, MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, MAT224H1/MAT247H1 (recommended, can also be taken in 2nd year)

Second Year:
MAT235Y1/MAT237Y1/MAT257Y1, MAT246H1 (waived for students taking MAT157Y1), MAT244H1/MAT267H1, STA257H1

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HP3200H1/IMC200H1/PH441H1/PPL265H1/PPL273H1/PPL275H1/PPL281H1 or another H course approved by the Department. Note: Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

Higher Years:
MAT301H1, MAT334H1

NOTE: Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.

Physical Sciences Concentration:

2. PHY151H1, PHY152H1, AST221H1
3. Three of: AST222H1, PHY250H1, PHY252H1, PHY254H1, PHY256H1
4. APM346H1/MAT351Y1
5. Three of: AST320H1, AST325H1, MAT337H1, MAT363H1/MAT367H1, PHY350H1, PHY354H1, PHY356H1, PHY357H1, PHY358H1
6. Two of: APM421H1, APM426H1, APM441H1, APM446H1, PHY407H1, PHY408H1, PHY456H1

Description of Proposed Changes:

Rationale:
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:

Consultation:

Resource Implications:
Mathematics & Its Applications Specialist (Probability/Statistics)

Completion Requirements:

(11.5-13.0 FCE, including at least 1.0 FCE at the 400 level)

Core Courses:

First Year:
(CSC108H1, CSC148H1)/CSC150H1; MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, MAT224H1/MAT247H1

Second Year:
MAT224H1/MAT247H1, MAT235Y1/MAT237Y1/MAT257Y1, MAT246H1 (waived for students taking MAT157Y1), MAT244H1/MAT267H1; STA257H1

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HP500H1/IMC200H1/PHL265H1/PHL273H1/PHL275H1/PHL281H1 or another H course approved by the Department. Note: Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

Higher Years:
MAT301H1, MAT334H1

NOTE:
1. Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.

Probability/Statistics Concentration:

1. APM346H1/MAT351Y1/APM462H1; MAT337H1; STA261H1, STA302H1, STA347H1, STA352Y1/(STA452H1, STA453H1)
2. Additional 1.0 FCE at the 300+ level from APM/MAT/STA
3. Two of: STA437H1, STA442H1, STA447H1, STA457H1

Description of Proposed Changes:

Moving MAT224H1/MAT247H1 from a second-year requirement to a first-year requirement. Removing IMC200H1 from the Ethics and Social Responsibility requirement.

Rationale:

The listing of MAT224H1 and MAT247H1 as courses in the second year sometimes lead to students taking Algebra I, MAT240H1, or Linear Algebra I, MAT223H1, in the first semester of the first year and then waiting until the next academic year for the follow up with Algebra II, MAT247H1, or Linear Algebra II, MAT224H1.

A few second-year courses list Algebra II, MAT247H1, among the prerequisites. It is therefore, imperative that the students understand that although this course may be taken in the second year, it is a first year course.

The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:

Consultation:
Mathematics (FAS), Department of

Resource Implications:

Mathematics & Its Applications Specialist (Teaching)

Completion Requirements:

(11.5-12.0 FCE, including at least 1.0 FCE at the 400 level)

Core Courses:

First Year:
CSC108H1; MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, MAT224H1/MAT247H1 (recommended, can also be taken in 2nd year)

Second Year:
MAT235Y1/MAT237Y1/MAT257Y1, MAT246H1 (waived for students taking MAT157Y1), MAT244H1/MAT267H1; STA257H1

NOTE:
1. MAT237Y1/MAT257Y1 is a direct or indirect prerequisite for many courses in each of the areas of concentration except the Teaching Concentration. Students are advised to take MAT237Y1/MAT257Y1 unless they have planned their program and course selection carefully and are certain that they will not need it.

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HPS200H1/IMC200H1/JPH441H1/PYL65H1/PYL73H1/PYL75H1/PYL81H1 or another H course approved by the Department. Note: Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

Higher Years:
MAT301H1, MAT334H1

NOTE:
1. Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.

Teaching Concentration:

For course selection, note that OISE requires students to have a second teachable subject.
1. MAT329Y1, HPS390H1/MAT390H1, HPS391H1/MAT391H1
2. Two of: MAT332H1/MAT344H1, MAT335H1, MAT337H1, MAT363H1/MAT367H1
3. Two of: MAT309H1, MAT315H1; STA302H1/STA347H1
4. MAT401H1/MAT402H1 and 0.5 FCE at the 400-level from MAT, APM, STA

Description of Proposed Changes:

Rationale:
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:
<table>
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<th>Mathematics Specialist</th>
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<td><strong>Completion Requirements:</strong></td>
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(12.5 FCE, including at least 3.0 FCE at the 400-level)

The Specialist Program in Mathematics is directed toward students who hope to pursue mathematical research as a career.

**First Year:**
MAT157Y1, MAT240H1, MAT247H1

**Second Year:**
MAT257Y1, MAT267H1

**Second and Higher Years:**

1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/ETH250H1/ETH260H1/ETH270H1/ETH280H1/ETH290H1/ETH300H1 or another H course approved by the Department.

NOTE: Students may use the CR/NCR option with this H course and have it count toward the Mathematics Specialist program. Students in the VIC program may also use VIC172Y1.

2. MAT327H1

**Third and Fourth Years:**
1. MAT347Y1, MAT354H1, MAT357H1, MAT363H1/MAT367H1 (MAT363H1 can be taken in the second year, if desired)
2. 2.0 FCE of: MAT309H1, MAT351Y1, ANY 400-level APM/MAT
3. 3.0 FCE of APM/MAT at the 300+ level, including at least 2.0 FCE at the 400 level (these may include options above not already chosen)
4. MAT477H1

NOTE:
1. The Department recommends that PHY151H1 and PHY152H1 be taken in the First Year, and that CSC148H1 and STA257H1 be taken during the program. If you do not have a year-long course in programming from high school, the Department strongly recommends that you take CSC108H1 prior to CSC148H1.

2. Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.

3. Students with a CGPA of 3.5 and above may apply to have graduate level math courses count towards their 400-level course requirements.

**Description of Proposed Changes:**

**Rationale:**
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

**Impact:**

**Consultation:**

**Resource Implications:**

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**Mathematics and Physics Specialist**

**Completion Requirements:**

(14.5-15.5 FCE, including at least 1.0 FCE at the 400-level)

First Year:
MAT157Y1, MAT240H1, MAT247H1, PHY151H1, PHY152H1

Second Year:
MAT257Y1, MAT267H1, PHY224H1, PHY250H1, PHY252H1, PHY254H1, PHY256H1

Second and Higher Years:
1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HPA200H1/IMC200H1/JPH441H1/PHL265H1/PHL273H1/PHL275H1/PHL281H1 or another H course approved by the Department.

**NOTE:** Students may use the CR/NCR option with this H course and have it count toward the program. Students in the VIC program may also use VIC172Y1.

2. Note: PHY252H1 and PHY324H1 may be taken in the 2nd or 3rd year.

Third Year:
1. MAT351Y1, MAT334H1/MAT354H1, MAT357H1
   2. One of: MAT327H1, MAT347Y1, MAT363H1/MAT367H1 (MAT363H1 can be taken in the second year, if desired)
   3. PHY324H1, PHY350H1, PHY354H1, PHY356H1

Fourth Year:
1. Two of: APM421H1, APM426H1, APM446H1, APM441H1
   2. Two of: PHY450H1, PHY452H1, PHY454H1, PHY456H1, PHY460H1
   3. One of: MAT477H1, PHY424H1, PHY478H1, PHY479Y1

**NOTE:**
1. Students who are intending to apply to graduate schools in mathematics would be well-advised to take MAT347Y1.
2. Students planning to take specific fourth year courses should ensure that they have the necessary second and third year prerequisites.
3. Students with a CGPA of 3.5 and above may apply to have graduate level math courses count towards their 400-level course requirements.

**Description of Proposed Changes:**

**Rationale:**
The current Associate Chair, Professor Dror Bar-Natan, and the past Associate Chair, Professor Mary Pugh, reviewed the requirement and agreed that IMC200H1 would no longer be allowed for the ethics and social responsibility component.

Impact:

Consultation:

Resource Implications:

1 New Course:

APM348H1: Mathematical Modelling

Contact Hours:

| Lecture: 36 | Practical: 22 |

Description:

An overview of mathematical modelling. A variety of approaches for representing physical situations mathematically followed by analytical techniques and numerical simulations to gain insight. Questions from biology, economics, engineering, medicine, physics, physiology, and the social sciences formulated as problems in optimization, differential equations, and probability. Precise content varies with instructor.

Prerequisites:

MAT244H1/MAT267H1, MAT224H1/MAT247H1, STA247H1/STA257H1/MAT377H1

Corequisites:

Exclusions:

MAT482H1 (Topics in Mathematics: Topics in Mathematical Modelling), offered in Winter 2019

Recommended Preparation:

Breadth Requirements:

The Physical and Mathematical Universes (5)

Distribution Requirements:

Science

Competencies:

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

Experiential Learning:

- Research: notably; Other: none

Rationale:

Our undergraduate students in mathematics, including those in the applied math specialist program, acquire broad mathematical knowledge, but have limited exposure to the process of mathematical modelling.

Mathematical modelling is the link between mathematics and the rest of the world. It is a way of structuring questions about the world so that mathematical techniques may provide insight. The proposed course demonstrates the process of asking a question about a physical situation, deriving a mathematical representation of the problem, studying it using mathematical techniques, and interpreting the results.
The students practice this process of modelling with a project. They learn how to formulate precise mathematical statements about an imprecise world, to reason with mathematics, and then communicate mathematical ideas. This experience makes the mathematics they have learned in other courses more useful for their future careers. The project also introduces students to applied mathematics research.

**Consultation:**
informal discussions with department members.

**Resources:**
0.5 FCE instructor, 1 TA for 60 hours, a computer lab once a week (the Sidney Smith Computer Lab is ideal).

**Overlap with Existing Courses:**
- BME344H1 - overlap of modelling in physiology
- BIO205H5 - overlap of population dynamics modelling - the proposed course is a more advanced treatment
- JMB170Y1 - the proposed course is a much more mathematically sophisticated study of some of the same topics
- CHE471H1 - overlap of modelling methodology and some applications in biology
- MATC58H3 - overlap of modelling in mathematical biology
- MIE360H1 - overlap of discrete event simulation

**Programs of Study for Which This Course Might be Suitable:**
- Applied Mathematics Specialist (Science Program) - ASSPE2053
- Mathematics and Physics Specialist (Science Program) - ASSPE0397
- Mathematics & Its Applications Specialist (Physical Science) (Science Program) - ASSPE1758
- Mathematics Major (Science Program) - ASMAJ1165

**Estimated Enrolment:**
25-35.

**Instructor:**
Adam Stinchcombe and others.
## 1 New Course:

**PSL199H1: Biomedical Research at the Cutting Edge**

<table>
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<th>Contact Hours:</th>
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<td>Lecture: 24</td>
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**Description:**

Explore the thought processes, logic, motivation, techniques, analysis and impact of recent high-profile publications to gain insight into the enterprise of science. Outstanding scientists present recent high-impact papers, and students will examine the research in depth, focusing on the underlying questions, experimental approach, results and significance. Restricted to newly admitted first-year students. Not eligible for CR/NCR option.

**Prerequisites:**

SBI4U and SCH4U (Grade 12 University Preparation Biology and Chemistry); permission of Department

**Corequisites:**

**Exclusions:**

**Recommended Preparation:**

**Breadth Requirements:**

Living Things and Their Environment (4)

**Distribution Requirements:**

Science

**Competencies:**

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

**Experiential Learning:**

- Research: none; Other: none

**Rationale:**

The Department of Physiology would like to change the existing course code for PSL190H1S to PSL199H1S. The format will remain the same, but we are proposing this course be changed into a first year foundation course.

**Consultation:**

**Resources:**

**Overlap with Existing Courses:**

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

**Estimated Enrolment:**

**Instructor:** 32
1 Retired Course:

PSL190H1: Biomedical Research at the Cutting Edge

Rationale:
The Department of Physiology would like to change the existing course code for PSL190H1S to PSL199H1S. The format will remain the same, but we are proposing this course be changed into a first year foundation course.
1 Program Revision:

Physiology Specialist

Enrolment Requirements:

The Physiology Specialist program is a Type 3 program. Only students with an average of at least 70% in the required first-year courses and a minimum of 60% in each of these courses will be considered for entrance into the specialist program. Enrolment is limited and selection is based on performance in the following first-year required courses: BIO130H1, (CHM135H1/CHM139H1), (CHM136H1/CHM138H1) or their equivalents, and 1.5 full course equivalents from: BIO120H1, MAT135H1, MAT136H1, MAT137Y1, MAT157Y1, PHY131H1, PHY132H1, PHY151H1, PHY152H1. Students apply via the Faculty’s Program Enrolment website. See the Arts & Science Program Enrolment website for application procedures. For more information, refer to the Physiology website at www.physiology.utoronto.ca.

Completion Requirements:

(14 full courses or their equivalent)

First Year:
BIO120H1/PSL190H1, BIO130H1; (CHM135H1/CHM139H1), (CHM136H1/CHM138H1))/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. PSL496Y1/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:

The Department of Physiology is planning to change PSL190H1S to PSL199H1S and should not be included under that requirement. BIO120H and BIO130H are requirements for the Life Science programs.

Rationale:
The Department of Physiology is planning to change PSL190H1S to PSL199H1S and should not be included under that requirement. BIO120H and BIO130H are requirements for the Life Science programs.

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<td>Consultation:</td>
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<td>Resource Implications:</td>
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1 New Course:

PSY203H1: Psychological Research

Contact Hours:
Lecture: 36

Description:
This course provides an introduction to conceiving, designing, and conducting research in psychology. It prepares students to be both consumers and producers of scientific research, and also addresses basic issues related to the work of psychological scientists such as theory development, research ethics, and scientific writing. Students in this course will gain insight into the scientific process as a whole – its advantages, difficulties, and limitations. As such, students will be able to better evaluate the knowledge that psychological science can provide, and integrate that knowledge into a broader worldview.

Prerequisites:
PSY100H1

Corequisites:
PSY201H1 (or exclusion)

Exclusions:
PSY309H1/PSY319H1/PSY329H1/PSY339H1/PSY359H1/PSY369H1/PSY379H1/PSY389H1

Recommended Preparation:

Breadth Requirements:
Thought, Belief and Behaviour (2)

Distribution Requirements:
Science

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

Experiential Learning:
Research: none; Other: none

Rationale:
A thorough understanding and appreciation of psychology as a science is essential to student success in a psychology program of study. In fact, one major subsection of program learning outcomes for the Undergraduate Psychology Major, as set forth by the American Psychological Association (APA) and adapted for the Department of Psychology, consists of outcomes related to Scientific Inquiry and Critical Thinking; further, out of 16 identified program learning outcomes, seven directly assess skills typically introduced in a methods course (including APA writing style, communicating about methods and statistics, discussing ethical principles of psychological research, searching databases, and more). However, the current psychology curriculum is such that only upper-level psychology specialists have formal methods training; the proposed methods course would help to fill this need and support these Program Learning outcomes for all students in Psychology programs of study.

Currently, only psychology specialists are required to take advanced lab courses, which represent their only formal training in research methods (though some students gain additional experience working in labs or by completing the research specialist program). Therefore, students enter the lab courses with widely varying proficiency in methods and design related concepts, pushing lab instructors to simplify much of the instructional content and rendering much of the
content introductory rather than advanced. The proposed course would offer all students an introduction to methodological basics, leveling the playing field upon entry to the advanced labs and allowing lab instructors to teach more advanced skills and content in their courses.

Because only specialists are required to take advanced lab courses (non-specialists are rarely granted access to these courses because of the necessary course caps), all of our psychology majors and minors take advanced psychology courses and graduate without training in research methods and design. Academically, this is limiting because many upper-level psychology courses require students to read empirical work and propose research studies as final papers, even though many of the students have often not been introduced to the necessary skills prior to these assignments. Given that misconceptions about psychology as a science abound, we are doing our students and ourselves a disservice by sending them out into the world without the tools needed to critically evaluate psychological research. The proposed course would offer all students the background necessary to better engage with psychological science, both in advanced courses and outside an academic domain.

In addition to the valuable content, an introductory methods course also provides an opportunity to widely introduce skills that students need in later courses but are currently introduced in a nonsystematic piecemeal fashion, such as APA citation and reference practices, psychology database searches, how to read academic articles, and more.

In sum, there is currently a gap in the Psychology curriculum that could be addressed by the foundational methods course proposed.

Consultation:
N/A

Resources:
Lecture hall capable of holding 200 students. Audio/Video Equipment for displaying lecture materials.

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

Overlap with Existing Courses:
HST250 (Introduction to Research Methods in Health Studies) offers Health Studies students a basic understanding of research design and data collection on health topics. The main focus of HST is research design specific to health topics, and this course is limited to students in the HST program. The proposed course will offer an overview of the most common methods and aspects of research design across areas of psychology and will serve a much broader audience. Further, the proposed course will also emphasize (a) ethical foundations on research with human subjects and (b) the importance of the students’ future roles as consumers of research, not just producers. Therefore, the overlap of the proposed course with HST250 will be low.

IRE379 (Employment Relations Research & Human Resources Analytics) is an introduction to both quantitative and qualitative research methods most commonly used in the labour field. Although some basic concepts might overlap (e.g., survey design, instrument reliability), the narrow focus of this course on human resources research (as well as the limited access as an upper level IRE course) means that psychology students will not gain the same experiences and knowledge from such a course. Therefore, the overlap of the proposed course with IRE379 will be low.

NFS301 (Nutrition Literacy: Sorting Science from Snake Oil) helps students critically consume claims from nutrition research. Though scientific literacy will be a focus of the proposed course, NFS301 is limited to nutrition science and relevant methods (many of which are outside the scope of traditional psychology methods). The proposed course will offer an overview of the most common methods and aspects of research design across areas of psychology and will serve a much broader audience. Further, the proposed course will also emphasize ethical foundations on research with human subjects. Therefore, the overlap of the proposed course with NFS301 will be low.

GGR271 (Social Research Methods) is a practical course on field methods most commonly used in geography. The main focus of GGR271 is to prepare students to conduct their own research. Although there will be overlap in content (e.g., behavioural observation, questionnaire design), the proposed course will offer an overview of the most common methods and aspects of research design across areas of psychology and will serve a much broader audience. Further, the proposed course will also emphasize (a) ethical foundations on research with human subjects and (b) the importance of the students’ future roles as consumers of research, not just producers. Therefore, the overlap of the proposed course with GGR271 will be low.

Programs of Study for Which This Course Might be Suitable:
### Psychology (FAS), Department of

All Psychology POSts and those in cognate disciplines that involve studying human and other animal behaviour

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<td>Dr. Molly Metz</td>
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Science Curriculum Committee
Revision Proposals By Unit