Science Curriculum Committee
Proposals for information By Unit

April 3, 2019
1 Course Modification:

**CSB499Y1: Independent Research in Cell and Systems Biology II**

<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>Allows students to do a second independent project. Operates in the same manner as CSB497H1/CSB498Y1. Students who have completed both CSB497H1 and CSB498Y1 are excluded from taking CSB499Y1. (Lab Materials Fee: $50). Not eligible for CR/NCR option.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Rationale:</th>
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<tbody>
<tr>
<td>The added line in the course description makes it clear to students the number of CSB 400-level independent research courses that can be taken.</td>
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<th>Consultation:</th>
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<tr>
<th>Resources:</th>
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</table>
### 37 Course Modifications:

**CSC300H1: Computers and Society**

<table>
<thead>
<tr>
<th>Exclusions:</th>
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<td>Previous:</td>
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| Rationale: | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |

| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science |

| Resources: |  |

**CSC301H1: Introduction to Software Engineering**

<table>
<thead>
<tr>
<th>Corequisites:</th>
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| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science |

| Resources: |  |

**CSC302H1: Engineering Large Software Systems**

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| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |

| Resources: |  |

**CSC303H1: Social and Information Networks**

| Exclusions: | CSCC46H3. NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

| Resources: |  |
Computer Science (FAS), Department of

| **Rationale:** | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| **Consultation:** | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| **Resources:** | |

**CSC309H1: Programming on the Web**

| **Exclusions:** | |
| **Previous:** | |
| **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

| **Rationale:** | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| **Consultation:** | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| **Resources:** | |

**CSC318H1: The Design of Interactive Computational Media**

| **Exclusions:** | |
| **Previous:** | |
| **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

| **Breadth Requirements:** | |
| **Previous:** | None |
| **New:** The Physical and Mathematical Universes (5) |

| **Rationale:** | CSC318H1 did not previously have a breadth category. We are not sure historically why this was the case. Possibly it was an erroneous omission. It clearly belongs to category 5. As for the exclusions field, we are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| **Consultation:** | For the breadth requirement addition, we consulted the course instructors and the departmental undergraduate committee. The addition of note in the exclusions field was done in consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| **Resources:** | |

**CSC320H1: Introduction to Visual Computing**

| **Exclusions:** | |
| **Previous:** | |
| **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

| **Rationale:** | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
### Computer Science (FAS), Department of

**Consultation:**  
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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<td>CSC324H1</td>
<td>Principles of Programming Languages</td>
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<td>CSC336H1</td>
<td>Numerical Methods</td>
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<td><strong>CSC350H1, CSC351H1. NOTE:</strong> Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.</td>
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<td>CSC367H1</td>
<td>Parallel Programming</td>
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UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC369H1: Operating Systems

**Exclusions:**
- **Previous:**
  - New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC373H1: Algorithm Design, Analysis & Complexity

**Exclusions:**
- CSC375H1. NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC384H1: Introduction to Artificial Intelligence

**Exclusions:**
- **Previous:**
  - New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**
## CSC385H1: Microprocessor Systems

**Exclusions:**
- CSC372H1, ECE385H1. **NOTE:** Students who are not enrolled in the Major or Specialist program at the UTSG, UTM or UTSC campuses may take a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
- We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
- In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

## CSC396Y0: Designing Systems for Real World Problems

**Exclusions:**
- **Previous:**
- **New:** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
- We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
- In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

## CSC401H1: Natural Language Computing

**Description:**

Introduction to techniques involving natural language processing and speech in applications such as information retrieval: extraction, and filtering; intelligent Web searching; spelling and grammar checking; speech recognition and synthesis; and synthesis, multi-lingual systems including machine translation. N-grams, POS-tagging, semantic distance metrics, summarization indexing, on-line lexicons and dialogue. N-grams thesauri, markup languages, collections of on-line documents, corpus analysis, neural methods, and information theory. Python PERL and other software.

**Exclusions:**
- **Previous:**
- **New:** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
- The new description reflects the current content of the course. As for the proposed exclusions, we are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
- In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**
## CSC404H1: Introduction to Video Game Design

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
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**Consultation:**
  - In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

## CSC410H1: Software Testing and Verification

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
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**Consultation:**
  - In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

## CSC412H1: Probabilistic Learning and Reasoning

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
  - We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
  - In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

## CSC420H1: Introduction to Image Understanding

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
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<tr>
<td>CSC428H1: Human-Computer Interaction</td>
<td>In consultation with Tamara Jones and Cheryl O'Donoghue from Arts &amp; Science.</td>
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<tr>
<td>CSC436H1: Numerical Algorithms</td>
<td>In consultation with Tamara Jones and Cheryl O'Donoghue from Arts &amp; Science.</td>
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**Exclusions:**
- CSC351H1. NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
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<tr>
<td>CSC438H1: Computability and Logic</td>
<td>In consultation with Tamara Jones and Cheryl O'Donoghue from Arts &amp; Science.</td>
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**Exclusions:**
- MAT309H1; PHL348H1. NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
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<td>CSC443H1: Database System Technology</td>
<td>In consultation with Tamara Jones and Cheryl O'Donoghue from Arts &amp; Science.</td>
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**Exclusions:**
- **Previous:**
- **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.
**CSC448H1: Formal Languages and Automata**

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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<tbody>
<tr>
<td>CSC236H1/CSC240H1, CSC263H1/CSC265H1</td>
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**Rationale:**
CSC265H1 is the enriched version of CSC263H1. It should have been listed as an alternative to CSC263H1 in the prerequisite list but was missed when CSC265H1 was created. As for the exclusions field, we are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

**CSC454H1: The Business of Software**

**Exclusions:**

| Previous: |
| New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

**CSC456H1: High-Performance Scientific Computing**

**Exclusions:**

| Previous: |
| New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses. |

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.
CSC458H1: Computer Networking Systems

Exclusions:

Previous:
New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

Rationale:
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

Consultation:
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

Resources:

CSC463H1: Computational Complexity and Computability

Exclusions:

CSC363H1/CSCC63H3, CSC365H1. NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

Rationale:
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

Consultation:
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

Resources:

CSC466H1: Numerical Methods for Optimization Problems

Exclusions:

Previous:
New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

Rationale:
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

Consultation:
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

Resources:

CSC469H1: Operating Systems Design and Implementation

Exclusions:

Previous:
New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

Rationale:
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC473H1: Advanced Algorithm Design

**Exclusions:**

- **Previous:**
- **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC486H1: Knowledge Representation and Reasoning

**Exclusions:**

- **Previous:**
- **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC488H1: Compilers and Interpreters

**Exclusions:**

- **Previous:**
- **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**
### CSC490H1: Capstone Design Project

**Exclusions:**

**Previous:**

**New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC491H1: Capstone Design Project

**Exclusions:**

**Previous:**

**New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### 9 Course Revisions:

#### CSC304H1: Algorithmic Game Theory and Mechanism Design

**Exclusions:**

**Previous:**

**New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

#### CSC311H1: Introduction to Machine Learning

**Exclusions:**
### CSC411H1, STA314H1, ECE421H1

**NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC343H1: Introduction to Databases

**Exclusions:**
CSC443H1. **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC413H1: Neural Networks and Deep Learning

**Exclusions:**
CSC321H1/CSC421H1. **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

### CSC418H1: Computer Graphics

**Exclusions:**

**Previous:**

**New:** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**
### CSC419H1: Geometry Processing

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC446H1: Computational Methods for Partial Differential Equations

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC465H1: Formal Methods in Software Design

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC485H1: Computational Linguistics

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.
Computer Science (FAS), Department of

<table>
<thead>
<tr>
<th>Consultation:</th>
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</thead>
<tbody>
<tr>
<td>In consultation with Tamara Jones and Cheryl O'Donoghue from Arts &amp; Science.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources:</th>
</tr>
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<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
4 Course Modifications:

**ESS345H1: Computational Geology**

**Description:**
A practical introduction to **High level computer** programming. This course will teach an operational knowledge on how to write and execute self written computer programs. Course topics touch upon using a computer without a graphical interface **manipulate**, using an integrated development environment **analyse**, programming, documenting, debugging and **visualise** geologic datasets, reading and writing data, graphical output, how to navigate existing documentation **solve** geologic **problems that require mathematical** and internet resources, and last but not least how to effectively ask for help **physical concepts**. Students will work individually and in small groups in an inverted classroom setting on earth science related problem sets. Previous programming experience is not required **Matlab; write reports**, however curiosity **give oral presentations**, independence and perseverance are mandatory **work in teams**.

**Prerequisites:**
- **Previous**: ESS241H1 / ESS261H1/ESS262H1
- **New**: 2 FCEs from first-year math, chemistry or physics courses; 2 FCEs of earth sciences courses

**Exclusions:**
- GLG204H1, CSC108H1

**Rationale:**
Rationale: The course description had to be updated to better reflect what is actually taught in the course, and to provide a more general framework with is programming language independent.

**Consultation:**
This was discussed with all instructors teaching the course, as well as with the undergraduate affairs committee.

**Resources:**

**ESS425H1: Analytical Methods for the Geosciences**

**Title:**
Advanced **Analytical** Methods in for the Geosciences

**Abbreviated Title:**
Advanced **Analytical** Methods

**Description:**
- **Previous**:

Theory and hands-on learning of current analytical techniques ( laboratory work is worth 50% of the final grade ). In each lab, groups of two students receive instruction from an experienced analyst and acquire hands-on experience using state-of-the-art analytical equipment. Where possible, samples supplied by the students are analyzed. Techniques covered include Neutron Activation, X-ray Fluorescence, X-ray Diffraction, Scanning Electron Microscopy, Gas Chromatography, Ion Chromatography, Atomic Absorption, Inductively Coupled Plasma Optical Emission Spectrometry and Inductively Coupled Plasma Mass Spectrometry .

- **New**:

This course provides an in-depth exploration of methods which are commonly used in the Geosciences . The course content will vary from year to year; students should inquire with the Department about course topics and pre-requisites
before the beginning of the Fall term. Topics taught in this course include, but are not limited to, laboratory analytical techniques (such as X-ray diffraction, X-ray fluorescence, stable isotopes, light and scanning electron microscopy and Inductively Coupled Plasma Mass Spectrometry), core logging, computational techniques including modeling, statistical methods, or spatial analysis tools for geological mapping applications such as plotting cross sections or correlating biostratigraphies.

**Prerequisites:**
- **Previous:**
  - New: 8 FCEs of Earth Sciences courses

**Exclusions:**
- **Previous:** ENV315H1
- **New:**

**Recommended Preparation:**
- **Previous:** ESS222H1, ESS223H1 & ESS311H1
- **New:**

**Rationale:**

**Consultation:**

**Resources:**

### ESS490H1: Geological Capstone Fieldtrip

**Description:**

A two-week excursion to a challenging field setting. Students will integrate field observations with their accumulated knowledge of geodynamics, structural geology, and landscape evolution to understand large-scale geological events. Not eligible for CR/NCR option. **This course will be offered in the summer session of 2020.** Note: Enrollment is handled by the department. For registration deadlines, additional fees associated with the field course, course dates, and special registration requirements, please consult the departmental announcements or inquire with ugrad@es.utoronto.ca.

**Recommended Preparation:**
- ESS221H1, ESS261H1, ESS222H1, ESS222H1, ESS234H1, ESS431H1, ESS331H1, ESS441H1, ESS423H1, ESS445H1

**Rationale:**

**Consultation:**

**Resources:**
ESS241H1: Geologic Structures and Maps

**Recommended Preparation:**

- **Previous:** (PHY131H1, PHY132H1) / (PHY151H1, PHY152H1)
- **New:** JEG100H1 / ESS262H1

**Rationale:**

**Consultation:**

**Resources:**
1 Course Revision:

GGR270H1: Introductory Analytical Methods

| Exclusions: | ECO220Y1/ECO227Y1/EEB225H1/GGR270Y1/LIN305H1/POL222H1/POL242Y1/PSY201H1/SOC202H1/STA220H1/STA248H1/STA250H1/STA261H1 |
| Rationale: | This course was just recently brought to the instructors attention, it should be listed as an exclusion as the content overlaps. |
| Consultation: |
| Resources: |
1 Minor Program Modification:

Economics & Mathematics Specialist

Completion Requirements:

Program Course Requirements: 13 full courses or their equivalent

First Year (2.0 FCE):

1. ECO100Y/(ECO101H1, ECO102H1);
2. MAT137Y1/MAT157Y1

Second Year and Higher (Core Courses, 8.5 FCE):

1. ECO206Y1, ECO208Y1, ECO220Y1/ECO227Y1/(STA257H1, STA261H1)
2. CSC108H1/CSC148H1
3. MAT223H1/MAT240H1, MAT224H1/MAT247H1, MAT237Y1/MAT257Y1, MAT246H1
4. ECO325H1, ECO326H1, ECO375H1
5. MAT337H1/MAT357H1, APM462H1

Third Year and Higher (Elective Courses, 2.5 FCE):

1. 0.5 300+ ECO course
2. 1.0 400-level ECO course
3. 1.0 300-level or higher MAT (or APM) courses (in addition to APM462H1).

Notes:

1. Students must meet all prerequisites for upper-year math and economics courses, and should choose their sequencing of courses accordingly.
2. CSC108H1/CSC148H1 may be taken in First Year.
3. MAT223H1/MAT240H1 may be taken in First Year.
4. ECO475H1 is strongly recommended.
5. STA302H1/STA303H1 are not accepted in lieu of ECO375H1.
6. Students with MAT157Y1 cannot take MAT246H1 (it is an exclusion). Such students can instead substitute any 300-level MAT or APM course to meet the MAT246H1 requirement.

Description of Proposed Changes:

Rationale:

Impact:

Consultation:
Resource Implications:
### 1 Course Modification:

#### ENV316H1: Laboratory and Field Methods in Environmental Science

<table>
<thead>
<tr>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course focuses on methods of sampling and analyzing natural air, water and solid Earth materials for physical, chemical and biological properties that are relevant to current environmental issues. It will integrate approaches from chemistry, physics, geology and biology, and cover techniques in field sampling, laboratory analyses and analyses of large environmental data sets. Basic concepts related to quality control will be emphasized throughout the course: sample collection and storage methods, calibration of field and lab instruments, analyses in complex matrices, errors (accuracy, precision), and detection limits. A fee of $20 will approximately $15 may be charged for laboratory materials field trip transportation.</td>
</tr>
</tbody>
</table>

| Rationale:                                                                   |
|                                                                             |

| Consultation:                                                               |
|                                                                             |

| Resources:                                                                  |
|                                                                             |
2 Course Modifications:

**HPS360H1: History of Modern Cosmology**

<table>
<thead>
<tr>
<th>Contact Hours:</th>
<th>Previous: Lecture: 24 / Tutorial: 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>New: Lecture:</td>
<td>24</td>
</tr>
</tbody>
</table>

Rationale:

Consultation:

Resources:

**HPS391H1: History of Mathematics after 1700**

<table>
<thead>
<tr>
<th>Contact Hours:</th>
<th>Previous: Lecture: 36</th>
</tr>
</thead>
<tbody>
<tr>
<td>New: Lecture:</td>
<td>24 / Tutorial: 10</td>
</tr>
</tbody>
</table>

Rationale:

Consultation:

Resources:
1 Course Modification:

**IMM350H1: The Immune System in Action**

<table>
<thead>
<tr>
<th>Contact Hours:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previous:</strong> Lecture: 24</td>
</tr>
<tr>
<td><strong>New:</strong> Lecture: 24 / Tutorial: 12</td>
</tr>
</tbody>
</table>

**Rationale:**
Correction to instructional hours, which have included tutorials for several years.

**Consultation:**

**Resources:**
## Mathematics Major

### Completion Requirements:

(7.5 full courses or their equivalent. These must include at least 2.5 full course equivalent (FCE) at the 300+ level. Of those 2.5 FCE, at least 0.5 FCE must be at the 400 level).

#### First Year:

(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1, MAT223H1/MAT240H1, MAT224H1/MAT247H1

#### Second Year:

**MAT224H1/MAT247H1**: MAT235Y1/MAT237Y1/MAT257Y1, MAT244H1, MAT246H1

**NOTE:**

1. MAT224H1 may be taken in first year

#### Second and Higher Years:

1. At least 0.5 FCE with a significant emphasis on ethics and social responsibility: ENV333H1/ETH201H1/ETH210H1/ETH220H1/HP200H1/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 use VIC172Y1.

#### Higher Years:

1. MAT301H1, MAT309H1/MAT315H1, MAT334H1
2. Additional 0.5 FCE at the 200+ level from: ACT240H1/ACT230H1 APM236H1, MAT309H1/MAT315H1/MAT335H1/MAT337H1, STA247H1/STA257H1
3. Additional 0.5 FCE at the 300+level from: APM346H1, APM462H1, MAT309H1, MAT315H1, MAT332H1/MAT344H1, MAT335H1, MAT337H1, MAT363H1, MAT475H1, HPS390H1, HPS391H1, PSL432H1
4. MAT401H1/MAT402H1 or any other MAT/APM 400-level course

**NOTES:**

1. Students using MAT157Y1 towards the first year program requirements must replace the exclusion course MAT246H1 with a different H level MAT/APM course at the 200+ level.

2. In the major program, higher level courses within the same topic are acceptable substitutions. With a judicious choice of courses, usually including introductory computer science, students can fulfill the requirements for a double major in mathematics and one of several other disciplines.

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

4. Students interested in becoming K-12 teachers should consider applying to the combined degree program --- a six-year program that leads to an Honours Bachelor of Science (H B Sc) from the University of Toronto and a Master of Teaching (M T) from the Ontario Institute for Studies in Education (OISE). The HBSc part of this program involves completing a Math Major, a Minor in Education and Society (offered by Victoria College) and a Minor in an area that would lead to a second "teachable" subject. Please see the Victoria College website for more information.

---

**Description of Proposed Changes:**

**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.

**Impact:**

**Consultation:**

**Resource Implications:**

### Mathematics and Philosophy Specialist

**Completion Requirements:**

Consult the Undergraduate Coordinators of the Departments of Mathematics and Philosophy.

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

**First Year:**
MAT157Y1, MAT240H1, MAT247H1; PHL232H1 or PHL233H1

**Higher Years:**
1. MAT257Y1, MAT327H1, MAT347Y1, MAT354H1/MAT357H1
2. PHL345H1, MAT309H1/PHL348H1
3. Four of: PHL325H1, PHL331H1, PHL332H1, PHL346H1, PHL347H1, PHL349H1, PHL355H1, PHL451H1, PHL480H1
4. 1.0 FCE from PHL200Y1/PHL205H1/PHL206H1/PHL210Y1
5. PHL265H1/PHL275H1
6. Additional 2.0 FCE of from PHL/APM/MAT at the 300+ level, to a total of 12.0 FCE.

**NOTE:** 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:**

**Impact:**

**Consultation:**

**Resource Implications:**

1 Course Modification:
MAT437H1: K-Theory and C* Algebras

Description:

The theory of operator algebras was begun by John von Neumann eighty years ago. In one of the most important innovations of this theory, von Neumann and Murray introduced a notion of equivalence of projections in a self-adjoint algebra (*-algebra) of Hilbert space operators that was compatible with addition of orthogonal projections (also in matrix algebras over the algebra), and so gave rise to an abelian semigroup, now referred to as the Murray-von Neumann semigroup.

Later, Grothendieck in geometry, Atiyah and Hirzebruch in topology, and Serre in the setting of arbitrary rings (pertinent for instance for number theory), considered similar constructions. The enveloping group of the semigroup considered in each of these settings is now referred to as the K-group (Grothendieck's terminology), or as the Grothendieck group.

Among the many indications of the depth of this construction was the discovery of Atiyah and Hirzebruch that Bott periodicity could be expressed in a simple way using the K-group. Also, Atiyah and Singer famously showed that K-theory was important in connection with the Fredholm index. Partly because of these developments, K-theory very soon became important again in the theory of operator algebras. (And in turn, operator algebras became increasingly important in other branches of mathematics.)

The purpose of this course is to give a general, elementary, introduction to the ideas of K-theory in the operator algebra context. (Very briefly, K-theory generalizes the notion of dimension of a vector space.)

The course will begin with a description of the method (K-theoretical in spirit) used by Murray and von Neumann to give a rough initial classification of von Neumann algebras (into types I, II, and III). It will centre around the relatively recent use of K-theory to study Bratteli's approximately finite-dimensional C*-algebras---both to classify them (a result that can be formulated and proved purely algebraically), and to prove that the class of these C*-algebras---what Bratteli called AF algebras---is closed under passing to extensions (a result that uses the Bott periodicity feature of K-theory).

Students will be encouraged to prepare oral or written reports on various subjects related to the course, including basic theory and applications.

Prerequisites:

Previous: MAT436H1
New: 5.0 FCE from MAT, including MAT224H1 / MAT247H1 and MAT237Y1/MAT257Y1.

Recommended Preparation:

Previous:

New: Students are encouraged to execute basic research that answers the question, what is an abelian group?

Rationale:

Consultation:

Resources:
4 Course Modifications:

**PCL389H1: Understanding the Role of Pharmacology and Toxicology in Society**

<table>
<thead>
<tr>
<th>Corequisites:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL302H1; (PSL300H1, PSL301H1) # PSL302Y+</td>
</tr>
</tbody>
</table>

**Rationale:**
Updats based on new course codes.

**Consultation:**

**Resources:**

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**PCL472Y1: Project in Pharmacology**

<table>
<thead>
<tr>
<th>Prerequisites:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL201H1, PCL302H1, PCL366H1/PCL367H1/PCL368H1, STA288H1/PCL376H1, and permission of Department</td>
</tr>
</tbody>
</table>

**Rationale:**
Updated based on new course codes.

**Consultation:**

**Resources:**

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**PCL474Y1: Project in Toxicology**

<table>
<thead>
<tr>
<th>Prerequisites:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL201H1, PCL302H1, PCL366H1/PCL367H1/PCL368H1, STA288H1/PCL376H1, and permission of Department</td>
</tr>
</tbody>
</table>

**Rationale:**
Updated based on new course codes.

**Consultation:**

**Resources:**

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**PCL490H1: Advanced Topics in Pharmacology and Toxicology**

<table>
<thead>
<tr>
<th>Recommended Preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL469H1/PCL470H1/PCL482H1/PCL483H1</td>
</tr>
</tbody>
</table>

**Rationale:**
Updated based on new course codes.

**Consultation:**

**Resources:**
1 Minor Program Modification:

Physiology Minor

<table>
<thead>
<tr>
<th>Completion Requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4 full courses or their equivalent; one 300+ level FCE must be included in the program)</td>
</tr>
<tr>
<td>1. 2 full course equivalents from: (BIO120H1, BIO130H1); PSL201Y1/(PSL300H1, PSL301H1)</td>
</tr>
<tr>
<td>2. 2 full course equivalents from: BIO251H1, BIO270H1, BIO271H1; CSB325H1, CSB332H/CJH332H1, CSB343H1, CSB344H, CSB345H1/CSB445H1, CSB346H1, CSB347H; EEB328H1; HMB200H1/HMB220H, HMB430H1, HMB470H1, HMB472H1; PSL280H1, PSL299Y1; PSL304H1, PSL305H1, PSL310H1, PSL350H1, PSL372H1, PSL374H1, PSL300-series (excluding PSL300H1 PSL378H1/PSL379H1/PSL398H0, PSL301H1) PSL399Y1, PSL400-series; PSY290H1, PSY396H1, PSY397H1, PSY369H1/PSY399H, PSY490H1, PSY492H1, PSY494H1, PSY497H1</td>
</tr>
</tbody>
</table>

Description of Proposed Changes:

| Rationale: |
| Impact: |
| Consultation: |
| Resource Implications: |
5 Course Modifications:

**PSY323H1: Sex Roles and Behaviour**

**Exclusions:**
PSY317H5/PSYD18H3

**Rationale:**

**Consultation:**

**Resources:**

**PSY405H1: Individual Projects**

**Description:**
An intensive laboratory or applied research project under the supervision of a Department of Psychology faculty member. Project must be academically demanding and uniquely suitable for the individual student. Additional information and applications are available at the department and on its website. This course is open to all Psychology program students.

**Rationale:**

**Consultation:**

**Resources:**

**PSY405Y1: Individual Projects**

**Description:**
An intensive laboratory or applied research project under the supervision of a Department of Psychology faculty member. Project must be academically demanding and uniquely suitable for the individual student. Additional information and applications are available at the department and on its website. This course is open to all Psychology program students.

**Rationale:**

**Consultation:**

**Resources:**

**PSY406H1: Individual Projects**

**Description:**
An intensive laboratory or applied research project under the supervision of a Department of Psychology faculty member. Project must be academically demanding and uniquely suitable for the individual student. Additional information and applications are available at the department and on its website. This course is open to all Psychology program students.

Rationale:

Consultation:

Resources:

**PSY406Y1: Individual Projects**

**Description:**

An intensive laboratory or applied research project under the supervision of a Department of Psychology faculty member. Project must be academically demanding and uniquely suitable for the individual student. Additional information and applications are available at the department and on its website. This course is open to all Psychology program students.

Rationale:

Consultation:

Resources:
1 Course Modification:

**ACT451H1: Loss Models**

**Prerequisites:**
- STA261H1, ACT348H1, ACT350H1/STA347H1. (ACT348H1, ACT350H1/STA347H1 can be corequisite with permission of instructor)

**Rationale:**

**Consultation:**

**Resources:**
2 Course Modifications:

**VIC459H1: Special Topics Seminar**

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<td>Resources:</td>
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</table>
1 Minor Program Modification:

Global Health 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)/(CHM138H, CHM139H)/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

Biological Foundations of Living Systems

3. BIO120H1, BIO130H1
4. BIO230H1/BIO255H1
5. HMB265H1/BIO260H1
6. PSL300H1, PSL301H1
7. 1.0 FCE from: HMB302H1/ANA300Y1/ANA301H1/BCH311H1/CSB351Y1/IMM340H1/IMM350H1/MGY377H1/MGY378H1/PSL350H1

Global Health Concentration Courses

8. 0.5 FCE from: PHS100H1/PSY100H1/INS201Y1/ANT100Y1/SOC101Y/SOC100H1/ECO100Y/ECO101H1 *Transfer credits from AP and IB psychology are not accepted.
9. HMB203H1
10. 0.5 FCE from courses on the biological dimensions of Global Health: HAJ453H1/HMB323H1/HMB342H1/HMB433H1/HMB436H1/HMB437H1/HMB440H1/HMB443H1/HMB462H1/HMB473H1/HMB474H1/HMB496Y1 */HMB499Y1 */CSB351Y1/EEB325H1/ETH352H1/HST373H1/MGY350H1/MGY377H1/MGY378H1/MIJ485H1
11. 0.5 FCE from courses on the social and ecological dimensions of Global Health: HMB303H1/HMB306H1/HMB406H1/ANT345H1/ANT348H1/ANT358H1/ANT458H1/ANT460H1/BIO220H1/EEB428H1/ENV341H1/ENV343H1/ENV432H1/GGR333H1/GGR434H1/JEH455H1/ECO314H1/HST410H1/HST440H1/HST464H1/INS240Y1/INS250H1/INS350H1/INS355H1/JNH350H1/NEW352H1/NEW353H1/NEW453H1/NFS490H1/PHS300H1/PSY320H1/PSY321H1/ECO324H1/ECO333H1/ECO334H1/ECO342H1/ECO369H1/ECO402H1

Data Analysis Courses

12. 0.5 FCE in statistics: HMB325H1/STA220H1/STA288H1/PSY201H1

* 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.

Global Health 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 Global Health majors. Students are responsible for checking priority of courses and meeting course prerequisites for courses they wish to take.
3. The Global Health major cannot be paired with any other Human Biology Program managed major program.
### Description of Proposed Changes
Correcting a typo. BO120H1 should be BIO120H1.

### Rationale:

### Impact:

### Consultation:

### Resource Implications:

#### 7 Course Modifications:

**HMB202H1: Introduction to Health and Disease**

**Description:**

An introductory course in Health and Disease using an interdisciplinary approach that integrates bacteriology and virology with other aspects of human biology, including chronic disease and neoplasia. An exploration of the key concepts and approaches that are necessary for understanding the dynamic nexus of human health and disease. (Lab Fees: $40 $51)

**Rationale:**

**Consultation:**

**Resources:**

**HMB302H1: Vertebrate Histology and Histopathology**

**Description:**

Laboratory and lecture course studying the structure of the cell, various tissues and organ systems. Emphasis is on functional morphology and the adaptive response (including the inflammatory reaction) by comparing histological sections of normal tissues and organs with common diseases including neoplasia, respiratory, and liver disease. (Lab Materials Fee: $27 $26)

**Rationale:**

**Consultation:**

**Resources:**
### HMB310H1: Laboratory in Neuroscience

**Description:**

A laboratory course based on current research techniques for students in the Neuroscience program. Lab topics may include human brain imaging and disorders, electrophysiology, cell culture, and changes in gene expression during neuronal development. Labs start in the first week of term. (Lab Materials Fee: $60 $56)

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### HMB311H1: Laboratory in Fundamental Genetics and its Applications

**Description:**

A laboratory course based on current research techniques for students in the Fundamental Genetics and its Applications programs. Lab topics may include molecular biology and animal cell culture techniques, nutrigenomics; an overview of microarrays and a CRISPR module. Labs start in the first week of term. (Lab Materials Fee: $100 $95)

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</table>

### HMB312H1: Laboratory in Health and Disease

**Description:**

A laboratory course based on current research techniques and topics which may include basic microbiology, molecular biology and animal cell culture techniques, immunocytochemistry, changes in gene expression, and histological techniques. Labs start in the first week of term. (Lab Materials Fee: $70 $60)

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### HMB314H1: Laboratory in Human Biology

**Description:**
Students analyze whole body, cellular, and molecular responses to stress. Techniques range from those standard in medical practice (e.g., fitness measures, blood pressure, lung function) to current research techniques (cell culture, changes in gene expression). Students gain technical and analytical skills as they work at the bench to design and carry out individual and group experiments. **Labs start in the first week of term.** (Lab Materials Fee: $52 $54)

**Rationale:**

**Consultation:**

**Resources:**

**HMB489H1: Advanced Laboratory in Human Biology**

**Description:**

Building on their experience in 3rd-year labs, students participate in inquiry-based laboratory experiments in diverse areas of current human biology research. Open to students in any Human Biology program. **Labs start in the first week of term**

Please see [Human Biology Program Website](#) for subtopic details; which vary from year to year. (Lab Materials Fee: $105 $80)

**Rationale:**

**Consultation:**

**Resources:**
Science Curriculum Committee
Revision Proposals By Unit
1 Program Revision:

Cell & Molecular Biology Major

Completion Requirements:

(8 full courses or their equivalent)

First Year: BIO120H1, BIO130H1; (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1;
1.0 credit from JMB170Y1/(MAT135H1;/MAT136H1;/MAT137Y1/MAT157Y1/PHY131H1;/PHY132H1;/PHY151H1;/PHY152H1)

Higher Years:
1. (BIO220H1, BIO230H1/BIO255H1)
2. BIO260H1/HMB265H1; BCH210H1
3. CSB349H1
4. 1.0 FCE from: CSB327H1, CSB328H1, CSB329H1, CSB331H1, CSB340H1, CSB353H1
5. 1.5 FCEs (at least 0.5 FCE at the 400-level) from: BCH422H1, BCH426H1, BCH440H1, BCH441H1, BCH444H1, BCH445H1, CJH332H1, CSB299Y1, CSB327H1, CSB328H1, CSB329H1, CSB330H1, CSB331H1, CSB340H1, CSB349H1, CSB350H1, CSB351Y1, CSB352H1, CSB353H1, CSB397Y0, CSB399Y1, CSB427H1, CSB428H1, CSB429H1, CSB430H1, CSB431H1, CSB435H1, CSB447H1, CSB450H1, CSB452H1, CSB454H1, CSB457H1, CSB458H1, CSB459H1, CSB460H1, CSB471H1, CSB472H1, CSB473H1, CSB474H1, CSB475H1, CSB483H1, CSB490H1, CSB491H1, CSB492H1, CSB497H1, CSB498Y1, CSB499Y1, HMB496Y1/HMB499Y1, MGY480Y1. No more than 0.5 FCE in BCH can be used towards this requirement.

The Cell & Molecular Biology Major Program has the additional option of a Disciplinary Focus.

Description of Proposed Changes:
We altered this program to give students an additional option of a half course in math and a half course in physics rather than the only option of a full course in either math or physics. This provides the students with a broader background for the remainder of the program.

Rationale:

Impact:

Consultation:

Resource Implications:

1 Course Revision:

BIO255H1: Cell and Molecular Biology with Advanced Laboratory

Title:
From Genes to Organisms Cell and Molecular Biology with Advanced Laboratory

Abbreviated Title:

Previous: Advanced Cell & Molec Bio
New: Advanced Genes to Organisms
<table>
<thead>
<tr>
<th><strong>Rationale:</strong></th>
<th>BIO230H1 and BIO255H1 share lectures, but BIO255 has a more advanced lab. Changing the title of BIO255 makes it clearer to students that it is an advanced version of BIO230.</th>
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# 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

**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.

Note that students admitted to the program after second or third year will be required to pay retroactive program fees.

**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 (6.5-3.5 FCEs)**

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

**Fourth year (3.0 FCEs)**
Computer Science (FAS), Department of

2.  
1. CSC373H1;  
2. STA314H1/CSC311H1/CSC411H1;  
3. JSC470H1 (Data Science III);  

3.  
4. +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).

Description of Proposed Changes:  
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.

Rationale:  

Impact:  

Consultation:  

Resource Implications:  

9 Course Revisions:  

CSC304H1: Algorithmic Game Theory and Mechanism Design  

Exclusions:  

Previous:  
New: NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

Rationale:  
We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

Consultation:  
In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

Resources:  

CSC311H1: Introduction to Machine Learning  

Exclusions:  

### Computer Science (FAS), Department of

**CSC411H1, STA314H1, ECE421H1.** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

| Rationale: | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| Resources: | |

### CSC343H1: Introduction to Databases

**Exclusions:**

**CSC443H1.** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

| Rationale: | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| Resources: | |

### CSC413H1: Neural Networks and Deep Learning

**Exclusions:**

**CSC321H1/CSC421H1.** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

| Rationale: | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| Resources: | |

### CSC418H1: Computer Graphics

**Exclusions:**

**Previous:**

**New:** **NOTE:** Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

| Rationale: | We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students. |
| Consultation: | In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science. |
| Resources: | |
### CSC419H1: Geometry Processing

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC446H1: Computational Methods for Partial Differential Equations

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC465H1: Formal Methods in Software Design

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.

**Consultation:**

In consultation with Tamara Jones and Cheryl O'Donoghue from Arts & Science.

**Resources:**

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### CSC485H1: Computational Linguistics

**Exclusions:**

- **Previous:**
  - **New:** NOTE: Students not enrolled in the Computer Science Major or Specialist program at the UTSG, UTM, or UTSC are limited to a maximum of three 300-/400-level CSC/ECE half-courses.

**Rationale:**

We are adding a clarifying sentence. We are not changing the rule that is being followed during prerequisite checks, only clarifying for students.
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<td>Resources:</td>
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1 Program Revision:

Earth and Environmental Systems Major

Completion Requirements:

(8 full courses or their equivalent including at least 2.0 FCE at 300+ series with at least 0.5 FCE at 400 level series.)

1. 2.0 FCE foundation science courses: 2.0 FCE selected from JEG100H1/ESS102H, BIO120H1/BIO130H1, CHM135H1/CHM139H, CHM136H1/CHM138H, PHY131H1, PHY132H1, MAT135H1, ENV237H1/ENV238H1

2. 3.0 FCE core courses:

- 1.0 FCE at 200 level chosen from the following courses: ESS241H1, ESS261H1, ESS262H1 (NOTE: ESS261H and ESS262H1 may be taken in either order.)
- 1.0 FCE at 300 level: ESS345H1, ESS351H1/ESS362H1/GGR305H1
- 0.5 FCE field course: ESS410H1/ESS450H1/GGR390H1
- 0.5 FCE capstone course: ESS461H1/ESS462H1/ESS463H1/ESS464H1

3. 3.0 FCE elective courses:

In addition to the above core courses, you need to take 3 FCE electives. This requirement can be satisfied by any of the Earth Sciences Courses listed in categories A to F below. The following clusters of courses are neither mutually exclusive nor meant to limit choice but intended to show logical course complements. These are not POSF requirements; rather, the clusters are presented to aid students in course selection according to their interests.

a) Earth Surface Processes

ESS241H1, ESS311H1, ESS331H1, ESS445H1, GGR201H1, GGR205H1, GGR272H1

b) Paleoclimate

ESS331H1, ESS361H1, ESS362H1, ESS461H1, ESS464H1, ENV234H1, GGR305H1

c) Biogeochemistry

ESS223H1/ENV233H, ESS311H1, ESS312H1, ESS362H1, ESS410H1, ESS462H1

d) Global Environmental Change

ESS362H1, ESS462H1, ESS463H1, GGR203H1, GGR314H1, PHY392H1

e) Quaternary Science

ANT314H1, ANT315H1, ANT409H1, ANT419H1, ESS461H1

f) Other Relevant Courses

ESS221H1, ESS222H1, JGA305H1, ESS450H1, GGR337H1, ENV337H1, JSC301H1, ESS381H1, ESS399Y0, ESS481H1, ESS490H1, ESS491H1/ESS492Y1

Description of Proposed Changes:
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<tr>
<td>Resource Implications:</td>
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5 Program Revisions:

**Biomedical Toxicology 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 2.0 required first-year courses:

BIO120H1, BIO130H1, (CHM135H1, CHM136H1) or (CHM138H1, CHM139H1) / CHM151Y1, with an average of at least 70% on these 2.0 full-course equivalents (FCEs) and a final mark of at least 60% in each course.

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

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 80s; average = mid 80s.

Students must apply to this program on the Arts & Science Faculty Registrar's Office website (see the Arts & Science Program Enrolment website for application procedures). Students wishing to enroll in this program will initially apply to a general departmental Major (ASMAJ2675) after their first year and during the spring of their second year of study (and completion of PCL201H1) students will select the focus for their future studies (Biomedical Toxicology or Pharmacology). First and second year courses are the same for all Major programs within the Department (ASMAJ2675/ASMAJ2082/ASMAJ2573). Students cannot combine a Biomedical Toxicology Major program with a Pharmacology Major or Specialist program for their degree.

Students will follow the calendar year in which they initially enter one of our programs (i.e., the ASMAJ2675).

Students wishing to enroll after their second year who have taken PCL201H1 will be considered on a case by case basis. Successful completion of required pre-requisite courses is required to further enroll in upper level program courses.

**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) or (CHM138H1, CHM139H1)/CHM151Y1

Second Year: BCH210H1; BIO230H1/BIO255H1; PCL201H1; CHM247H1/CHM249H1; (PSL300H1, PSL301H1) or 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/PCL484H1/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:**
Small editorial corrections + removal of very old courses that are no longer offered (CHM138, CHM139, PSL302).

**Rationale:**

**Impact:**

**Consultation:**

**Resource Implications:**

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**Biomedical Toxicology 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) or (CHM138H, CHM139H) or CHM151Y1, and 1.0 FCE from (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1/(PHY131H1, PHY132H1)/(PHY151H1, PHY152H1) 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.

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

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 80s; average = mid 80s.

Students must apply to this program on the Arts & Science Faculty Registrar's Office website (see the Arts & Science Program Enrolment website for application procedures). **Students wishing to enrol in the Biomedical Toxicology Specialist will initially apply to the Specialist in Pharmacology and Biomedical Toxicology (ASSPE2340). After completion of first year pre-requisite courses and during the spring of their second year of study (and completion of PCL201H1) students can then choose to apply to the Biomedical Toxicology Specialist.** First and second year courses are the same for all Specialist programs within the Department (ASSPE2082/ASSPE2340/ASSPE2573). Students will follow the calendar year in which they initially enter one of our programs (students who are enrolled in the Biomedical Toxicology or the Pharmacology Specialist will follow the requirements for the calendar year in which they first enrolled in the Specialist in Pharmacology and Biomedical Toxicology (ASSPE2340)).

Students cannot combine the Biomedical Toxicology Specialist with either departmental Major programs (Biomedical Toxicology or Pharmacology).

Students wishing to enrol after their second year who have taken PCL201H1 will be considered on a case by case basis. Successful completion of required pre-requisite courses is required to further enroll in upper level program courses. Students may not transfer to the Major program from the Specialist after completion of PCL474Y1 or PEY.

**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:

Minor editorial changes and removal of retired courses (CHM138, CHM139, and PSL302).

Rationale:

Impact:

Consultation:
Pharmacology & Toxicology (MED), Department of

Resource Implications:

Pharmacology 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 2.0 required first-year courses:

BIO120H1, BIO130H1, (CHM135H1, CHM136H1)/(CHM138H, CHM139H)/CHM151Y1, with an average of at least 70% on these 2.0 full-course equivalents (FCEs) and a final mark of at least 60% in each course.

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

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 80s; average = mid 80s.

Students must apply to this program on the Arts & Science Faculty Registrar's Office website (see the Arts & Science Program Enrolment website for application procedures). Students wishing to enroll in this program will initially apply to a general departmental Major (ASMAJ2675) after their first year and during the spring of their second year of study (and completion of PCL201H1) students will select the focus for their future studies (Biomedical Toxicology or Pharmacology). First and second year courses are the same for all Major programs within the Department (ASMAJ2675/ASMAJ2082/ASMAJ2573). Students cannot combine a Pharmacology Major program with a Pharmacology Major or Specialist program for their degree.

Students will follow the calendar year in which they initially enter one of our programs (i.e., the ASMAJ2675).

Students wishing to enroll after their second year who have taken PCL201H1 will be considered on a case by case basis. Successful completion of required pre-requisite courses is required to further enroll in upper level program courses.

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.
Pharmacology & Toxicology (MED), Department of

Description of Proposed Changes:

Minor editorial changes and removal of retired courses (CHM138, CHM139, and PSL302).

Rationale:

Impact:

Consultation:

Resource Implications:

Pharmacology 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)/(CHM138H, CHM139H)/ CHM151Y1, and 1.0 FCE from (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1/(PHY131H1, PHY132H1)/(PHY151H1, PHY152H1) 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.

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

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 80s; average = mid 80s.

Students must apply to this program on the Arts & Science Faculty Registrar’s Office website (see the Arts & Science Program Enrolment website for application procedures). Students wishing to enroll in the Pharmacology Specialist will initially apply to the Specialist in Pharmacology and Biomedical Toxicology (ASSPE2340). After completion of first year pre-requisite courses and during the spring of their second year of study (and completion of PCL201H1) students can then choose to apply to the Pharmacology Specialist. First and second year courses are the same for all Specialist programs within the Department (ASSPE2082/ASSPE2340/ASSPE2573).

Students will follow the calendar year in which they initially enter one of our programs (students who are enrolled in the Biomedical Toxicology or the Pharmacology Specialist will follow the requirements for the calendar year in which they first enrolled in the Specialist in Pharmacology and Biomedical Toxicology (ASSPE2340)).

Students cannot combine the Biomedical Toxicology Specialist with either departmental Major programs (Biomedical Toxicology or Pharmacology).

Students wishing to enroll after their second year who have taken PCL201H1 will be considered on a case by case basis. Successful completion of required pre-requisite courses is required to further enroll in upper level program courses. Students may not transfer to the Major program from the Specialist after completion of PCL472Y1 or PEY.

Completion Requirements:

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

(14.5 full courses or their equivalent)
Pharmacology & Toxicology (MED), Department of

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: 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:

Minor editorial changes and removal of retired courses CHM138, CHM139, and PSL302

Rationale:

Impact:

Consultation:

Resource Implications:
Specialist in Pharmacology and Biomedical Toxicology

Description:

Pharmacology and Biomedical Toxicology are complementary sciences, and the Pharmacology and Biomedical Toxicology Specialist combines the requirements of the two distinct specialist programs. The Specialist program integrates knowledge of pharmacology – the understanding of the therapeutic properties and clinical applications of externally administered chemical substances in the whole body and the mechanisms of their actions and interactions with their intended targets, while biomedical toxicology examines the harmful effects of exogenous chemicals on the health and behaviour of individuals and society, addressing drug safety and the adverse consequences of chemical exposure. Biomedical toxicology includes understanding the safety/toxicity of a wide array of chemicals (pharmaceutical preparations, herbal products, natural toxins and environmental contaminants) with a focus on their effects and adverse consequences on human health.

Both Pharmacology and Biomedical Toxicology are integrative life sciences which build on the core foundational disciplines of the basic life sciences and the prominent role each science plays in society. A comprehension of the biological mechanisms of action and potential uses of chemicals are key to career success in the fields of medicine, dentistry, pharmacy and nursing. The Specialist program prepares students for a variety of job opportunities following its completion as well as for further study in graduate research or professional programs such as Medicine, Dentistry, and Pharmacy. (Note: Students interested in professional programs should contact the respective faculties to inquire about specific transfer credits.) Graduates of this rigorous program will have access to an impressive variety of job opportunities in either research-based or non-research-based careers, including scientific research in research institutes and in universities, positions in the pharmaceutical, biotechnology and chemical industries, forensic science, nutrition and food sciences, government or consulting agencies. Students learn about both basic and clinical pharmacology and biomedical toxicology through lectures, tutorials, small group sessions, laboratories and independent research projects. The senior 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.

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)/(CHM138H, CHM139H)/CHM151Y1, and 1.0 FCE from (MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1/(PHY131H1, PHY132H1)/(PHY151H1, PHY152H1) 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.

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

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 80s; average = mid 80s.

Students must apply to this program on the Arts & Science Faculty Registrar's Office website (see the Arts & Science Program Enrolment website for application procedures). Students will follow the calendar year in which they initially enter one of our programs.

Students cannot combine the Biomedical Toxicology Specialist with either departmental Major programs (Biomedical Toxicology or Pharmacology).

Students wishing to enroll after their second year who have taken PCL201H1 will be considered on a case by case basis. Successful completion of required pre-requisite courses is required to further enroll in upper level program courses. Students may not transfer to the Major program from the Specialist after completion of PCL472Y1/PCL474Y1 courses or PEY.

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).

(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.

Description of Proposed Changes:
Minor editorial changes and removal of retired courses (CHM138, CHM139, and PSL302)

Rationale:
### 3 Course Revisions:

#### PCL302H1: Pharmacodynamic Principles

**Prerequisites:**
- (PSL300H1, PSL301H1) / PSL302Y1

**Rationale:**
Updating based on new course codes.

**Consultation:**

**Resources:**

#### PCL469H1: Systems Pharmacology I

**Prerequisites:**
- PCL201H1, PCL302H1, (PSL300H1, PSL301H1) / PSL302Y1

**Rationale:**
Updated based on new course codes.

**Consultation:**

**Resources:**

#### PCL470H1: Systems Pharmacology II

**Prerequisites:**
- PCL201H1, PCL302H1, (PSL300H1, PSL301H1) / PSL302Y1

**Rationale:**
Updated based on new course codes.

**Consultation:**

**Resources:**
1 Course Revision:

**TRN136Y1: Canadian Health Policy in the Global Context**

**Description:**

In this course we consider when our public health policies support the highest standards of medical care, consistent with the latest discoveries in medical research. We examine Canada and connect it to the ways in which debates around ethics, effectiveness and efficiency shape global and national health policy political context. We begin by exploring the most important advancements in global health policy over the past two decades. We evolve Canadian healthcare into its current form and then assess Canada’s experience in providing health care, identifying lessons for national policy reform and for Canada’s role as a leader in global health research and policy. We explore international institutional arrangements that offer different approaches to a range of health policy challenges; including universal health care, anti-microbial drug resistance, HIV AIDS, infectious disease, tuberculosis, reproductive non-communicable diseases, maternal, newborn and child health, cardiovascular care, oncology, and environmental health, indigenous health, violence against women and mental health. Restricted to newly admitted first-year students. Not eligible for CR/NCR option.

**Rationale:**

Clearer course description.

**Consultation:**

**Resources:**
1 Program Revision:

Cognitive Science Major - Science

Enrolment Requirements:

This is a Type 2 program. Enrolment is limited and admission requires the completion of CSC108H1 and 1.0 FCE of either COG250Y1; or a combination of 4.5 FCE in CSC/; LIN/; PHL/; PSY (no more than 0.5 FCE from a single department). Please note that meeting the minimum admission requirements does not guarantee one a spot in any one of our programs, depending on the number of program spaces available.

Students are responsible for checking co- and prerequisites for all courses. Please note that not all courses are offered on a regular basis. A list of approved Cognitive Science courses can be found on the website: www.uc.utoronto.ca/requirements. For any questions, consult the Cognitive Science Program Office, UC173, University College, 416-946-4025. Email: cecille.sioulis@utoronto.ca or the Program Director at: cogsci.director@utoronto.ca

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 in Year 1); STA220H1/STA257H1/PSY201H1; PSY270H1

Second Year and Higher:

PHL342H1; PSY493H1 or PSY473H1 (for those with the appropriate prerequisites); and 2.5 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 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 FCEs must be at the 300-level. COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/CSC207H1/CSC304H1/CSC311H1/CSC324H1/CSC384H1/CSC401H1/CSC413H1/CSC420H1/CSC485H1/CSC486H1/JLP315H1/JLP374H1/JLP471H1/LIN102H1/LIN228H1/LIN232H1/LIN323H1/LIN331H1/LIN341H1/NEW333H1/NEW438H1/PHL240H1/PHL245H1/PHL246H1/PHL345H1/PHL347H1/PHL348H1/PHL349H1/PHL355H1/PSY210H1/PSY220H1/PSY230H1/PSY260H1/PSY270H1/PSY280H1/PSY290H1/PSY312H1/PSY305H1/PSY316H1/PSY330H1/PSY331H1/PSY362H1/PSY370H1/PSY371H1/PSY372H1/PSY378H1/PSY379H1/PSY380H1/PSY414H1/PSY475H1
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.

BIO130H1 and 2.0 FCEs of the following courses, with at least 1 FCE coming from PSY courses. At least 0.5 FCE of the 2.0 FCEs must be at the 300-level. COG260H1/COG341H1/COG342H1/COG343H1/COG415H1/COG498H1/COG499H1/CSC207H1/CSC311H1/JLP471H1/JLS472H1/JLS473H1/NEW333H1/NEW438H1/PHL355H1/PHL357H1/PSY210H1/PSY270H1/PSY280H1/PSY290H1/PSY312H1/PSY316H1/PSY331H1/PSY362H1/PSY380H1/PSY390H1/PSY396H1/PSY397H1/PSY473H1/PSY492H1/PSY494H1

Fourth Year:
COG402H1/COG403H1/COG404H1

**Description of Proposed Changes:**
One additional course: COG404 and changes to program admission requirements

**Rationale:**
The new course will be assigned to the new LIN/COG hire, search underway. The changes in the admission criteria to the science stream will signal the computational demands of the science stream to incoming students.

**Impact:**
The change in the admission requirements will not impact completion requirement (it is already a required course in the stream)

**Consultation:**
CSC undergraduate chair was consulted and agreed to the change to the admission requirement. She requested we provide appropriate mentoring to students who do not secure enrolment in CSC108 but want to apply

**Resource Implications:**
No additional resources.

### 1 Course Revision:

**COG403H1: Seminar in Cognitive Science**

**Abbreviated Title:**
Seminar in COG Cognitive Science

**Prerequisites:**
CSC148H1; COG250Y1; COG260H1;(MAT135H1, MAT136H1)/MAT137Y1, 0.5 FCE in statistics; 14.0 credits

**Rationale:**

**Consultation:**

**Resources:**

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