



# UNIVERSITY OF TORONTO

## **University of Toronto Mississauga**

SCI Curriculum Proposals Report

October 21, 2022

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## SCI Online-by-Design Proposal Summary

Anthropology (UTM), Department of

### **ANT402H5      Wild Nights: Sleep, evolution, and performance in the 21st century**

Sleep is essential to cognitive function and health in humans, yet the ultimate reasons for sleep - that is, 'why' we sleep - remains mysterious. This course integrates research findings from human sleep studies, the ethnographic record, and the ecology and evolution of mammalian and primate sleep to better understand sleep along the human lineage and in the modern world. Students will learn how to use 'wearable' technology, such as actigraphy, for scientific research. The goal of the course is to empower students with the theoretical and technological tools to be able to not only critically assess their own sleep-wake behaviour and performance but also popular generalizations about how to maximize long-term health outcomes.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 36 (24L sync; 12T sync)

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Chemical and Physical Sciences (UTM), Department of

### **JCP410H5      Modelling of Biochemical Systems**

An introduction to mathematical modelling of complex biological systems, with a focus on biochemical kinetic models, their numerical simulation, and methods for analytically and computationally studying their behaviour. This is a one-term independent-study project course: students will be given a set of directed readings, then assisted in selecting an existing model from the literature. After reproducing existing results, students will be tasked with extending the model in a direction of their own choosing; this can include exploring different parameter regimes, incorporating new or different aspects of the underlying biology, or applying different analytical techniques. Students will work with the instructor to select a suitable project, matching their background and interests. Formal lectures will be replaced

with a series of weekly meetings with the instructor to discuss progress and plans.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 24 (24S sync)

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Geography, Geomatics and Environment (UTM), Department of

**ENV100Y5      The Environment**

This introductory environmental science course examines large-scale features of Earth, natural hazards, Earth's climate and weather systems, energy and mineral resources, human population growth, extinction and biodiversity, environmental toxins, vanishing soils and expanding deserts, forests, urban environmental management, and food resources. Interdisciplinary interaction among Science, Social Science, and Humanities is a major theme.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 72 (48L async; 22T sync; 2T in-person midterm)

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Geography, Geomatics and Environment (UTM), Department of

**JGE378H5      Natural Hazards**

Earth is a dangerous place and risk is an inherent feature of life on this planet. Some of the events and processes that we call “hazardous” such as earthquakes, volcanic eruptions, floods, tsunamis, cyclones, and forest fires are natural environmental processes. We define them as hazards only when they pose a threat to human interests. In this course we will examine natural hazards as well as some technological hazards -- their causes, their potential impacts on people, and their management and mitigation.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 36 (24L async; 12T async)

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Mathematical and Computational Sciences (UTM), Department of

**MAT322H5      Mathematical Modelling in Biology**

The course will serve as an introduction to mathematical modelling of biological processes. It will cover a selection of the following topics: Difference equations and applications. Linear differential equations and systems; phase plane analysis; nonlinear systems of differential equations and linearization; Poincaré- Bendixson Theorem. Applications of differential equations to biology, including a logistic population with harvesting; predator-prey model; competing species; epidemic models. Examples of partial differential equations; reaction-diffusion equation; pattern formation.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 48 (36L sync; 12T sync)

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Study of University Pedagogy (UTM), Institute for the

**ISP010H5      Basics of Writing in English (BoWiE)**

This non-credit ten week course is specifically designed to help students build skills that will assist in the completion of their written academic course work. Students in the course will learn to communicate their ideas in written form, applying skills in English mechanics and usage through in-course practice. Students who wish to improve their basic English writing skills, or who do not reach the threshold score on the competency assessment delivered in the first week of ISP100H5 Writing for University and Beyond, should take this course to develop their skills for university work and ensure successful completion of ISP100H5. No credit is awarded for this course, and it begins in week 3 of the academic term, following the competency assessment for ISP100H5.

**Mode of Delivery:** In Class, Online

**Instructional Hours:** 20 (10L sync; 10L async)

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Mathematical and Computational Sciences (UTM), Department of

**MAT223H5      Linear Algebra I**

Systems of linear equations, matrix algebra, determinants. Vector geometry in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ . Complex numbers.  $\mathbb{R}^n$ : subspaces, linear independence, bases, dimension, column spaces, null spaces, rank and dimension formula. Orthogonality, orthonormal sets, Gram-Schmidt orthogonalization process, least square approximation. Linear transformations from  $\mathbb{R}^n$  to  $\mathbb{R}^m$ . The determinant, classical adjoint, Cramer's rule. Eigenvalues, eigenvectors, eigenspaces, diagonalization. Function spaces and applications to a system of linear differential equations. The real and complex number fields.

**Mode of Delivery:** In Class, Hybrid

**Instructional Hours:** 52 (36L sync; 4L in-person assessment; 12T in-person OR 12L in-person; 24L sync; 4L in-person assessment; 12T in-person)

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## Chemical and Physical Sciences (UTM), Department of

### 1 New Course:

#### CHM323H5: Introduction to Computational Chemistry

**Contact Hours:**

***Lecture: 12 / Tutorial: 36***

**Description:** This course covers the foundations of computational chemistry with a focus on practical applications and does not require a background in programming or quantum mechanics. An array of methods for predicting the structural, electronic, thermodynamic, and spectroscopic, properties of chemical species will be addressed, as well as how the calculated results can complement experimental observations. Relevant fundamental theories to computational chemistry will be covered on a need-to-know basis. Students will follow an individualized study path and select the chemical systems to which each method will be applied.

**Prerequisites:** CHM243H5

**Corequisites:**

**Exclusions:**

**Recommended Preparation:** CHM231H5 and JCP221H5

**Rationale:**

In accordance with the recommendation of the February 2017 external review of the CPS department, it is difficult to deny that computational methods are becoming increasingly important to all of the chemistry sub-disciplines. Numerical and computational methods are valuable skills to chemists, and in recent years have become a core part of the chemist's toolkit. The need for a dedicated computational chemistry course was raised by the CSC Accreditation Committee in May 2022. Examples of computational methods with direct relevance to chemistry in the CPS curriculum are currently limited, largely theoretical in nature, and are restricted to upper division JCP courses with extensive mathematics course pre-requisites. The only current chemistry degree program which requires 200-level MAT credits is the chemistry specialist, which may discourage students in chemistry major or biological chemistry specialist programs from developing numerical and computational skills at the undergraduate level. This course would introduce computational chemistry and its applications to organic, inorganic, physical, analytical, and biological chemistry. Computational experiment modules would be designed to demonstrate particular methods and techniques, but students could readily be given some freedom about which chemical systems of interest to apply those methods to. The course would be taught with a focus on practical application and would therefore not require prerequisites from quantum mechanics or advanced mathematics courses. Similar to the CHM371/2, 394/5, and 396/7, it is recommended that the course is offered at the 300-level so that the skills offered by the course could be available to students before beginning 4th-year thesis projects.

**Resources:**

resource form submitted

## 15 Course Modifications:

### AST110H5: Introduction to Astronomical Observations

**Exclusions:**

**Previous:** AST326Y1

**New:**

**Rationale:**

The content of AST326Y1 is sufficiently distinct from AST110H5 that an exclusion is not necessary. Therefore removed AST325Y1 as an exclusion.

**Resources:**

None

### AST115H5: Cultural Astronomy

**Prerequisites:**

**Previous:** 4.0 full course credits

**New:**

**Exclusions:** AST101H1 or AST101H5 ~~or AST121H1 or AST201H1 or AST201H5~~ or AST215H5 or AST210H1 or ASTB03H3

**Rationale:**

The courses removed from the exclusions list have sufficiently distinct content that an exclusion is not necessary. The remaining courses focus on solar system/naked eye astronomy and astronomy from an historical perspective, so they remain sufficiently similar that an exclusion is still merited. Also, the 4.0 credit requirement as pre-requisite is removed since this course changed from 200 level to 100 level.

**Resources:**

None

### AST221H5: Astrophysics I – Planets, Sun and Stars

**Prerequisites:** ~~AST110H5 and [(MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) or MAT135Y5 or MAT137Y5 or MAT157Y5]~~ and (PHY146H5 and PHY147H5)

**Rationale:**

Although AST110H5 is a major or specialist program requirement, the content from those courses is not assumed in AST221H5 or AST222H5, so the prerequisite requirement is unnecessary.

**Resources:**



None

#### AST252H5: Life in the Universe

**Prerequisites:**

**Previous:** 0.5 credit from CHM110H5 or CHM120H5 or ERS101H5 or ERS111H5 or PHY136H5 or PHY137H5 or PHY146H5 or PHY147H5

**New:**

**Exclusions:**

**Previous:** AST221H1 or AST222H1 or AST251H1

**New:** AST251H1

**Rationale:**

Exclusion change: The material presented in AST252H5 is sufficiently different than material in AST221H1 and AST222H1, and should be available for students in the major and specialist programs. Furthermore, with the addition of AST221H5 and AST222H5 to the UTM course calendar, most astronomy students at UTM will no longer be taking AST221H1 or AST222H1 so these exclusions are no longer applicable.

Prerequisite change: Basic scientific and mathematical fluency is acceptable for this course. None of the actual material from any of these courses will be assumed. In removing the pre-requisite, we are opening the course for enrolment to all students interested to fulfil their science credit.

**Resources:**

None

#### CHM311H5: Instrumental Analytical Chemistry

**Contact Hours:**

**Previous:** *Lecture:* 24 / *Seminar:* 12

**New:** *Lecture:* 36

**Description:** Introduction to the basic theory and practice underlying important techniques in analytical chemistry, chosen from three major areas of instrumental analysis: spectroscopy, electrochemistry and separation science. Specific topics will include fluorescence spectroscopy, atomic spectroscopy, x-ray fluorescence, voltammetry, high resolution gas and liquid chromatography, mass spectrometry, and a brief introduction to computer applications, including Fourier transform methods. A problem-based approach will be used to explore these methods in a wide variety of practical applications, which will include **individualized student assignments presentations**.

**Rationale:**

Course enrolments in CHM311 have grown steadily over the past decade and are now approaching 100 students (course enrolment for the winter term offering is currently at 99

students). Student group presentations on topics associated with current research and developments in analytical chemistry have long been a part of this course in order to provide students with the opportunity to become more familiar with new developments and develop their presentation skills. Unfortunately, this is no longer tenable as the group sizes would be too large (> 8 students per group) for meaningful contribution to and participation in the presentations (typically 15 minutes in length, followed by 5 minutes for questions). As such, differentiated assignments will be introduced that will focus on recent developments with a focus on Science, Technology, Society and Environment (STSE) pedagogy. The differentiated assignments can be in written form (e.g. a 10 page report) or a 15 minute video presentation, consistent with Universal Design for Learning practices, to better allow students to demonstrate their knowledge in a motif that they feel will most effectively demonstrate their progress and empower them as self-directed learners. While the course instructor could handle the grading of presentations during class time, these STSE assignments will require additional marking support. The class time that was devoted to student presentations (seminar sessions) will be converted to regular lectures to provide more examples and improved communication of difficult concepts.

**Resources:**

Additional TA marking support will be requested. A resource form and a revised TA rationale will be submitted to the office of the Dean.

CHM361H5: Structural Biochemistry

**Description:** An introduction to the molecular anatomy and properties of the major cellular biomolecules: proteins, nucleic acids, carbohydrates and lipids. The course also covers the structural organization of membranes and **other macromolecular complexes** ~~nucleoproteins~~. Enzyme mechanisms and membrane transport phenomena will be examined in the context **of quantitative analyses these processes and** of structure/function relationships. ~~{24L, 12T}~~

**Rationale:**

The course description for CHM361 needs to change to reflect that we cover multiple macromolecular complexes in the course (and not just nucleoproteins). There is also a focus on quantitative aspects of enzyme and membrane transport kinetics (.e.g, how to determine and measure enzyme velocity, inhibition constants, etc).

**Resources:**

None

CHM372H5: Techniques in Biological Chemistry I

**Contact Hours:**

**Previous: Practical:** 48

**New: Lecture:** 12 / **Practical:** 48

**Description:** The first in a sequence of two laboratory courses intended to complement CHM361H5 and CHM362H5. Experiments are designed to familiarize students with techniques commonly used to study the chemical and physical properties of biological molecules. Topics

covered in the first half **also** include a wide range of chromatographic ~~methods~~, and/or **fractionation methods to separate proteins** ~~the isolation~~ and/or ~~characterization of~~ subcellular organelles, **enzyme kinetics, electrophoresis to study proteins and their complexes**. **The theoretical basis for each experiment will be covered in a 1h lecture each week.** ~~</p>~~

**Prerequisites:**

**Previous:**

**New:** CHM243H5

**Rationale:**

Rationale for change in Course in description: The course description for CHM372H5 needs to change to reflect the types of experiments performed. Experiments in CHM372H5 expose students to new and modern protein biochemistry techniques. They also prepare students for the work they will do in CHM373H5.

We are also indicating that CHM243 as a pre-requisite to the course. CHM361, a co-requisite of the course, has CHM243 as a pre-requisite.

Rationale for change in Instruction hours: The course will include a 1h lecture, given by the Professor, each week. The 1h lecture will cover the background into each technique used in the lab, as well as related protocols. Additionally, the lecture will cover aspects of scientific writing. There is not enough time in a 15min-20min pre-laboratory talk by the TAs to cover these topics, as well as go through laboratory procedures. There should be one lecture section for all students.

**Resources:**

Resource form and a revised TA rationale will be submitted to the Office of the Dean.

CHM373H5: Techniques in Biological Chemistry II

**Contact Hours:**

**Previous: *Practical*: 48**

**New: *Lecture*: 12 / *Practical*: 48**

**Description:** The second in a sequence of two laboratory courses intended to complement CHM361H5 and CHM362H5. CHM373H5 carries on from CHM372H5 with a particular emphasis on protein purification, enzyme **kinetics and protein characterization (e.g., kinetics, reactions, binding, depending on the protein studied)**. **Techniques covered include classic biochemical techniques used in studying proteins and protein complexes, such as chromatography and fluorescence methods. The theoretical basis for each experiment will be covered in a 1h lecture each week.**

**Rationale:**

Rationale for change in Course in description: The course description for CHM373H5 needs to change to reflect new and modern protein biochemistry experiments being implemented in the laboratory. Thus, the course description has changed to reflect that this lab course covers

methods aimed at characterizing proteins and protein complexes using both classic and new types of biochemical methods.

Rationale for change in Instruction hours: The course will include a 1h lecture, given by the Professor, each week. The 1h lecture will cover the background into each technique used in the lab, as well as related protocols. Additionally, the lecture will cover aspects of scientific writing. There is not enough time in a 15min-20min pre-laboratory talk by the TAs to cover these topics, as well as go through laboratory procedures. There should be one lecture section for all students.

**Resources:**

Resource form and a revised TA rationale will be submitted to the Office of the Dean.

CPS489Y5: Introduction to Research in the Chemical and Physical Sciences

**Prerequisites:** (2.0 credits at the 300 level from BIO or CHM or JBC or JCP or ERS or ESS or PHY) and (1.0 credit from BIO206H5 or BIO314H5 or CHM372H5 or CHM373H5 or CHM394H5 or CHM395H5 or CHM396H5 or CHM397H5 or ERS201H5 or ERS202H5 or PHY324H5 or PHY347H5 or JCP321H5 or JCP322H5 or PHY325H5 or PHY332H5 or PHY333H5 or PHY343H5 or PHY351H5)

**Rationale:**

To increase options for students and avoid any accidental barriers to students engaging in physics research we have removed the specific physics course requirement and now allow more 300-level course from JCP/PHY.

**Resources:**

none

ERS411H5: Paleobiology

**Contact Hours:**

**Previous: Lecture:** 36

**New: Practical:** 36

**Rationale:**

ERS411H5 is currently a 3-hour lecture-only course driven by the instructor. ERS411 will be modified to a 3-hour hands-on experiential learning practical (flipped classroom). The class will include a one-hour introduction to the topic as a series of student public lectures, followed by a 1-hour deep dive paper discussion led by students, and capped off by a 1-hour research breakdown where students discuss with the TA and Instructor about the progress made on their research topic that week (the main deliverable from this class is a fully fleshed out research proposal). Two of the three hours will involve skills training/practice and discipline/research topic discussions with the professor and a TA. The TA support for the in-class discussions, and for providing feedback on the assignments (the flipped classroom results in

students working on their own and bringing in their work for consultation in class), has become essential to ensure proper pedagogical best practices are employed.

**Resources:**

A resource form/revised TA rationale form will be submitted to the office of the Dean.

PHY146H5: Principles of Physics I

**Description:**

**Previous:** The first physics course is for students intending to pursue any of the Physics or Astronomy programs and highly recommended for some of the other programs in the Department of Chemical and Physical Sciences. This course provides a rigorous introduction to the concepts, approaches and tools that physicists use to describe the physical world through the study of classical and modern mechanics. Topics include mathematical physics, kinematics and dynamics as well as conservation laws for energy and momentum. Special relativity will be introduced as a topic that successfully addresses problems that arose in classical mechanics.

**New:** Physics is the scientific study of the laws governing all forms of matter and energy, from sub-atomic particles to stars and galaxies. The goal of physics is to develop physical laws based upon the results of experimental inquiry, and usually expressed in the language of mathematics, to predict phenomena within our natural world. This first course in classical physics is intended for students pursuing any of the Physics or Astronomy programs, although it is highly recommended for anyone in the Sciences. Topics include Newton's Laws of motion, conservation of energy and momentum, inertia, circular motion, simple harmonic motion, waves and vibrations, thermal motion, and more.

**Corequisites:** ~~(MAT135H5 and MAT136H5)~~ or ~~(MAT137H5 and MAT139H5)~~ or ~~(MAT135Y5 or MAT157H5 MAT137Y5)~~

**Rationale:**

Changes to course description to reflect the content of the course more accurately. MAT135Y5, MAT157Y are no longer in the calendar and have been split up into two half courses to give students more flexibility. Additionally, there is a new MAT137 calculus course. The corequisites have been updated accordingly.

**Resources:**

None

PHY147H5: Principles of Physics II

**Prerequisites:** PHY146H5 or PHY136H5(minimum grade of 80%)and [MAT135H5 or MAT137H5 or MAT157H5]

**Corequisites:** ~~(MAT135H5 and MAT136H5)~~ or ~~(MAT137H5 and MAT139H5)~~ or ~~(MAT135Y5 or MAT159H5 MAT137Y5)~~

**Rationale:**

MAT135Y5, MAT157Y are no longer in the calendar and have been split up into two half courses to give students more flexibility. Additionally, there is a new MAT137H5+MAT139H5 calculus course. The pre/corequisites have been updated accordingly. Our students are now required to have passed the first calculus course (derivatives) and have to take the second calculus course (integrals) concurrently with our second year physics course.

**Resources:**

None

## PHY241H5: Electromagnetism

**Prerequisites:** [(PHY146H5 or PHY136H5 ~~(minimum grade of 80%)~~) and (PHY147H5 or PHY137H5 ~~(minimum grade of 80%)~~)] and [(MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (**MAT157H5 and MAT159H5** ~~MAT135Y5 or MAT137Y5~~)]

**Corequisites:**

**Previous:**

**New:** MAT232H5

**Rationale:**

Multivariable calculus is an integral part of this course and many upper year courses. We are thus introducing MAT232 as an explicit instead of hidden requirement. We are also eliminating the minimum grade requirement to be consistent with the minor in physics program requirements. We are also adding the newly introduced MAT157H4 and MAT159H5 as allowed pre-req to reflect the retirement of MAT159Y.

**Resources:**

none

## PHY245H5: Vibrations and Waves

**Prerequisites:** [(PHY146H5 or PHY136H5 ~~(minimum grade of 80%)~~) and (PHY147H5 or PHY137H5 ~~(minimum grade of 80%)~~)] and [(MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (**MAT157H5 and MAT159H5** ~~MAT135Y5 or MAT137Y5~~)]

**Corequisites:**

**Previous:**

**New:** MAT244H5

**Rationale:**

Differential Equations are an integral part of this course and many upper year courses. We are thus introducing MAT244 as an explicit instead of hidden requirement. We are also eliminating the minimum grade requirement to be consistent with the minor in physics program

requirements. We are also adding the newly introduced MAT157H4 and MAT159H5 as allowed pre-req to reflect the retirement of MAT159Y.

**Resources:**

none

PHY325H5: Mathematical and Computational Physics

**Prerequisites:** PHY241H5 and PHY245H5 and ~~MAT232H5 JCP221H5~~ and ~~MAT244H5 JCP265H5~~

**Rationale:**

We are adding the relevant math courses as explicit prereqs. These math courses are already introduced as coreqs of PHY241 and PHY245 (see above) and added here to ensure that students actually passed the mathematical courses. In the past these courses were strongly recommended but not required. We have found that students who hadn't taken them struggled to succeed in this course.

**Resources:**

None

## 5 Program Revisions:

### Biophysics - Specialist (Science)

**Title:** **Biophysics** ~~Biomedical Physics~~ – Specialist (Science )

#### Enrolment Requirements:

**Limited Enrolment** – Enrolment in this program is based on completion of 4.0 credits, including:

1. PHY146H5 (with a minimum grade of 65%) or PHY136H5 (with a minimum grade of 80%) ;
2. PHY147H5 (with a minimum grade of 65%) or PHY137H5 (with a minimum grade of 80%) ; and
3. ~~(MAT132H5 and MAT134H5 (minimum grade of 65% in MAT134H5)) or (MAT135H5 and MAT136H5 (minimum grade of 65% in MAT136H5))~~ or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) ~~or MAT134Y5 (minimum grade of 65%) or MAT135Y5 (minimum grade of 65%) or MAT137Y5 or MAT157Y5~~
4. A minimum CGPA of 2.5

#### Completion Requirements:

14.0 credits are required.

#### First Year:

1. (PHY146H5 and PHY147H5) or (PHY136H5 and PHY137H5)
2. BIO152H5
3. CHM110H5 and CHM120H5
4. (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) ~~or MAT135Y5 or MAT137Y5 or MAT157Y5~~
5. ISP100H5

#### Second Year:

1. PHY241H5 and PHY245H5 and PHY255H5
2. JCP221H5 and JCP265H5
3. **MAT223H5** and MAT232H5 and ~~(MAT212H5 or MAT244H5 or STA256H5)~~
4. BIO206H5

#### Third Year:

1. PHY324H5 ~~and PHY325H5~~ and PHY332H5 and PHY333H5 and PHY347H5
2. JCP321H5 and JCP322H5
3. **BIO314H5 or PHY325H5**

#### Fourth Year:

- 1- ~~PHY426H5 and PHY451H5 and JCP421H5~~
2. ~~{(PHY426H5 or PHY433H5 or JCP463H5) and JCP421H5~~
2. **1.0 credit from** PHY473H5 ~~}~~ or **JCP410H5 or JCP422H5** ~~PHY489Y5~~ or CPS489Y5 or CPS400Y5 or JCB487Y5 or PHY399Y5

#### NOTES:

1. At least 65% mark in PHY146H5 and PHY147H5
2. At least 80% in PHY136H5 and PHY137H5



**Rationale:**

This change reflects better the nature of the program which has only a minor connection to medical questions.

We are removing MAT132H5 and MAT134H5 as accepted program requirements because these math courses are geared towards the life sciences and do not provide a through enough preparation for our upper year physics courses. MAT134Y5, MAT135Y5, MAT157Y are no longer in the calendar and have been split up into two half courses to give students more flexibility. Our students will have to choose one of these three advanced level calculus courses. We are changing the mathematical course requirements in the second year to better reflect the actual mathematics used in our program. A thorough mathematical understanding of differential equations is required of our specialist students to succeed in our upper year courses. We have thus made MAT244 a compulsory requirement without alternative options. We have removed STA256. This reflects that probability and statistics is not a core requirement for our program (while undoubtedly useful). MAT212 is a previous course on differential equations geared toward life sciences that is no longer in the calendar and has been removed. In addition to the MAT232 requirement which is kept as before, we also require MAT223 (linear algebra) to better prepare our specialist students for success in their upper year courses.

To better reflect that some of our students want to deepen their experimental knowledge of biology we have removed the requirement for our students to take the theoretical course PHY325 on Mathematical and Computational Physics and have made it optional such that students can instead BIO314 (Laboratory in Cell and Molecular Biology) which is a basic experimental course in cell and molecular biology. This opens the possibility for our students to deepen their experimental and biological understanding while keeping the necessary mathematical requirements for everyone through the explicit second year math requirements. The PHY433 and JCP463 courses are grouped with PHY426 and to be offered as an alternative. This grouping better separates lecture-based courses from experiential learning courses. Two courses: JCP410H5 and JCP422 are added to the program and can be combined with PHY473 to have a choice of theory/reading based courses, or lab based experiential learning courses.

### Chemistry - Specialist (Science)

**Completion Requirements:**

13.0-13.5 credits are required.

**First Year:**

1. CHM110H5 and CHM120H5
2. (MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137 and MAT139) or (MAT157 and MAT159) or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5
3. (PHY136H5 and PHY137H5) or (PHY146H5 and PHY147H5)
4. For students entering the program in 2023-2024 (and beyond): ISP100H5

**Second Year:**

1. CHM211H5 and CHM231H5 and CHM242H5 and CHM243H5
2. JCP221H5
3. ~~MAT212H5~~ or MAT232H5

**Third Year:**

1. CHM311H5 and CHM331H5 and CHM361H5 and CHM394H5 and CHM396H5
2. CHM341H5 or CHM345H5
3. JCP321H5

**Fourth Year:**

1. (CHM395H5 and CHM397H5) or CHM399Y5 or CHM489Y5 or CPS489Y5 or CPS400Y5 or CPS401Y5 or JCB487Y5
2. 1.5 credits lecture courses from: CHM412H5 or CHM414H5 or CHM416H5 or CHM436H5 or CHM442H5 or CHM444H5 or CHM462H5 or JCP421H5 or JCP422H5 or JCP410H5 or JCP463H5
3. 1.0 credit from: CHM333H5 or CHM341H5 or CHM345H5 or CHM347H5 or CHM362H5 or CHM372H or CHM373H5 or CHM395H or CHM397H5 or CHM412H5 or CHM414H5 or CHM416H5 or CHM436H5 or CHM442H5 or CHM444H5 or CHM462H5 or CHM485H5 or CPS398H5 or FSC311H5 or JCP321H5 or JCP322H5 or JCP410H5 or JCP421H5 or JCP422H5 or JCP463H5

**Rationale:**

Clean-up - Removed MAT212H5 as an option since the course has been deleted by MCS

## Earth Science - Major (Science)

**Completion Requirements:**

8.0-8.5 credits are required, including at least 3.0 at the 300/400 level.

**First Year:**

1. ERS101H5 or ERS111H5 or ENV100Y5
2. ISP100H5
3. (MAT132H5 and MAT134H5) or (MAT135H5 and ~~or~~ MAT136H5) or (MAT137H5 and MAT139H5) or MAT134Y5 or MAT135Y5 or MAT137Y5
4. (CHM110H5 and CHM120H5) or (PHY136H5 and PHY137H5) or (PHY146H5 and PHY147H5)

**Second Year:**

1. ERS201H5 and ERS202H5 and ERS203H5
2. 0.5 credit from ERS211H5 or ERS225H5 or GGR214H5 or GGR217H5 or GGR227H5 or GGR272H5 or GGR276H5 or GGR278H5

**Higher Years:** 3.0 additional credits at the 300/400 level from ERS301H5 or ERS302H5 or ERS303H5 or ERS304H5 or ERS311H5 or ERS312H5 or ERS315H5 or ERS325H5 or ERS381H5 or ERS401H5 or ERS402H5 or ERS403H5 or ERS404H5 or ERS411H5 or ERS412H5 or ERS425H5 or PHY351H5 or JGE378H5 or CPS400Y5.

**NOTE:** GGR272H5 is a prerequisite for GGR278H5.

**Rationale:**

Correction of typo - MAT135 or MAT136H5 should read as MAT135 and MAT136H5

## Physics - Major (Science)

### Enrolment Requirements:

**Limited Enrolment** – Enrolment in this program is based on completion of 4.0 credits, including:

- ONE of the following:
- PHY146H5 (~~with a minimum grade of 60%~~) and PHY147H5 (with a minimum grade of 60%)
- PHY136H5 (~~with a minimum grade of 80%~~) and PHY137H5 (with a minimum grade of 80%)
- (~~MAT132H5 and MAT134H5~~) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) ~~or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5~~

### Completion Requirements:

8.5 credits are required.

### First Year:

1. (PHY146H5 and PHY147H5) or (PHY136H5 or PHY137H5)
2. (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) ~~or MAT135Y5 or MAT137Y5 or MAT157Y5~~
3. ISP100H5

### Second Year:

1. PHY241H5 and PHY245H5
2. JCP221H5
3. **MAT232H5** and **MAT244H5** ~~JCP265H5~~

### Third & Fourth Years:

**3.5 credits from the following list of courses** PHY324H5, ~~and~~ PHY325H5, **PHY332H5, PHY333H5,** ~~and~~ PHY343H5, ~~and~~ PHY347H5, **PHY351H5, PHY399Y5,** ~~and~~ PHY451H5, **JCP265h5** ~~and~~ JCP321H5, ~~and~~ JCP322H5, ~~and~~ JCP421H5

### NOTES:

- 1- ~~At least 60% mark in PHY146H5 and PHY147H5~~
- 2- ~~At least 80% in PHY136H5 and PHY137H5~~

### Rationale:

Minimum grade requirements in PHY146 and PHY136 are removed so that students can show their proficiency by passing the minimum grade requirements in the subsequent courses PHY147 and PHY137. The students who showed low scores in PHY136 or PHY146 will now have an opportunity to improve their grade in the second semester.

We are removing MAT132H5 and MAT134H5 as accepted program requirements because these math courses are geared towards the life sciences and do not provide a through enough preparation for our upper year physics courses. MAT134Y5, MAT135Y5, MAT157Y are no longer in the calendar and have been split up into two half courses to give students more flexibility. Our students will have to choose one of these three advanced level calculus courses.

We are removing ISP100 from the first-year requirements because it is not a technical pre-requisite for success in our second-year physics courses. This offers students flexibility in when

they take this course due to the number of requirements in first year. Writing is important in the research-based courses taken in 3rd and 4th year.

The course JCP265 is substituted with MAT232 and MAT244 to explicitly reflect the course prerequisites in the program and to improve the student learning experience. JCP265 is removed as a required course in order to offer students increased flexibility in their course selection. This change is made in combination with the increased flexibility in the course choice at the 300/400 level

We provide the students with more flexibility in their choices for the 300/400 level courses. We additionally allow JCP265 to be used for third year credits to reduce the course load in the second year.

The noted minimum grade requirement in PHY146 and PHY136 is removed. It is enough to have the minimum grade requirements for PHY147 and PHY137. The students who showed low scores in PHY136 or PHY146 will have an opportunity to improve their grade in the second semester and show their proficiency of the material.

#### Physics - Minor (Science)

##### **Enrolment Requirements:**

**Limited Enrolment** — Enrolment in this program is based on completion of 4.0 credits including:

1. (PHY146H5 ~~(minimum grade of 60%)~~ and PHY147H5 ~~(minimum grade of 60%)~~); or (PHY136H5 ~~(with a minimum grade of 80%)~~ and PHY137H5 ~~(with a minimum grade of 80%)~~)
2. ~~(MAT132H5 and MAT134H5) or~~ (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5 and MAT159H5) ~~or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5~~

##### **Completion Requirements:**

4.0 credits are required including at least 1.5 credits at the 300/400 level. Please note that a number of these courses have MAT pre-requisites and/or co-requisites.

**First Year:** (PHY146H5 and PHY147H5) or (PHY136H5 and PHY137H5)

**Second Year:** 1.5 credits from: PHY241H5, PHY242H5, and PHY245H5, PHY255H5, PHY299Y5, JCP221H5, and JCP265H5.

**Higher Years:** 1.5 credits from: JCP321H5, JCP322H5, JCP410H5, JCP421H5, JCP422H5, JCP463H5, PHY324H5, PHY325H5, PHY332H5, PHY333H5, PHY343H5, PHY347H5, PHY351H5, PHY399Y5, PHY426H5, PHY433H5, PHY451H5, PHY473H5.

##### **NOTES:**

1. At least 60% mark in PHY146H5 and PHY147H5
2. At least 80% in PHY136H5 and PHY137H5
3. Not all 300 and 400 level courses are offered every year. Please check the course timetable carefully each academic year.
24. Check all prerequisites and corequisites when registering for 200+ level courses.

**Rationale:**

The minimum grade requirements for PHY136/7 and PHY146/7 are removed in order to allow students who struggled in their first year to make up for it in their second year.

We are removing MAT132H5 and MAT134H5 as accepted program requirements because these math courses are geared towards the life sciences and do not provide a through enough preparation for our upper year physics courses. MAT134Y5, MAT135Y5, MAT157Y are no longer in the calendar and have been split up into two half courses to give students more flexibility. Our students will have to choose one of these three advanced level calculus courses.

Specific second year courses are removed and replaced with any 1.5 credits in 200-level JCP/courses. This change is made in combination with the increased flexibility in the course choice at the 300/400 level and we also provided the students with more flexibility in their choices for the 300/400 level courses.

## Anthropology (UTM), Department of

### 6 Course Modifications:

#### ANT201H5: World Prehistory

**Title:** World ~~Archaeology~~ ~~Prehistory~~

**Description:** ~~Archaeological survey~~ ~~Survey~~ of human cultural development ~~from a global perspective, including over 2.5 million years. The course will cover the following topics:~~the ~~elaboration~~ ~~nature and origins~~ of material culture; the ~~expansion of social inequality;~~ the ~~nature and~~ development of ~~diverse food procurement (hunter-gatherer-fisher) and food production (herding-agricultural)~~ ~~hunter-gather-fisher~~ economies; and the ~~changes in patterns of mobility over time~~ ~~nature~~ and ~~between world areas, with the growth~~ ~~development~~ of ~~village resource production;~~ and ~~city life. Students will engage with the current state~~ ~~nature~~ of archaeological research and some ~~development~~ of the major issues archaeologists address in their recreations of archaeologically-based human history ~~complex societies.~~

{24L, 12P}

**Rationale:**

Update and clarification of the topics and focus of the course, with new regular instructor and developments in the field. New wording also makes more explicit the similarities with the St.George equivalent course.

**Resources:**

None

#### ANT202H5: Biological Anthropology: Human Variation and Adaptation

**Contact Hours:**

**Previous:** *Lecture:* 24 / *Practical:* 12

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

**Rationale:**

We are changing the type of student contact hours from PRA to TUT.

Prior to the 2014-2015 academic year, ANT202H5 and ANT203H5 used to be a full-year course (ANT203Y5). This full-year course had practicals. When the course was split into two different "H" courses, the primatology half (ANT203H5) still needed to be held in our undergraduate teaching labs since it makes use of the items in our collections' room. But, for the ANT202H5 half (genetics), this was no longer the case. ANT202H5 continued to be scheduled in our labs since it had a 12P. But the nature of the hands-on activities in ANT202H5 are more in line with what a tutorial might be and not a practical. As such we wish to change the 12P to 12T.

**Resources:**

## ANT314H5: Archaeological Theory

**Title:** **History of** Archaeological Theory

**Description:**

**Previous:** The course examines theoretical approaches to archeological explanation of the human past. The goals for the course are: 1) to trace the emergence and growth of scientific archeology; and 2) to analyze the development of theoretical approaches in the latter half of the 20th century and first part of the 21st century. [ 24L ]

**New:** This course examines major schools of archaeological thought over time. We will explore how theoretical approaches to archeological explanations of the human past affect and are affected by how archaeologists investigate research questions and interpret archaeological evidence. Readings include historically important key works as well as recent syntheses.

**Rationale:**

Update and clarification of the topics and focus of the course, with new regular instructor and developments in the field. (Note: Equivalent St. George course no longer exists, but will monitor for future equivalencies)

**Resources:**

None

## ANT317H5: Pre-contact Indigenous History of Eastern North America

**Title:** **Archaeology** ~~Pre-contact Indigenous History~~ of **Indigenous** Eastern North America

**Description:** This course is a survey **from an archaeological perspective** of ~~pre-contact and early contact~~ Indigenous history in **Ontario and** the Eastern Woodlands of North America from earliest times (~~ca. 12-15, 000 years ago~~) until **colonization AD 1650**. **Themes examined** ~~Topics covered~~ will include **technology** ~~earliest inhabitants~~, **subsistence** ~~hunter-gatherer-fisher lifeways~~, **shelter** ~~the origins of food production~~, **landscape use**, **art** ~~development of village-dwelling tribal communities~~, and **trade and how these vary in time and space** ~~first contact with Europeans~~.  
{24L}

**Rationale:**

We are updating the title and description to eliminate the contradiction in the time range by moving away from a quasi-evolutionary time-based series of topics to a number of themes relevant at all times.

**Resources:**

None

## ANT320H5: Archaeological Approaches to Technology

**Contact Hours:**

**Previous: Lecture: 24 / Practical: 12**

**New: Lecture: 12 / Practical: 24**

**Description:** Using hands-on learning as a primary approach, this course focuses on insights into social and cultural processes provided by the study of ancient and historic historical technology. Experimental It emphasizes the importance for archaeological studies of archaeological, ethnographic textual, archaeological, experimental and textual ethnographic data are used to examine topics such as organization. Organization and control of production, style of technology, and the value of objects will be examined. Throughout, we will discuss social and cultural as well as economic and functional reasons for the development and adoption of new technologies will be discussed.

**Rationale:**

Update and clarification of the topics and focus of the course, after first time teaching with addition of practicals. Students also need extra time and instruction on basic lab techniques, since ANT312 (Archaeological Lab Methods) is NOT a pre-requisite for this course. Shift in lecture vs. practical hours also reflects need for additional instructor demonstration times in lab setting. The "EXISTING Course Change Resource Implications Form" webform has been submitted with ANT312H5 used as a proxy course.

**Resources:**

ANT402H5: Wild Nights: Sleep, evolution, and performance in the 21st century

**Contact Hours:**

**Previous: Lecture: 12 / Seminar: 12**

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

**Rationale:**

For the 2018-2019 Academic Calendar, we proposed ANT402H5 as a new course with student contact hours as [12L, 12S]. In essence, this means that students would have 2 hours per week with a blend of both lecture type instructional teaching and hands-on activities. As such, in consultation with the undergraduate advisor at the time this new course was proposed, we decided to go with [12L, 12S] to indicate the nature of what the students would be doing, instead of 24L. This course change proposes a more accurate reflection of 24 lecture hours with an additional 12 tutorial hours. The content previously delivered in the seminar hours will be divided between the lectures and tutorials, as appropriate, with additional time for discussion and hands-on activities to encourage a deeper understanding of the content. See OBD Proposal submission for additional details.

**Resources:**



### 1 Course Modification:

#### ISP100H5: Writing for University and Beyond

**Description:** This course teaches writing- and reading-related skills that are necessary for success in the transition to university work. The course uses a 'Writing About Writing' approach to help students understand the writing process, with an emphasis on the concepts of discourse communities, genre, rhetoric, argument, and audience. Rather than focusing on discipline-specific writing skills, the course helps students develop transferable writing skills. ISP100H5 is delivered from the perspective that all writers can improve their writing, so that students with diverse writing skills will benefit by taking it. There is a required writing assessment in the first week of classes, and students must pass the threshold mark to continue in the course. Those below the threshold ~~should enrol~~ **will be automatically enrolled** in ISP100H5, Basics of Writing in English.

#### **Rationale:**

Students are no longer automatically enrolled in ISP010 if they do not pass the Writing Check-In assessment. This change is a reflection of the online by design proposal that has been submitted for ISP010 and contributes to a larger re-design of the course. Students can now self-enrol in ISP010 at any time throughout the course enrolment period if they identify that they would benefit from extra support prior to enrolling in ISP100. If a student successfully completes ISP010, they will be able to continue in ISP100 regardless of the outcome on the Writing Check-In assessment.

#### **Resources:**

None.

## Biology (UTM), Department of

### 2 New Courses:

BIO329H5: Conservation Biology

**Contact Hours:**

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

**Description:** Conservation of biodiversity, from genes to ecosystems. Topics include identifying biodiversity across levels of organization; understanding major threats to biodiversity (land use change, climate change, overharvesting); evaluating conservation actions (protected areas, reintroductions, assisted migration, restoration); and ethical considerations pertaining to conservation practices.

**Prerequisites:** BIO205H5 and BIO259H5

**Corequisites:**

**Exclusions:** BIOC63H3 or EEB215H1 or EEB255H1 or EEB365H1

**Recommended Preparation:**

**Rationale:**

Conservation biology is a core topic in an undergraduate biology curriculum, which currently our department does not offer courses in the subject area. The course will emphasize patterns of biodiversity, anthropogenic threats to biodiversity, and the primary conservation strategies that are employed to protect biodiversity. The course will be an important course option to the Ecology & Evolution Specialist, and the Biology Specialist program. Students may also use the course to complete the Biology Major (ERMAJ2364) and the Biology Minor (ERMIN2364).

**Resources:**

Resource form has been submitted

## BIO444H5: Urban Field Ecology and Evolution

### **Contact Hours:**

***Lecture: 14 / Practical: 98***

**Description:** This course will introduce students to the fundamentals of urban ecology and evolution using the Greater Toronto Area as a model to study the topic. The course will focus on understanding how ecological and evolutionary processes are influenced by urban development, human behaviour, and the built environment, and how the environment can feed back to shape cities and socio-ecology, including human behaviour and well-being. Students will be introduced to principles of the scientific process including making observations, stating hypotheses, experimental design, conducting experiments, data collection, statistical analysis and interpretation, and scientific writing and oral presentations. The course will focus on all major habitats in urban areas to understand how urban environmental change of air, water and land influence the ecology and evolution of populations, communities and ecosystems.

**Prerequisites:** BIO152H5 and BIO153H5 and (BIO205H5 or BIO342H5) and (BIO259H5 or STA215H5)

### **Corequisites:**

### **Exclusions:**

### **Recommended Preparation:**

### **Rationale:**

Most field courses are very expensive because of the travel and accommodation costs and the department would like to offer an affordable field course option to students. This course will take place in the Greater Toronto area and will provide students with a field course experience, who may not have the means for a more expensive field experience. There are also limited field courses in urban field ecology and evolution and we wanted to make this available to all students in the department. Many urban habitats are peaking in plant and insect diversity in mid-August, so this will be a two week summer field course. Sites will be visited using a combination of private transportation, public transit and contracted buses.

### **Resources:**

Field courses have additional health and safety challenges given the nature of field work. 2 TAs will help maximize support in achieving the course goals while maintaining safety.

## 12 Course Modifications:

### BIO313H5: Field Methods and Experimental Design in Ecology

**Title:** ~~Field~~ Methods and Experimental Design in Ecology

**Prerequisites:**

**Previous:** (BIO205H5 or BIO259H5 or STA215H5 or PSY201H5) or equivalent \*PSY201H5 and STA215H5 will no longer be accepted as an appropriate prerequisite course AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the prerequisite statistics course.

**New:** (BIO205H5 or BIO259H5 or STA215 or PSY201) or equivalent.

**Rationale:**

The rationale for removing the work "field" from the title is that over the years the instructor has decided to allow students to also pursue lab based projects if that is their interest so the projects are not always in the field any longer. She also thinks "method" is broader and accurately reflects the range of projects that students pursue.

**Resources:**

None

### BIO314H5: Laboratory in Cell and Molecular Biology

**Prerequisites:**

**Previous:** 2013-14 and prior: BIO215H5 and 2014-15 onward: BIO206H5

**New:** BIO206H5

**Rationale:**

Removing the note regarding BIO215 as this course has been retired for many years. The only prereq should be BIO206.

**Resources:**

None

### BIO315H5: Human Cell Biology

**Prerequisites:**

**Previous:** 2013-14 and prior: BIO206H5 and BIO207H5 and BIO215H5 and 2014-15 onward: BIO206H5 and BIO207H5 NOTE: BIO206H5 with NO practical component is not an acceptable pre-requisite for this course without BIO215H5.

**New:** BIO206H5 and BIO207H5

**Rationale:**

Removing the note regarding BIO215 as this course has been retired for many years. The only prereq should be BIO206 and BIO207.

**Resources:**

None

**BIO326H5: Ornithology****UTM International Delivery Options:**

**Previous:**

**New:** International - Optional

**Rationale:**

The instructor for the course would like to add an optional international experience during reading week in October. Students will have the same assignment regardless of whether students travel or not. Depending on the option they choose, students will have the opportunity to participate in international partner interviews either in person or through the abroad trip. Students who remain on campus will have interaction with other global partners. The trip will be organized through the UTM International Education Centre.

**Resources:**

IEC to submit proposed budget to Dean's Office

**BIO341H5: Advanced Genetics****Prerequisites:**

**Previous:** 2013-14 and prior: BIO206H5 and BIO207H5 and BIO215H5 and 2014-15 onward: BIO206H5 and BIO207H5 NOTE: BIO206H5 with NO practical component is not an acceptable pre-requisite for this course without BIO215H5.

**New:** BIO206H5 and BIO207H5

**Rationale:**

Removing the note regarding BIO215H5 as this course has been retired for many years. The only prereq should be BIO206H5 and BIO207H5

**Resources:**

None

**BIO356H5: Major Features of Vertebrate Evolution****Recommended Preparation:**

**Previous:** BIO259H5 or BIO360H5 or STA215H5

**New:**

**Rationale:**

Instructor feels that the recommended prep courses are no longer relevant because he previously used a lot of modeling and phylogenetic analysis but no longer does this.

**Resources:**

None.

**BIO370Y5: Microbiology****Prerequisites:**

**Previous:** BIO206H5 and BIO207H5 and 2013-14 and prior: BIO206H5 and BIO207H5 and BIO215H5;

**New:** BIO206H5 and BIO207H5

**Exclusions:**

**Previous:**

**New:** BIO371H5

**Rationale:**

The note regarding BIO215H5 and the course is no longer relevant as BIO215 has not been offered for many years. BIO371H5 was missed previously as an exclusion. BIO371 lectures are the same as BIO370, but BIO370 has labs.

**Resources:**

None

**BIO374H5: Modern Biotechnology****Prerequisites:**

**Previous:** 2013-14 and prior: BIO215H5 and 2014-15 onward: BIO206H5

**New:** BIO206H5

**Rationale:**

Removing the note regarding BIO215 as this course has been retired for many years. The only prereq should be BIO206H5.

**Resources:**

No new resources needed

**HSC401H5: Health and Science Communication Design**

**Prerequisites:** HSC200H5 **and one of the following courses: HSC300H5 or HSC301H5 or HSC302H5 or HSC307H5**

**Rationale:**

As the HSC 400 level courses had no prerequisites students were trying to complete this minor in one fall/winter term. Caps of these courses are small due to being in the MAC lab, so students were also encountering enrollment issues. We have introduced prerequisites to the 4th year courses in order to pace students through the program in a timely manner. It will also force

students to plan enrollment into these courses as they plan enrolment for other Biology programs..

**Resources:**

No new resources

HSC402H5: Digital Learning Environments in Biology and Health Science

**Prerequisites:**

**Previous:** (ANT101H5 or BIO152H5 or CCT260H5) and HSC200H5

**New:** HSC200H5 and one of the following courses: HSC300H5 or HSC301H5 or HSC302H5 or HSC307H5

**Rationale:**

As the HSC 400 level courses had no prerequisites students were trying to complete this minor in one fall/winter term. Caps of these courses are small due to being in the MAC lab, so students were also encountering enrollment issues. We have introduced prerequisites to the 4th year courses in order to pace students through the program in a timely manner. It will also force students to plan enrollment into these courses as they plan enrollment for other Biology programs. The removal of ANT101H5 and CCT260H5 is clean up as these prereqs were options when the course was brought to the campus years ago and are no longer relevant. BIO152 is currently a prereq for HSC200 so this does not need to be listed.

**Resources:**

No new resources needed

HSC404H5: Advanced Visual Media for Anthropological Data

**Prerequisites:** ~~HSC200H5 and (HSC200H5 ANT200H5 and one of the following courses: HSC300H5 ANT201H5) or HSC301H5 or HSC302H5 or HSC307H5 (ANT202H5 and ANT203H5) or permission of instructor~~ ~~BIO152H5~~

**Rationale:**

Removal on ANT courses is due to HSC courses no longer being listed in Forensic Anthro Spec although these students will be able to enrol with permission of instructor if need be. Listing BIO152 is not necessary as it is a prereq to HSC200.

**Resources:**

None

HSC405H5: Digital Forensic Facial Reconstruction

**Prerequisites:**

**Previous:** 10.0 credits including ANT202H5 or ANT205H5 or (BIO208H5 and BIO209H5) or BIO210Y5

**New:** (HSC200H5 and one of the following courses: HSC300H5 or HSC301H5 or HSC302H5 or HSC307H5) or permission of instructor

**Recommended Preparation:**

**Previous:** ANT334H5

**New:**

**Rationale:**

The HSC 400 level courses had no prerequisites and therefore students were trying to complete this minor in one fall/winter term. Caps of these courses are small due to being in the MAC lab, so students were also encountering enrollment issues. We have introduced prerequisites to the 4th year courses in order to pace students through the program in a timely manner. It will also force students to plan enrollment into these courses as they plan enrollment for other Biology programs. Instructor has deleted BIO208 & BIO209 as prereqs as he now teaches the basics of anatomy/physiology for what is needed in the course. The ANT prereqs are no longer relevant.

**Resources:**

No new resources required



## 10 Program Modifications:

### Biology - Major (Science)

#### Completion Requirements:

8.0 credits are required including at least 2.0 at the 300/400 level.

1. BIO152H5, BIO153H5; CHM110H5, CHM120H5; (MAT132H5 and MAT134H5 \*) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5

\* **Note** - MAT132H5 and MAT134H5 - for Life Sciences is highly recommended.

2. BIO202H5, BIO203H5, BIO205H5, BIO206H5, BIO207H5, **BIO259H5**; ~~\* \* BIO259H5 or PSY201H5 or STA215H5~~

~~\* \* PSY201H5 or STA215H5 will no longer be accepted as an appropriate courses for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program. Students who plan to take BIO360H5 or who plan to transfer to a Biology Specialist program should enrol in.~~

3. 2.0 in UTM Biology courses at the 300 or 400 level.

#### NOTES

- Students should be aware of the distinct credit requirement for their degree (see section 8.6 - HBS degree Requirements for full details). Completion of this program with another Biology Major or Biology Minor will not satisfy the min. 12.0 distinct credit requirement for a degree. Please choose programs and courses accordingly.
- PSL201Y1, offered on the St. George campus, will not meet the Physiology requirements for the Biology Major program and cannot be used for this program.
- Students may take no more than 2.0 credits combined in ROP, Internship Program, or Individual Project/Thesis courses at the 300/400-level for credit toward their Biology program.
- Students must consult with the Undergraduate Advisor before enrolling in any St. George course that they wish to use for credit toward any Biology program.

#### Rationale:

Removal of note regarding STA215H5 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required.

### Biology - Minor (Science)

#### Completion Requirements:

1. BIO152H5, BIO153H5

2. Two courses from **the list**: BIO202H5, BIO203H5, BIO205H5, BIO206H5, BIO207H5, ~~{BIO208H5, BIO209H5}~~

3. 2.0 additional Biology credits, at least 1.0 **credit** at the 300/400 level.

#### NOTE:

1. ~~Four of the six courses in requirement 2 (above) require CHM110H5, CHM120H5 as a pre-requisite.~~
2. ~~If BIO210Y5 is used to complete requirement #2 above, please note that this counts as ONE COURSE. Another course from the list must be completed to fulfill the program requirements.~~

**Rationale:**

BIO210Y5Y was a previous course option in REQ#2 for this program, but BIO210Y5Y was split into BIO208H5 & BIO209H5. As these two courses were replacing BIO210Y5Y, if students chose to complete these two courses for REQ#2 we were counting them as only one course, which meant they would need to complete one additional course to fulfill the requirement. Students have complained about this over the years as it can mean having to finish the program with 4.5 credits rather than 4.0 credits (depending on which courses you choose to complete REQ#2). This change will allow BIO208H5 and BIO209H5 to be counted individually and will also allow students to choose only one of the courses rather than having to complete both. All students will now complete the program with a minimum of 4.0 credits.

Biology - Specialist (Science)

**Completion Requirements:**

13.5 credits are required, including at least 6.0 credits at the 300/400 level, of which 1.0 credit must be at the 400 level.

**First Year:**

1. BIO152H5 and BIO153H5
2. CHM110H5 and CHM120H5
3. (MAT132H5 and MAT134H5) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5
4. 1.0 credit from: CLA201H5 or ENV100Y5 or (ERS101H5 or ERS120H5) or PHY136H5 or PHY137H5 or PSY100Y5 or WRI173H5 or WRI307H5

**Note** - (MAT132H5 and MAT134H5) - Calculus for Life Sciences is highly recommended.

**Second Year:**

1. BIO202H5 and BIO203H5 and BIO205H5 and BIO206H5 and BIO207H5 **and**
2. BIO259H5 ~~or STA215H5~~

~~\* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third and Fourth Years:**

1. BIO313H5 or BIO314H5 or BIO409H5
2. BIO360H5
3. 5.5 additional UTM BIO credits. At least 5.0 of these credits must be at the 300 level or above, of which at least 1.0 must be at the 400 level

It is recommended that students in the specialist program include at least 0.5 credit from each of four of the following groups:

- **Ecology and Field Biology:** BIO311H5 or BIO312H5 or BIO313H5 or **BIO329H5** or BIO330H5 or BIO331H5 or BIO333H5 or BIO373H5 or BIO376H5 or BIO378H5 or BIO412H5 or BIO416H5 or **BIO444H5** or BIO464H5
- **Biology of Whole Organisms:** BIO325H5 or BIO326H5 or **BIO329H5** or BIO354H5 or BIO356H5 or BIO376H5 or BIO378H5
- **Genetics and Evolution:** **BIO329H5** or BIO341H5 or BIO342H5 or BIO347H5 or BIO407H5 or BIO422H5 or BIO427H5 or BIO443H5 or BIO445H5 or BIO464H5
- **Cell, Molecular and Developmental Biology:** BIO314H5 or BIO315H5 or BIO324H5 or BIO362H5 or (BIO370Y5 or BIO371H5) or **BIO368H5** or BIO372H5 or BIO374H5 or BIO375H5 or BIO380H5 or BIO404H5 or BIO407H5 or BIO408H5 or BIO417H5 or BIO419H5 or BIO422H5 or BIO458H5 or BIO475H5 or BIO476H5 or BIO477H5
- **Physiology and Behaviour:** (~~BIO208H5 or BIO209H5~~) or BIO304H5 or BIO310H5 or BIO312H5 or (BIO318Y5 or BIO328H5) or BIO320H5 or **BIO324** or BIO368H5 or BIO405H5 or BIO408H5 or BIO409H5 or BIO410H5 or BIO411H5 or BIO414H5 or BIO429H5 or BIO434H5

Up to 1.0 credit may be taken from the following biology-related courses: GGR227H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR311H5 or GGR312H5 or CHM347H5 or CHM361H5 or CHM362H5 or CHM372H5 or CHM373H5 or PHY332H5 or PHY333H5 or PSY290H5 or PSY355H5 or PSY357H5 or PSY392H5 or PSY395H5 or PSY397H5 or ANT334H5 or ANT336H5 or ANT340H5.

Additional courses: BIO361H5 or BIO400Y5 or BIO481Y5 or JCB487Y5

#### **Rationale:**

Removal of note regarding STA215 as the course will no longer be offered in fall 2023 (BIO259 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required ). Addition of new optional courses BIO329 and BIO444H5 for program completion. Addition of other optional courses (BIO324 & BIO368) that were previously missed. We have removed BIO209H5 as an option as this was messing up the coding in Degree Explorer (students only have the option on completing 0.5 credit at the 200 level within the 5.5 required credits), so have decided just to list the one course at the 200 level.

### Biology for Health Sciences - Major (Science)

#### **Completion Requirements:**

8.5 credits are required including at least 2.0 at the 300/400 level.

#### **~~Program Requirements:~~**

1. BIO152H5, BIO153H5; CHM110H5, CHM120H5; (MAT132H5 and MAT134H5\*) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5

**\*Note:** MAT132H5 and MAT134H5 - for Life Sciences is highly recommended.

2. BIO202H5, BIO206H5, BIO207H5, BIO208H5, BIO209H5, **BIO259H5**, BIO304H5, BIO310H5, BIO380H5; ~~(BIO259H5 or PSY201H5 or STA215H5)~~ \* \*

\* \* **Note:** PSY201H5 or STA215H5 will no longer be accepted as appropriate courses for this program AFTER 2022–2023 Academic year. Beginning 2023–2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program. Students who plan to take BIO360H5 or who plan to transfer to a Biology Specialist program should enrol in BIO259H5.

3. 1.0 **credit** credits from **any one** of the **courses listed below** following lists:

**Cell, Molecular, and Biotechnology Stream:** BIO200H5, BIO314H5, BIO315H5, BIO324H5, BIO360H5, **BIO368H5**, BIO370Y5/BIO371H5, BIO372H5, BIO374H5, BIO375H5, BIO404H5, BIO417H5, BIO419H5, BIO422H5, BIO475H5, BIO476H5, BIO477H5; JBC472H5

**Neuroscience Stream:** BIO320H5, BIO360H5, BIO403H5, BIO408H5, BIO409H5, BIO411H5, BIO429H5

**Genes and Behaviour Stream:** BIO315H5, BIO318Y5/BIO328H5, **BIO329H5**, BIO341H5, BIO342H5, BIO347H5, BIO360H5, BIO361H5, ~~BIO368H5~~, BIO405H5, BIO407H5, BIO414H5, BIO422H5, BIO427H5, BIO443H5

#### NOTES

- **Completion of this program with another Biology Major or Biology Minor will not satisfy the 12.0 distinct credit requirement for degree completion.** Students should be aware of the distinct credit requirement for their degree (see section 8.6 - HBS degree Requirements for full details)- ~~Completion of this program with another Biology Major or Biology Minor will not satisfy the min. 12.0 distinct credit requirement for a degree.~~ Please choose programs and courses accordingly-
- ~~As part of your degree requirement the 'Biology for Health Sciences' Major would be academically complemented by a Major in Psychology, Anthropology, Exceptionality in Human Learning, Forensic Science, and Chemistry, as well as other disciplines such as the Major in Management. This major program would also be complemented by a Minor in Biomedical Communications (Science).~~

#### Rationale:

Removal of note and courses regarding STA215H5 and PSY201H5 as the STA215H5 course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. Addition of new optional course BIO329H5 for program completion as well as BIO324H5 and BIO368H5 as optional courses that were missed previously.

Biomedical Communications - Minor (Science)

#### Enrolment Requirements:

**Limited Enrolment** — Enrolment in this program requires the student meet one of the following two conditions: 1) concurrent enrolment in a science major and any minor; or 2) enrolment in a

science specialist program. A minimum CGPA of 2.20 is required. All students(including transfer students) must complete **BIO152H5, BIO153H5, HSC200H5 plus 2.5 additional** ~~4.0~~ UTM credits **before** requesting this program.

**Note:** CGPA for enrolment in this program is calculated based on a minimum of 4.0 credits completed at UTM with final percentage grades (i.e. CR/NCR courses are not applicable).

**Completion Requirements:**

1. BIO152H5 and BIO153H5 and HSC200H5
2. **2.5 credits** ~~1.0 credit~~ from the following **of which at least 1.0 credit must be at the 400 level:** HSC300H5 or HSC301H5 or HSC302H5 or HSC307H5 **or**
3. ~~1.5 credits from the following:~~ HSC401H5 or HSC402H5 or HSC404H5 or HSC405H5 or HSC406H5

**Rationale:**

Over the past few years we have found that students try to complete this minor in one fall/winter term because of the way students could request program entry, and also because the 400 level courses did not have any prereqs. We have added an additional course to the limited enrollment requirements as well as added prereqs to the 400 level courses, to ensure that students pace themselves through the program. This will also help with enrollment issues each year as course caps are small due to courses taking place in MAC lab. The required courses at the 400 level have changed from 1.5 to 1.0 due to us having a shortage on offering HSC courses at the 400 level.

Biotechnology - Specialist (Science)

**Completion Requirements:**

15.0 credits are required, including at least 7.0 at the 300/400 level, of which 1.5 must be at the 400 level.

**First Year:** BIO152H5, BIO153H5; CHM110H5, CHM120H5; (MAT132H5 and MAT134H5 \*) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5; MGM101H5 ~~\*, \*~~, MGM102H5 ~~\*, \*~~

**\*Note** - (MAT132H5 and MAT134H5) or MAT134Y5Y - Calculus for Life Sciences is highly recommended.

~~\*, \* Please note that while MGM101H and MGM102H are listed as first-year courses, students cannot enrol in these courses until they are admitted into the Specialist Program and therefore will be taking these courses in their 2nd, 3rd or 4th years of study~~

**Second Year:** BIO200H5, BIO202H5/BIO203H5, BIO206H5, BIO207H5; CHM211H5, CHM242H5, CHM243H5; ~~STA215H5 \*, \*, \*~~

~~\*, \*, \* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third and Fourth Years:**

1. BIO314H5, BIO315H5, BIO360H5, BIO370Y5, BIO372H5, BIO374H5; CHM311H5, CHM361H5; JBC472H5
2. 1.0 credit from: BIO304H5, BIO310H5, BIO312H5, **BIO324H5**, BIO341H5, BIO342H5, BIO347H5, BIO362H5, **BIO368H5**, BIO375H5, BIO380H5, BIO409H5, BIO429H5; CHM333H5 (note: CHM231H5 is prerequisite for this course), CHM341H5, CHM345H5, CHM347H5, CHM362H5, CHM372H5, CHM373H5
3. 1.0 credit from UTM CHM/BIO courses at the 400 level.

NOTE: No substitute statistics course will be allowed for BIO360H5.

It is recommended that students in this program consider taking a research project or internship course in either Biology (BIO400Y5/BIO481Y5) or Chemistry (CPS489Y5) or JCB487Y5. Other 4th-year courses directly relevant to this program are BIO443H5, BIO476H5, BIO477H5, CHM414H5 and CHM462H5.

Students may take no more than 2.0 credits combined in ROP, Internship Program, or Individual Project/Thesis courses at the 300/400-level for credit toward their Biology program.

Students must consult with the Undergraduate Advisor before enrolling in any St. George course that they wish to use for credit toward any Biology program.

#### **Rationale:**

Removal of note regarding STA215 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. Addition of new optional courses (BIO324 & BIO368) were previously missed so this is clean up. Removal of note regarding MGM course enrollment is no longer relevant, as the Management department is now allowing Life Science students to enroll into the courses prior to being enrolled in the program.

### Comparative Physiology - Specialist (Science)

#### **Completion Requirements:**

14.5 credits are required, including at least 5.0 at the 300/400 level, of which 1.0 credit must be at the 400 level.

#### **First Year:**

1. BIO152H5 and BIO153H5
2. CHM110H5 and CHM120H5
3. (MAT132H5 and MAT134H5) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5
4. 1.0 credit from CLA201H5 or ENV100Y5 or ERS101H5 or PHY136H5 or PHY137H5 or PSY100Y5 or WRI173H5 or WRI307H5

Note: (MAT132H5 and MAT134H5) - Calculus for Life Sciences is highly recommended.

#### **Second Year:**

1. BIO202H5 and BIO203H5 and BIO205H5 and BIO206H5 and BIO207H5 and BIO208H5 and BIO209H5 **and**

2. BIO259H5 ~~or STA215H5~~

~~\* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third and Fourth Years:**

1. BIO304H5 and BIO310H5 and BIO312H5 and BIO360H5 and BIO409H5;
2. CHM242H5 and CHM243H5
3. At least 2.0 credits from: BIO320H5 or BIO347H5 or BIO354H5 or BIO361H5 ~~or BIO368H5~~ or BIO372H5 or BIO404H5 or BIO408H5 or BIO410H5 or BIO411H5 or BIO412H5 or BIO414H5 or BIO417H5 or BIO419H5 or BIO422H5 or BIO429H5 or BIO481Y5 or CHM361H5 or CHM362H5 or JCB487Y5 or PHY332H5 or PHY333H5 or PSY290H5 or PSY395H5
4. 1.0 additional BIO credit taken at U of T Mississauga campus

No substitute statistics course will be allowed for BIO360H5. Students may take no more than 2.0 credits combined in ROP, Internship Program, or Individual Project/Thesis courses at the 300/400-level for credit toward their Biology program. Students must consult with the Undergraduate Advisor before enrolling in any St. George course that they wish to use for credit toward any Biology program.

**Rationale:**

Removal of note regarding STA215 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. Addition of new optional course BIO368H5 was missed previously.

Ecology and Evolution - Specialist (Science)

**Completion Requirements:**

14.5 credits are required, including at least 6.0 credits at the 300/400 level, of which 1.0 credits must be at the 400 level.

**First Year:**

1. BIO152H5 and BIO153H5
2. CHM110H5 and CHM120H5
3. (MAT132H5 and MAT134H5) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5
4. 1.0 credit from: CLA201H5 or ENV100Y5 or ERS101H5 or PHY136H5 or PHY137H5 or PSY100Y5 or WRI173H5 or WRI307H5

Note: (MAT132H5 and MAT134H5) - Calculus for Life Sciences is highly recommended.

**Second Year:**

1. BIO202H5 and BIO203H5 and BIO205H5 and BIO206H5 and BIO207H5 and BIO259H5 ~~or STA215H5~~

~~\* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third and Fourth Years:**

1. BIO313H5 and BIO342H5 and BIO360H5 and BIO443H5
2. 1.0 credit from courses in organismal biology: BIO325H5 or BIO326H5 or BIO339H5 or BIO354H5 or BIO356H5 or (BIO370Y5 or BIO371H5)
3. 0.5 credit from field courses: **BIO332H5** or BIO416H5 or **BIO444H5** other 2-week Ontario Universities Program in Field Biology (OUPFB) Courses
4. 2.0 credits from core ecology/evolutionary biology courses: BIO311H5 or **BIO329H5** or BIO330H5 or BIO331H5 or BIO333H5 or BIO341H5 or BIO361H5 or BIO373H5 or BIO376H5 or BIO378H5 or BIO406H5 or BIO427H5 or BIO445H5 or BIO464H5 or GGR312H5 or JBH471H5
5. 1.0 credit from other UTM biology courses at the 300/400 level.
6. 1.0 credit from related courses from other departments: MAT222H5 or MAT232H5 or STA302H5 or STA322H5 or GGR227H5 or GGR278H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR311H5 or from courses listed in #4, #5 and #6

**Rationale:**

Removal of note regarding STA215 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. Addition of new optional course BIO329 and BIO444H5 for program completion as well as BIO332H5 which might have been missed previously.

**Molecular Biology - Specialist (Science)****Completion Requirements:**

15.0 credits are required.

**First Year:**

1. BIO152H5 and BIO153H5
2. CHM110H5 and CHM120H5
3. (MAT132H5 and MAT134H5) or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5.
4. 1.0 credit from: CLA201H5 or ENV100Y5 or (ERS101H5 or ERS120H5) or PHY136H5 or PHY137H5 or PSY100Y5 or WRI173H5 or WRI307H5

Note: (MAT132H5 and MAT134H5) - Calculus for Life Sciences is highly recommended.

**Second Year:**

1. BIO206H5 and BIO207H5
- ~~2. CHM242H5 and CHM243H5~~
- ~~3. BIO259H5 or STA215H5~~
- ~~4. 1.0 credit from BIO202H5 or BIO203H5 or BIO205H5~~
- ~~5. CHM242H5 and CHM243H5~~

~~\* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third Year:**



1. BIO314H5 and BIO315H5 and BIO342H5 and BIO360H5 and BIO370Y5 and BIO372H5
2. CHM361H5 and CHM362H5 and CHM372H5 and CHM373H5
3. 0.5 credit from BIO304H5 or BIO310H5 or **BIO324H5** or BIO341H5 or BIO347H5 or BIO362H5 or BIO368H5 or BIO374H5 or BIO375H5 or BIO380H5 or CHM347H5 or PHY332H5 or PHY333H5 or BCH335H1 or BCH340H1

**Fourth Year:**

1. BIO477H5 or BIO419H5\*\*
2. 1.0 credit from BIO403H5 or BIO407H5 or BIO408H5 or BIO411H5 or BIO417H5 or BIO419H5 or BIO422H5 or BIO429H5 or BIO443H5 or BIO458H5 or BIO476H5 or BIO477H5 or BIO481Y5 or BCH441H1 or CHM444H5 or CHM462H5 or CPS489Y5 or JBC472H5 or JCB487Y5 or JCP463H5 or CSB435H1 or CSB450H1 or CSB459H1 or CSB472H1 or CSB473H1 or CSB474H1 or CSB475H1 or MGY425H1 or MGY428H1 or MGY440H1 or MGY445H1 or MGY451H1 or MGY452H1 or MGY470H1 or MIJ485H1

\*\* Please note that both BIO477H5 and BIO419H5 can be taken, but each will be counted only once in the total 1.5 credits required in this section.

**Rationale:**

Removal of note and course STA215H5 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. Addition of optional course BIO324H5 was previously missed.

Paleontology - Major (Science)

**Completion Requirements:**

**First Year:** BIO152H5, BIO153H5; CHM110H5, CHM120H5; (MAT132H5 and MAT134H5)\*or MAT134Y5 or (MAT135H5 and MAT136H5) or MAT135Y5 or (MAT137H5 and MAT139H5) or MAT137Y5; ENV100Y5/ERS101H5/ERS120H5/ERS111H5

**\*Note** - MAT132H5 and MAT134H5 - Calculus for Life Sciences is highly recommended.

**Second Year:** (BIO208H5, BIO209H5), ERS201H5, ERS202H5, ERS203H5; ESS261H1; ~~STA215H5~~  
~~\* STA215H5 will no longer be accepted as an appropriate course for this program AFTER 2022-2023 Academic year. Beginning 2023-2024 Academic year all students will be required to complete BIO259H5 as the statistics course for this program.~~

**Third Year and Fourth Year:** ERS325H5; BIO354H5, BIO356H5, ESS331H1

**Rationale:**

Removal of note regarding STA215H5 as the course will no longer be offered. BIO259H5 will replace STA215H5 and PSY201H5 for all BIO programs where stats is required. \*\*Please see note for formatting issues regarding other mentioned first year courses.

## Geography, Geomatics and Environment (UTM), Department of

### 3 Course Modifications:

#### ENV496H5: Restoration Ecology II

**Prerequisites:** 14.0 credits including ENV495H5 ~~or permission of instructor~~

**Rationale:**

Instructor would like to remove PI from prerequisite.

**Resources:**

none

#### GGR335H5: Remote Sensing Applications

**Prerequisites:** 8.5 credits and (~~GGR272H5 or~~ GGR276H5 or GGR278H5 or GGR337H5)

**Rationale:**

updated prerequisites to reflect requirements course content.

**Resources:**

none

#### GGR442H5: GIS Capstone Project

**Prerequisites:** {12.0 credits **including and** GGR276H5 **or STA256H5** and GGR278H5 and(1.0 credit from GGR321H5 or GGR335H5 or GGR337H5 or GGR376H5 or GGR382H5 or GGR463H5) ~~and (1.0 credit from GGR311H5 or GGR370H5 or GGR372H5 or GGR384H5 or GGR437H5 or GGR440H5)}~~ or permission of **instructor**.  
~~instructor.~~

**Rationale:**

we are removing the additional 1.0 credit requirement since many of these courses are offered on rotation and therefore not offered every year. Students struggle to meet this part of the prerequisite.

**Resources:**

None

## 5 Minor Program Modifications:

### Environmental Science - Major (Science)

#### Enrolment Requirements:

**Limited Enrolment** - — Enrolment in this program is limited to students who have completed ENV100Y5 with a mark of 63% or higher.

#### Completion Requirements:

8.0 credits are required, of which at least 2.0 must be at the 300-400 level.

#### First Year: 3.0 credits:

- **Environment Foundation:** ENV100Y5
- **Quantitative and Basic Science Foundation:** 2.0 credits from ANT101H5 or BIO152H5 or BIO153H5 or CHM110H5 or CHM120H5 or ERS101H5 or GGR112H5 or ISP130H5 or MAT132H5 or MAT134H5 or MAT135H5 or MAT136H5 or **MAT137H5** or MAT137Y5 or **MAT139H5** or PHY136H5 or PHY137H5 or PHY146H5 or PHY147H5

*Be sure to look ahead and plan to complete the prerequisites for any upper-level courses that are of interest to you.*

#### Second Year: 2.5 credits:

- **Environmental Management Core:** ENV201H5
- **Life Sciences Core:** 0.5 credit from BIO201H5 or BIO205H5 or BIO211H5 or GGR227H5
- **Physical Geographical and Earth Sciences Core:** 1.0 credit from CHM211H5 or CHM231H5 or CHM242H5 or ERS201H5 or ERS202H5 or ERS203H5 or GGR201H5 or GGR214H5 or GGR217H5 or JCP221H5
- **Quantitative, Digital, and Analytical Methods Core:** 0.5 credit from BIO360H5 or BIO361H5 or CHM211H5 or GGR276H5 or GGR278H5 or ~~STA215H5~~ or STA220H5 or STA221H5

#### Upper Years: 2.5 credits:

- **Environmental Science Perspectives:** ENV330H5
- **Field, Project-Based, Experiential, and Research Perspectives:** 0.5 credit from BIO416H5 or CPS401Y5 or ENV299Y5 or ENV399Y5 or ENV496H5 or ENV497H5 or ERS325H5 or GGR335H5 or GGR379H5 or JEG400Y5 or JEG417Y5
- **Biogeochemical Perspectives:** 1.0 credit from BIO311H5 or BIO331H5 or BIO333H5 or ENV495H5 or ENV496H5 or ERS312H5 or ERS315H5 or ERS412H5 or GGR304H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR311H5 or GGR315H5 or GGR316H5 or GGR317H5 or GGR337H5 or GGR338H5 or GGR372H5 or GGR374H5 or GGR375H5 or GGR376H5 or GGR377H5 or GGR383H5 or GGR384H5 or GGR404H5 or GGR406H5 or GGR407H5 or GGR440H5 or GGR479H5 or GGR484H5
- **Social, Economic & Policy Perspectives:** 0.5 credit from ANT357H5 or ANT368H5 or ANT370H5 or BIO464H5 or ECO373Y5 or **ENV305H5** ~~ENV310H5~~ or ENV311H5 or ENV320H5 or ENV393H5 or ENV425H5 or ENV430H5 or **ENV435H5** or GGR322H5 or GGR325H5 or GGR329H5 or GGR333H5 or GGR348H5 or GGR349H5 or GGR353H5 or GGR361H5 or GGR362H5 or GGR365H5 or GGR370H5 or GGR415H5 or GGR419H5 or GGR420H5 or JEP351H5 or JEP356H5 or JEP452H5 or JGE378H5 or JPE251H5 or JPE252H5 or POL343Y5 or POL346Y5 or POL475H5 or SOC349H5 or SOC356H5 or SOC465H5 or WRI375H5

**Note:** ENV490H5, ENV491H5 can substitute for #1, #2, #3, or #4 as course requirements, where appropriate, and with permission of the Program Advisor or Academic Counsellor.

**Rationale:**

STA215H5 is being retired. Updated program to reflect this change.

Updating to include new MATH course codes MAT137H5 & MAT139H5

Environmental Science - Specialist (Science)

**Enrolment Requirements:**

**Limited Enrolment** - Enrolment in this program is limited to students who have completed ENV100Y5 with a mark of 65% or higher, and who have a CGPA of at least 2.0.

**Completion Requirements:**

12.0 credits are required, of which at least 4.0 credits must be at the 300-400 level, including at least 1.0 credit at the 400 level.

**First Year: 4.0 credits:**

- **Environment Foundation:** ENV100Y5
- **Quantitative and Basic Scientific Foundation:** 3.0 credits from ANT101H5 or BIO152H5 or BIO153H5 or CHM110H5 or CHM120H5 or CSC108H5 or CSC148H5 or ERS101H5 or GGR112H5 or ISP130H5 or MAT132H5 or MAT134H5 or MAT135H5 or MAT136H5 or **MAT137H5** or MAT137Y5 or **MAT139H5** or PHY136H5 or PHY137H5 or PHY146H5 or PHY147H5

*Be sure to look ahead and plan to complete the prerequisites for any upper-level courses that are of interest to you.*

**Second Year: 4.0 credits:**

- **Environmental Management Core:** ENV201H5
- **Life Science Core:** 1.0 credit from BIO201H5 or BIO205H5 or BIO211H5 or GGR227H5
- **Physical Geographical and Earth Science Core:** 1.5 credits from CHM211H5 or CHM231H5 or CHM242H5 or GGR201H5 or GGR214H5 or GGR217H5 or ERS201H5 or ERS202H5 or ERS203H5 or JCP221H5
- **Quantitative, Digital, and Analytical Methods Core:** 1.0 credit from BIO360H5 or BIO361H5 or CHM211H5 or GGR276H5 or GGR278H5 or ~~STA215H5~~ or STA220H5 or STA221H5

**Upper Years: 4.0 credits:**

- **Environmental Science Perspective:** ENV330H5
- **Field, Project-based, Experiential, and Research Perspectives:** 1.5 credits from BIO416H5 or CPS401Y5 or ENV299Y5 or ENV399Y5 or ENV496H5 or ENV497H5 or ERS325H5 or GGR335H5 or GGR379H5 or JEG400Y5 or JEG417Y5
- **Biogeochemical Perspectives:** 1.0 credit from BIO311H5 or BIO331H5 or BIO333H5 or BIO373H5 or BIO406H5 or ENV495H5 or ENV496H5 or ERS312H5 or ERS315H5 or ERS412H5 or GGR304H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR311H5 or GGR315H5 or GGR316H5 or GGR317H5 or GGR337H5 or GGR338H5 or GGR372H5 or GGR374H5 or GGR375H5 or GGR376H5 or GGR377H5 or GGR383H5 or GGR384H5 or GGR404H5 or GGR406H5 or GGR407H5 or GGR440H5 or GGR479H5 or GGR484H5

- **Environmental Management Perspectives:** 0.5 credit from BIO464H5 or ENV305H5 or ENV310H5 or ENV311H5 or ENV320H5 or ENV393H5 or ENV425H5 or ENV430H5 or JEP452H5
- **Social, Economic and Policy Perspectives:** 0.5 credit from ANT357H5 or ANT368H5 or ANT370H5 or ECO373Y5 or ENV305H5 or ENV310H5 or ENV311H5 or ENV320H5 or ENV393H5 or ENV425H5 or ENV430H5 or ENV435H5 or GGR322H5 or GGR325H5 or GGR329H5 or GGR333H5 or GGR348H5 or GGR349H5 or GGR353H5 or GGR361H5 or GGR362H5 or GGR365H5 or GGR370H5 or GGR419H5 or JEP351H5 or JEP356H5 or JEP452H5 or JGE378H5 or JPE251H5 or JPE252H5 or POL343Y5 or POL346Y5 or POL475H5 or SOC349H5 or SOC356H5 or SOC465H5 or WRI375H5

**Note:** ENV490H5 or ENV491H5 can substitute for #1 or #2 or #3 or or #4 as course requirements, where appropriate, and with permission of the Program Advisor or Academic Counsellor.

**Rationale:**

STA215H5 is being retired. Updated program to reflect this change.

### Geographical Information Systems - Major (Science)

**Note:** Students may take no more than 2.0 credits combined in ROP, individual project courses, or thesis courses at the 300/400 level for credit toward their GIS program. Students must receive permission from Faculty Program Advisor and Academic Counsellor prior to taking GGR courses on other U of T campuses toward their program requirement. No more than 1.0 non-U of T Mississauga credit is accepted in the Geography Specialist program; and no more than 0.5 non-U of T Mississauga credit in the Geography and GIS Major programs. No substitution is allowed for GGR276H5, GGR272H5, GGR278H5, GGR321H5, GGR337H5, GGR382H5.

**Rationale:**

Updating course list in notes.

### Geography - Major (Science)

**Completion Requirements:**

8.0 credits and 8 Field Days are required.

**First Year: 2.0 credits:**

- GGR111H5 and GGR112H5
- 1.0 credit from BIO152H5 or BIO153H5 or CHM110H5 or CHM120H5 or ERS101H5 or ISP130H5 or MAT132H5 or MAT134H5 or MAT135H5 or MAT136H5 or MAT137H5 or MAT137Y5 or PHY100H5 or PHY136H5 or PHY137H5

**Second Year: 2.5 credits:**

- GGR276H5
- 1.5 credits from GGR201H5 or GGR214H5 or GGR217H5 or GGR227H5

- 0.5 credit from GGR202H5 or GGR207H5 or GGR208H5 or GGR209H5 or GGR210H5 or GGR265H5

**Third Year: 3.0 credits:**

- 2.5 credits from GGR304H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR315H5 or GGR316H5 or GGR317H5 or GGR338H5 or GGR374H5 or GGR377H5 or GGR379H5 or GGR383H5 or GGR384H5 or JGE378H5
- 0.5 additional credit from the list above or from the following: GGR311H5 or GGR321H5 or GGR322H5 or GGR335H5 or GGR337H5 or GGR372H5 or GGR375H5 or GGR376H5

**Fourth Year: 0.5 credit:**

- 0.5 credit from GGR404H5 or GGR406H5 or GGR407H5 or GGR417Y5 or GGR479H5 or GGR484H5 or JEG400Y5

**Field Days: 8 days:**

Eight days accumulated either through a geography field course and/or through geography courses with field day components as indicated in course descriptions.

**ROP/Project courses: Maximum 2.0 credits:**

Students may take no more than 2.0 credits combined in ROP, individual project courses, or thesis courses at the 300/400 level for credit toward a Geography Major program.

**Rationale:**

updated course list to reflect changes made to MAT137Y5

## Geography - Specialist (Science)

**Enrolment Requirements:**

**Limited Enrolment** - — Enrolment in this program is limited to students who have completed GGR111H5 and GGR112H5 and a Cumulative Grade Point Average of 2.7(B-) in 2nd year program courses.

**Completion Requirements:**

12.0 credits and 8 Field Days are required.

**First Year: 3.0 credits:**

- GGR111H5 and GGR112H5
- 2.0 credits from BIO152H5 or BIO153H5 or CHM110H5 or CHM120H5 or ERS101H5 or ISP130H5 or MAT132H5 or MAT134H5 or MAT135H5 or MAT136H5 or **MAT137H5** or MAT137Y5 or **MAT139H5** or PHY100H5 or PHY136H5 or PHY137H5

**Second Year: 3.0 credits:**

- GGR276H5 and GGR278H5
- 1.5 credits from GGR201H5 or GGR214H5 or GGR217H5 or GGR227H5
- 0.5 credit from GGR202H5 or GGR207H5 or GGR208H5 or GGR209H5 or GGR210H5 or GGR265H5 or GGR288H5

***Third Year: 4.5 credits:***

- 3.5 credits from GGR304H5 or GGR305H5 or GGR307H5 or GGR309H5 or GGR315H5 or GGR316H5 or GGR317H5 or GGR338H5 or GGR374H5 or GGR377H5 or GGR379H5 or GGR383H5 or GGR384H5 or JGE378H5
- 1.0 credit from the list above or from the following: GGR311H5 or GGR312H5 or GGR321H5 or GGR322H5 or GGR335H5 or GGR337H5 or GGR372H5 or GGR375H5 or GGR376H5

***Fourth Year: 1.5 credit:***

- GGR417Y5 or JEG400Y5
- 0.5 credit from GGR404H5 or GGR406H5 or GGR407H5 or GGR479H5 or GGR484H5

***Field Days: 8 days***

Eight days accumulated either through a geography field course or through geography courses with field day components as indicated in course descriptions.

***ROP/Project courses: Maximum 2.0 credits***

Students may take no more than 2.0 credits combined in ROP, individual project courses, or thesis courses at the 300/400 level for credit toward a Geography Specialist program.

***Rationale:***

updated course list to reflect changes made to MAT137Y5

## Forensic Science (UTM), Programs in

### 1 New Course:

#### FSC341H5: Applied Forensic Statistics

**Contact Hours:**

***Lecture: 12 / Practical: 24***

**Description:** Designed as a companion course to FSC340H5, Forensic Statistics will introduce students to basic analytic methods necessary to evaluate quantitative data in forensic science. Students will learn methods of visualizing and analyzing univariate, bivariate, and multivariate data in forensic science, with emphasis on practical applications of statistics in various forensic sub-disciplines. No prior knowledge of statistics and mathematics is required.

**Prerequisites:** FSC239Y5

**Corequisites:**

**Exclusions:**

**Recommended Preparation:**

**Rationale:**

This course is intended to replace the current statistics course requirement (STA215H5), as forensic students require specific foundational statistical concepts and research methods more relevant to the actual analysis used in the professional discipline. The concepts in this course will provide preparation for the workplace and contribute to the steps towards accreditation.

After many years of consulting with the MCS department about how to provide the necessary STA content for Forensic Science, meeting the needs of the FSC program students has not been possible. FSC is in need of a course that can have consistent, focused content, controlled by the FSC Program. Previous attempts to construct a STA course (STA311H5) resulted in content changes that excluded FSC students from being able to take the course entirely. A pre-requisite was added without consultation, which our students could not fit into their program, and the content became too advanced (instead of introductory). Consequently, not a single FSC student ever took the course that STA specifically designed for FSC.

STA215 is too theoretical, and is taught inconsistently, changing depending on which instructor is hired to teach it. Forensic students have had to re-learn relevant statistics in later courses before they can complete their research.

Course was tested as a "special topics" in 2021-2022 (see attached syllabus). All of the work associated with developing the course has been completed. It was very carefully and thoughtfully developed to fulfill the needs of our students and program. The program director, Dr. Tracy Rogers, consulted with the sessional instructor who taught the course for more than a year and decided what needed to be included, the approach to take, the textbook, the type of assignments, the data sets to use, the software programs, and how to best integrate the course with its collateral course (FSC340 Research Design). Each lecture topic was discussed and



reviewed. There is very little to adjust in the upcoming years.

**Consultation:**

October 6th, 2021 - FSC Curriculum Committee

November 15th, 2021- SCI Curriculum Committee

January 2022- consultation undertaken with MCS, and Biology (Joel Levine) regarding implementation of a program specific STA course.

February 11, 2022- FSC Curriculum Committee

**Resources:**

Resource Implications Form has been submitted

## 5 Course Modifications:

### FSC303H5: Techniques of Crime Scene Investigation

**Description:** This course will provide students with an introduction to forensic photography, crime scene processing, and forensic identification. Topics include, but are not limited to: fingerprint identification, chance impression evidence, physical evidence, crime scene and victim photography, and proper documentation of a crime scene. Students will gain an understanding of the basic "toolkit" required for crime scene processing, and learn the fundamentals of proper collection and analysis of physical evidence.

As an alternative to (FSC300H5, FSC302H5), this course satisfies the third year IDENT requirement needed for enrolment in FSC481Y5, FSC482H5, FSC483H5, and FSC485H5. Note: This course does not satisfy the IDENT requirement for FSC407H5.

~~This course will provide students with an introduction to forensic photography, crime scene processing, and forensic identification. Topics include, but are not limited to: fingerprint identification, chance impression evidence, physical evidence, crime scene and victim photography, and proper documentation of a crime scene. Students will gain an understanding of the basic "toolkit" required for crime scene processing, and learn the fundamentals of proper collection and analysis of physical evidence. [12L, 24P]~~

#### **Rationale:**

Students were experiencing confusion under the assumption that (FSC300H5, FSC302H5) is the only option to satisfy the IDENT requirement for fourth year capstone courses, as FSC303 was not explicitly designated as an IDENT course in the description despite being an alternative option. The description has been updated to reflect this course's eligibility to satisfy the third year IDENT requirement needed for enrolment in the fourth year capstone experience courses FSC481, FSC482, FSC483, and FSC485.

#### **Resources:**

None

### FSC335H5: Forensic Epistemology and Theory

#### **Contact Hours:**

**Previous: Seminar:** 36

**New: Lecture:** 36

#### **Rationale:**

Due to the rapidly increasing course enrolments in the program, this course can no longer be sustained as a seminar, and will be presented in lecture format with intermittent in-class discussions to supplement the lectures.

#### **Resources:**

### FSC340H5: Research Design

**Contact Hours:**

**Previous:** *Lecture: 24 / Seminar: 12*

**New:** *Lecture: 12 / Practical: 24*

**Rationale:**

Lecture is being reduced to [12L] and course Seminar [12S] is being modified to Practical [24P], as students work primarily on practical components, e.g. statistics on computers, scenario applications, or data searches on computers.

**Resources:**

A computer lab will be necessary for students to use licensed statistics software.

### FSC361H5: Mental Illness and the Criminal Justice System

**Exclusions:**

**Previous:** FSC350H5 (Special Topics in Forensic Science: Mental Health & the Law)

**New:**

**Rationale:**

Removed the exclusion of FSC350H5 (Special Topics in Forensic Science: Mental Health & the Law), as this no longer exists as a "Special Topics" module. Exclusion removed to reduce confusion among new students. Students may now take FSC350 and FSC361 without conflict.

**Resources:**

None

### FSC416H5: Population Genetics

**Prerequisites:** (ANT202H5 or BIO207H5) and **BIO259H5** ~~STA215H5~~

**Rationale:**

Course prerequisite has been updated to reflect the new Biology statistics course requirement for both ERSPE2364 (Biology) and ERSPE1410 (Forensic Biology), and to prevent students from unnecessarily taking STA215H5 in addition to their BIO259H5 statistics requirement.

**Resources:**

None

## Mathematical and Computational Sciences (UTM), Department of

### 1 New Course:

CSC389H5: Computing Education

**Contact Hours:**

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

**Description:** Introduction to computing education research (CER) and pedagogical content knowledge. Introduction to learning theories and their application to computing. Foundational and influential CER work. High- impact practices and practical applications to evaluation, assessment, feedback. Writing intensive.

**Prerequisites:** Permission of the instructor and 1.0 CSC credit at the 200 level

**Corequisites:**

**Exclusions:**

**Recommended Preparation:**

**Rationale:**

U of T is well-positioned to offer a course on computing education because of (a) a strong contingent of active researchers in computing education and (b) opportunities for students to connect their course work to practical application as a TA in the third and fourth year. This course cannot be offered in most computer science departments, but it is beneficial to students interested in graduate studies and to those interested in developing their abilities as teachers or technical trainers.

**Resources:**

Resource form submitted

### 30 Course Modifications:

#### CSC311H5: Introduction to Machine Learning

**Contact Hours:**

**Previous: Lecture: 24 / Tutorial: 12**

**New: Lecture: 24 / Practical: 12**

**Rationale:**

change TUT to PRA. We would like to run the tutorial in the lab now because this course has a computational component of machine learning that we have found works well with students exploring in the labs.

**Resources:**

Lab usage has been occurring in course during Fall 2022, so no lab hours will be added.

#### MAT134H5: Integral Calculus for Life Sciences

**Description:** **Continuation of MAT132H5.** Antiderivatives and indefinite integrals in one variable, definite integrals and the fundamental theorem of calculus. Integration techniques and applications of integration. Infinite sequences, series and convergence tests. Power series, Taylor and Maclaurin series. Life science applications are emphasized.

**Rationale:**

A note is added to the course description to more clearly indicate which calculus courses are of the same type. Rationale: There are now many 100-level calculus courses and indicating which calculus courses are of the same type may help students plan their enrollments. Impact: None.

**Resources:**

None

#### MAT136H5: Integral Calculus

**Description:** **Continuation of MAT135H5.** Antiderivatives and indefinite integrals in one variable, definite integrals and the fundamental theorem of calculus. Integration techniques and applications of integration. Infinite sequences, series and convergence tests. Power series, Taylor and Maclaurin series. A wide range of applications from the sciences will be discussed.

**Rationale:**

A note is added to the course description to more clearly indicate which calculus courses are of the same type. Rationale: There are now many 100-level calculus courses and indicating which calculus courses are of the same type may help students plan their enrollments. Impact: None.

**Resources:**

None

### MAT139H5: Integral Calculus for Mathematical Sciences

**Description:** **Continuation of MAT137H5.** A conceptual sequel to MAT137H5. Integration, the fundamental theorem of calculus, sequences and series, power series and Taylor's theorem. Applications typically include approximation, integration techniques, areas and volumes.

**Rationale:**

A note is added to the course description to more clearly indicate which calculus courses are of the same type. Rationale: There are now many 100-level calculus courses and indicating which calculus courses are of the same type may help students plan their enrollments. Impact: None.

**Resources:**

None

### MAT159H5: Analysis II

**Description:** **Continuation of MAT157H5.** A rigorous and proof-intensive sequel to MAT157H5 for students with a serious interest in mathematics. Topics typically include sequences, series, and integration of single variable real-valued functions.

**Rationale:**

A note is added to the course description to more clearly indicate which calculus courses are of the same type. Rationale: There are now many 100-level calculus courses and indicating which calculus courses are of the same type may help students plan their enrollments. Impact: None.

**Resources:**

None

### MAT236H5: Vector Calculus

**Description:** ~~(Formerly MAT368H5)~~ The implicit function theorem, vector fields. Transformations. Parametrized integrals. Line, surface and volume integrals. Theorems of Gauss and Stokes with applications.

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics, Computer Science and Statistics Specialist or Major **programs; Astronomical Sciences Specialist (ERSPE1025) and Astronomy major (ERMAJ2204)** programs.

**Rationale:**

(a) Removing a reference to course code change made in 2013.  
(b) Adding Astronomy Programs to priority enrollments. MAT236H5 is required for AST. Currently, AST students are not able to enroll while there is still space. The wording is similar to the MAT244H5 enrollment controls. Rationale: (a) Bookkeeping. The course code changed more than 5 years ago.

Impact: (a) None. (b) Astronomy students will have a better chance of enrolling before the course is full, but the total number of students will not change.

**Resources:**

None

MAT244H5: Differential Equations I

**Description:** ~~(Formerly MAT242H5)~~ Ordinary differential equations of the first and second order, existence and uniqueness; solutions by series and integrals; linear systems of first order; linearization of non-linear systems. Applications in life and physical sciences. Power series solutions, boundary value problems, Fourier series solutions, numerical methods.

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics, Computer Science and Statistics Specialist or Major programs; Astronomical Sciences Specialist (ERSPE1025), Astronomy Major (ERMAJ2204), Biomedical Physics Specialist (ERSPE1944), and Physics Major (ERMAJ1944).

**Rationale:**

(a) Removing a reference to course code change made in 2013. (b) Adding the Physics Major to priority enrollment. Rationale: (a) Bookkeeping. The course code changed more than 5 years ago. (b) CPS is making changes to make MAT244H5 a required course for the Physics Major. Adding the program to the priority enrollments will allow student to enroll before the course is full.

Impact: (a) None. (b) Physics Major students will have a better chance of enrolling before the course is full, but the total number of students will not change.

**Resources:**

None

MAT257Y5: Analysis III

**Description:** A rigorous and proof-intensive course in multivariable calculus for students with a serious interest in mathematics. Topology of metric spaces; compactness, functions and continuity, the extreme value theorem. Derivatives; inverse and implicit function theorems, maxima and minima. Integration; Fubini's theorem, partitions of unity, change of variables. Integration on manifolds; Stokes' theorem. ~~Note: MAT257Y5 will be accepted anywhere where MAT232H5 or MAT236H5 are accepted.~~

**Rationale:**

Removing an old note from when the course was new. Rationale: We have now made the changes needed to prerequisites and program requirements to indicate where MAT257Y5 is accepted. Impact: None.

**Resources:**

None

#### MAT307H5: Curves and Surfaces

**Prerequisites:** [(MAT224H5 or MAT240H5) and (MAT232H5 or MAT233H5)] or MAT257Y5

**Exclusions:** MAT363H1 or MAT367H1 or MATC63H3 or MATD26H3 or MATD67H3

**Rationale:**

Adding MAT233H5 as an option to replace MAT232H5. Rationale: MAT233H5 and MAT232H5 are interchangeable in all other prerequisites for MAT courses, so this change aligns with other courses. Impact: Students who took MAT233H5 will now be able to take MAT307H5.

**Resources:**

None

#### MAT309H5: Introduction to Mathematical Logic

**Prerequisites:** MAT257Y5 or [MAT236H5 and (MAT202H5 or MAT224H5 or MAT240H5) and ~~at least~~ 0.5 additional MAT credit of MAT at the 300+ level]

**Rationale:**

Changed to align with similar language in other 300/400 level MAT courses. Impact: none

**Resources:**

None

#### MAT311H5: Partial Differential Equations

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics, Computer Science and ~~or~~ Statistics Specialist or Major programs; Astronomical Sciences Specialist (ERSPE1025), Astronomy Major (ERMAJ2204). ~~programs.~~

**Rationale:**

Adding Astronomy Programs to priority enrollments. Rationale: MAT311H5 is required for AST. Currently, AST students are not able to enroll while there is still space. Impact: Astronomy students will have a better chance of enrolling before the course is full, but the total number of students will not change.

**Resources:**

None

#### MAT334H5: Complex Variables



**Prerequisites:** MAT257Y5 or[(MAT232H5 or MAT233H5)and(MAT202H5 or MAT240H5 or ~~at least~~ 0.5 **additional** credit of MAT at the 300+ level with a mark of at least 60%)]

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics, **Computer Science and ~~or~~ Statistics Specialist or Major programs; Astronomical Sciences Specialist (ERSPE1025), Astronomy Major (ERMAJ2204).**  
~~programs.~~

**Rationale:**

(a) Changed to align with similar language in other 300/400 level MAT courses. (b) Adding Astronomy Programs to priority enrollments. Rationale: (b) MAT334H5 is required for AST. Currently, AST students are not able to enroll while there is still space. Impact: (a) None (b) Astronomy students will have a better chance of enrolling before the course is full, but the total number of students will not change.

**Resources:**

None

MAT397H5: Further Studies in Mathematics

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics ~~or Statistics~~ Specialist or Major programs.

**Rationale:**

Removing Statistics Programs from priority enrollment. Rationale: It was noted that Statistics is not included in priority groups on online timetable. There should be alignment between Academic Calendar and TT. Giving priority to Mathematics students only, is preferred. Impact: None.

**Resources:**

None

MAT398H5: Further Studies in Mathematics

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics ~~or Statistics~~ Specialist or Major **programs. programs**

**Rationale:**

Removing Statistics Programs from priority enrollment. Rationale: It was noted that Statistics is not included in priority groups on online timetable. There should be alignment between Academic Calendar and TT. Giving priority to Mathematics students only, is preferred. Impact: None.

**Resources:**

None

#### MAT402H5: Classical Geometries

**Prerequisites:** MAT102H5 and (MAT232H5 or MAT233H5 or MAT257Y5) and (MAT224H5 or MAT240H5) and 0.5 additional credit of at least one MAT half-course at the 300+ level.

**Rationale:**

Changed to align with similar language in other 300/400 level MAT courses. Impact: none

**Resources:**

None

#### MAT405H5: Introduction to Topology

**Prerequisites:** MAT257Y5 or [(MAT224H5 or MAT240H5) and MAT236H5 and at least 0.5 additional credit of MAT at the 300+ level with a mark of at least 65%]

**Recommended Preparation:** MAT337H5 or MAT378H5

**Rationale:**

(a) Changed to align with similar language in other 300/400 level MAT courses. (b) Removing the course code of a retired course as recommended preparation.

Rationale: (a) See above. (b) There is no course with course code MAT378H5, so referring to it as recommended preparation may be unclear to students. Impact: None.

**Resources:**

None

#### MAT406H5: Mathematical Introduction to Game Theory

**Prerequisites:** MAT102H5 and (MAT223H5 or MAT240H5) and (STA246H5 or STA256H5)

**Rationale:**

Adding STA246H5 as an alternative prerequisite to STA256H5. Rationale: STA246H5 is a new course that is intended for CS students. STA246H5 is less advanced than STA256H5, but STA246H5 provides enough statistical background for MAT406H5. Several CS students may want to take MAT406H5. Impact: CSC students who completed STA246H5 will be able to take MAT406H5.

**Resources:**

None

#### MAT497H5: Further Studies in Mathematics

**Enrolment Limits:** Priority is given to students enrolled in the Mathematics ~~or Statistics~~ Specialist or Major programs.

**Rationale:**

Removing Statistics Programs from priority enrollment. Rationale: It was noted that Statistics is not included in priority groups on online timetable. There should be alignment between Academic Calendar and TT. Giving priority to Mathematics students only, is preferred. Impact: None.

**Resources:**

None

STA246H5: Computational Probability and Statistics

**Contact Hours:**

**Previous: Lecture: 36 / Tutorial: 12**

**New: Lecture: 36 / Practical: 12**

**Rationale:**

Brief description: This change requested by D. Zingaro in early September 2022 because lab rooms would be used in instruction. Such a change would align with Dean's Office expectations of lab usage. Impact: Lab usage has been occurring in initial session/term course was offered (Fall 2022), so no lab hours will be added.

**Resources:**

None

STA256H5: Probability and Statistics I

**Description:** This course covers probability including its role in statistical modeling. Topics include probability distributions, expectation, ~~continuous and~~ discrete ~~and continuous~~ random variables and vectors, distribution functions, ~~distributions of functions of random variables,~~ **limit theorems**, ~~- Basic limiting results and the central limit theorem normal distribution presented with a view to their applications in statistics.~~

**Rationale:**

Updating course descriptions to better align with the actual topics covered, and to be consistent from one term/session to another even with changes in teaching assignments. To reflect what exactly should be covered in these courses and to avoid any significant overlap between courses.

**Resources:**

None

#### STA258H5: Statistics with Applied Probability

**Description:** A survey of statistical methodology with emphasis on the relationship between data analysis and probability theory. Topics covered include descriptive statistics, limit theorems, sampling distribution, point and interval estimation ~~both classical and bootstrap~~, hypothesis testing ~~both classical and bootstrap, permutation tests~~, contingency tables and count data. A statistical computer package will be used.

**Rationale:**

Updating course descriptions to better align with the actual topics covered, and to be consistent from one term/session to another even with changes in teaching assignments. Rationale: To reflect what exactly should be covered in these courses and to avoid any significant overlap between courses.

**Resources:**

None.

#### STA260H5: Probability and Statistics II

**Description:** A sequel to STA256H5 ~~introducing giving an introduction to~~ current statistical theory and methodology. Topics include: ~~Sampling distributions, point~~ estimation, ~~confidence intervals~~, testing (~~Neyman-Pearson Theorem, uniformly most powerful test, likelihood ratio tests~~), ~~and confidence intervals~~; unbiasedness, ~~consistency~~, sufficiency, ~~complete statistics, and exponential family~~; ~~Fisher Information and the Rao-Cramer inequality~~; ~~likelihood~~; simple linear models.

**Rationale:**

Updating course descriptions to better align with the actual topics covered, and to be consistent from one term/session to another even with changes in teaching assignments. Rationale: To reflect what exactly should be covered in these courses and to avoid any significant overlap between courses.

**Resources:**

None

#### STA302H5: Regression Analysis

**Contact Hours:**

**Previous: Lecture:** 36 / **Tutorial:** 12

**New: Lecture:** 39 / **Tutorial:** 12

**Rationale:**

This change was suggested by A. Nosedal Sanchez (STA Faculty member). This is core course, multi-section and include projects with presentations. Adding another 3 LEC hours will facilitate administration/completion of tests and presentations during the LEC times while still allowing enough time to cover essential topics. Assessments would be planned outside of LEC time.

**Resources:**

Scheduling impact so assessments can be held outside of LEC time.

## STA304H5: Surveys, Sampling and Observational Data

**Contact Hours:**

**Previous: Lecture: 36 / Tutorial: 12**

**New: Lecture: 39 / Tutorial: 12**

**Rationale:**

This change was suggested by A. Nosedal Sanchez (STA Faculty member). This is a core course, multi-sections and includes projects with presentations. Adding another 3 LEC hours will facilitate administration/completion of tests and presentations during the LEC times while still allowing enough time to cover essential topics. Assessments would be planned outside of LEC time. Impact: Scheduling impact so assessments can be held outside of LEC time.

**Resources:**

Scheduling impact so assessments can be held outside of LEC time.

## STA305H5: Experimental Design

**Contact Hours:**

**Previous: Lecture: 36 / Tutorial: 12**

**New: Lecture: 39 / Tutorial: 12**

**Rationale:**

This change was suggested by A. Nosedal Sanchez (STA Faculty member). This is a core course, with multi-sections and includes projects with presentations. Adding another 3 LEC hours will facilitate administration/completion of tests and presentations during the LEC times while still allowing enough time to cover essential topics. Assessments would be planned outside of LEC time.

**Resources:**

Scheduling impact so assessments can be held outside of LEC time.

## STA378H5: Research Project

**Title:** **Statistics** Research Project

**Description:** **Students explore a Research project. The project topic in statistics under the supervision of a faculty member will vary from year to year.** Interested students must consult with statistics faculty, at least two months prior to registration, to determine the project's topic and scope. **Enrolment by permission of instructor only.**

**Prerequisites:** Departmental permission ~~Permission of instructor and department~~ and a minimum CGPA of ~~2.5~~ ~~2.5~~

**Rationale:**

Effort to streamline descriptions of 4 STA Reading courses and to align the language with MAT Reading Courses. Discussions started with STA Associate Chair via email in Spring 2022.

**Resources:**

None.

STA380H5: Computational Statistics

**Prerequisites:** STA260H5 or STA238H1

**Rationale:**

STA238H1 has computational material, is often taken by A&S Data Science students and provides acceptable background for STA380H5. Note that 238H1 is NOT acceptable substitute as pre-req in other places that STA260H5 or STA256H5 is needed. STA238H1 is a new course. It contains most of the topics covered in STA260 and uses statistical computation for data analysis and simulation.

**Resources:**

None.

STA398H5: Research Project

**Title:** Statistics Research Project

**Description:** Students explore a ~~The project~~ topic in statistics under the supervision of a faculty member ~~will vary from year to year~~. Interested students must consult with statistics faculty, at least two months prior to registration, to determine the ~~project's~~ topic and scope.  
~~Enrolment by permission of instructor only.~~

**Prerequisites:** Departmental permission ~~Permission of instructor and department~~ and a minimum CGPA of ~~2.5~~ ~~2.5~~

**Rationale:**

Effort to streamline descriptions of 4 STA Reading courses and to align the language with MAT Reading Courses. Discussion started with STA Associate Chair via email in Spring 2022.

**Resources:**

None.

STA478H5: Statistics Research Project

**Description:** ~~Students explore a Research project. The project~~ topic ~~in statistics under the supervision of a faculty member will vary from year to year.~~ Interested students must consult with statistics faculty, at least two months prior to registration, to determine the ~~project's~~ topic and scope. ~~Enrolment by permission of instructor only.~~

**Prerequisites:** ~~Departmental permission~~ ~~Permission of instructor and department~~ and a minimum CGPA of 2.5.

**Rationale:**

Effort to streamline descriptions of 4 STA Reading courses and to align the language with MAT Reading Courses. Discussions started with STA Associate Chair via email in Spring 2022.

**Resources:**

None.

STA498H5: Research Project

**Title:** ~~Statistics~~ Research Project

**Description:** ~~Students explore a~~ ~~The project~~ topic ~~in statistics under the supervision of a faculty member will vary from year to year.~~ Interested students must consult with statistics faculty, at least two months prior to registration, to determine the ~~project's~~ topic and scope. ~~Enrolment by permission of instructor only.~~

**Prerequisites:** ~~Departmental permission~~ ~~Permission of instructor and department~~ and a minimum CGPA of ~~2.5.~~ ~~2.5~~

**Rationale:**

Effort to streamline descriptions of 4 STA Reading courses and to align the language with MAT Reading Courses. Discussions started with STA Associate Chair via email in Spring 2022.

**Resources:**

None.

## 1 Retired Course:

### STA215H5: Introduction to Applied Statistics

**Rationale:**

Departments/programs who formerly used this course to satisfy statistics requirement have developed their own subject-specific stats course. Rationale: Programs including Forensic Science, Psychology, Environmental Management/Science, and Biology have developed their own targeted statistics courses. As such, STA215H5 will not have the same utility moving forward as it did before so there is no reason to continue offering it.



## 10 Program Revisions:

### Applied Statistics - Major (Science)

#### Completion Requirements:

7.0-7.5 credits are required.

#### First Year:

1. CSC108H5
2. MAT102H5
3. [(MAT132H5 and ~~MAT134H5~~) or (~~MAT135H5 and MAT136H5~~) or (~~MAT137H5 and MAT139H5~~) or (~~MAT157H5~~) and (**MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5**)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5
4. MAT223H5 or MAT240H5

#### Second Year:

1. MAT232H5 or MAT233H5 or MAT257Y5
2. STA256H5 and STA258H5 and STA260H5

#### Higher Years:

1. STA302H5 and STA304H5 and STA305H5
2. 1.0 credit from any 300/400 level STA course or CSC322H5 or (CSC311H5 or CSC411H5) or MAT302H5 or MAT311H5 or MAT332H5 or MAT334H5 or MAT344H5 or (MAT337H5 or MAT378H5)

#### NOTES:

1. MAT133Y5 is included in the credit count only if the student also completes MAT233H5 (in which case MAT232H5 is not required).
2. **Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.**
3. ECO220Y5 cannot be substituted for STA256H5 or STA258H5 and/or STA260H5.
4. ECO227Y5 can be substituted for STA256H5 and STA258H5, but not for STA260H5.
5. STA107H5 is highly recommended in first year, but it is not required.
6. MAT337H5 or MAT378H5 is highly recommended for students intending to pursue graduate level studies in statistics.
7. STA246H5 will not be permitted as a pre-requisite for any other 200+ level STA courses. In addition, STA246H5 cannot be used towards any program (s) in Applied Statistics or Mathematics. The course is intended only for students in Computer Science programs who will not need STA256H5 for other program requirements.

#### Description of Proposed Changes:

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

(a) & (b) Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

**Resource Implications:**

(a) & (b) The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

## Applied Statistics - Minor (Science)

**Completion Requirements:**

4.5 -5.0 credits are required.

**First Year:** MAT133Y5 or [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5

**Higher Years:**

1. 1.0 credit made up of any combination of (PSY201H5 and PSY202H5) or (BIO360H5 and BIO361H5) or SOC350H5 or ECO220Y5 or any STA courses other than STA256H5 and STA258H5
2. MAT232H5 or MAT233H5 or MAT257Y5
3. STA256H5 and STA258H5
4. 1.0 additional credit of STA at the 300/400 level

**NOTES:**

1. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.
2. ECO220Y5 cannot be substituted for STA256H5 and/or STA258H5 and/or STA260H5.
3. ECO227Y5 can be substituted for STA256H5 and STA258H5, but not for STA260H5.
4. Students who include any of PSY201H5 or PSY202H5 or BIO360H5 or BIO361H5 or SOC350H5 or ECO220Y5 in this program are responsible for ensuring that these courses are completed prior to enrolling in STA256H5 and that all STA course prerequisites and exclusions are met.
5. STA246H5 will not be permitted as a pre-requisite for any other 200+ level STA courses. In addition, STA246H5 cannot be used towards any program (s) in Applied Statistics or Mathematics. The course is intended only for students in Computer Science programs who will not need STA256H5 for other program requirements.

**Description of Proposed Changes:**

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

(a) & (b) Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

**Resource Implications:**

(a) & (b) The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

**Applied Statistics - Specialist (Science)****Enrolment Requirements:**

**Limited Enrolment** — Enrolment in the Specialist program is limited to students with a minimum of 4.0 credits, including:

1. STA107H5 (with a minimum grade of 60%) or STA256H5;
2. A minimum 60% grade in MAT134H5 or MAT136H5 or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT139H5 or MAT233H5 (~~or a minimum 60%~~) or 50% in MAT157Y5 or MAT159H5;
3. A minimum cumulative grade point average, to be determined annually.
4. All students must complete 4.0 U of T credits before requesting this program. Courses with a grade of CR/NCR will not count as a part of the 4.0 credits required for program entry.

**Completion Requirements:**

12.0-12.5 credits are required.

**First Year:**

1. CSC108H5
2. MAT102H5
3. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5
4. MAT223H5 or MAT240H5

**Second Year:**

1. MAT232H5 or MAT233H5 or MAT257Y5
2. MAT244H5
3. STA256H5 and STA258H5 and STA260H5

**Higher Years:**

1. STA302H5 and STA304H5 and STA305H5 and STA348H5
2. 2.0 credits of STA at the 300/400 level STA course
3. 2.0 credits from CSC322H5 or (CSC311H5 or CSC411H5) or MAT302H5 or MAT311H5 or MAT332H5 or MAT334H5 or MAT344H5 or (MAT337H5 or MAT378H5)
4. 1.0 credit of STA

**NOTES:**

1. MAT133Y5 is included in the credit count only if the student also completes MAT233H5 (in which case MAT232H5 is not required).
2. **Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.**
3. ECO220Y5 cannot be substituted for STA256H5 or STA258H5 or STA260H5.
4. ECO227Y5 can be substituted for STA256H5 and STA258H5, but not for STA260H5.
5. STA107H5 is highly recommended in first year, but it is not required.
6. MAT337H5 or MAT378H5 is highly recommend for students intending to pursue graduate level studies in statistics.
7. STA246H5 will not be permitted as a pre-requisite for any other 200+ level STA courses. In addition, STA246H5 cannot be used towards any program (s) in Applied Statistics or Mathematics. The course is intended only for students in Computer Science programs who will not need STA256H5 for other program requirements.

#### **Description of Proposed Changes:**

- (a) As per discussions at May SCI curriculum meeting, some consistency desired in how a minimum grade is depicted in entry requirements across MCS programs. Also, consistency desired in how 'minimum 50%' is depicted; stating the grade is unnecessary as simply listing the course implies that min 50% is needed.
- (b) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (c) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

#### **Rationale:**

- (a) see Description. (b) & (c) Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

#### **Resource Implications:**

- (a) None. (b) & (c) The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

### **Bioinformatics - Specialist (Science)**

#### **Completion Requirements:**

14.0 credits are required.

#### **First Year:**

1. BIO152H5 and BIO153H5
2. CHM110H5 and CHM120H5
3. CSC108H5 and CSC148H5

4. MAT102H5
5. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5

**Second Year:**

1. BIO206H5 and BIO207H5
2. CHM242H5
3. CSC207H5 and CSC236H5 and CSC263H5
4. MAT223H5 or MAT240H5

**Third Year:**

1. MAT232H5 and MAT244H5
2. STA246H5 or STA256H5 or ECO227Y5

**Fourth Year:**

1. BIO314H5 and BIO372H5 and BIO477H5
2. CSC413H5 or CSC321H5 or CSC411H5 or CSC311H5
3. CSC343H5 and CSC373H5
4. MAT332H5
5. At least 1.0 credit from the following list of recommended courses, of which at least 0.5 credit must be at the 400-level: BIO315H5 or BIO341H5 or BIO370Y5 or BIO371H5 or BIO380H5 or BIO443H5 or BIO481Y5 or CBJ481Y5 or CHM361H5 or CSC310H5 or CSC338H5 or CSC363H5 or JCP410H5 or STA302H5 or STA348H5

**NOTES:**

1. If BIO477H5 is not offered in the fourth year of a student's studies, he or she must take an additional 0.5 credit from the recommended 400-level courses.
2. Students intending to take CHM361H5 as one of their fourth year recommended courses must take CHM243H5 as a prerequisite course..

**Description of Proposed Changes:**

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

**Resource Implications:**

None. The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

### Computer Science - Major (Science)

#### **Completion Requirements:**

7.5-8.0 credits are required.

#### **First Year:**

1. CSC108H5 and CSC148H5 and ISP100H5
2. MAT102H5
3. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5 or MAT233H5

#### **Second Year:**

1. CSC207H5 and CSC236H5
2. 1.0 credit from the following CSC209H5 or CSC258H5 or CSC263H5
3. MAT223H5 or MAT240H5
4. STA246H5 or STA256H5 or ECO227Y5

#### **Higher Years:**

1. 2.0 credits from any 300/400 level CSC course or GGR335H5 or GGR337H5 or GGR437H5. At least 0.5 credit must come from 400-level courses, and no more than 0.5 credit of GGR courses may count to this requirement.

#### **NOTE:**

1. In addition to the course requirements above, students must complete an integrative learning experience. This requirement may be met by participating in the Professional Experience Year (PEY) Co-op program \* or by completing taking at least one of the following half-courses: CSC318H5, ~~or~~ CSC367H5, ~~or~~ CSC375H5, CSC376H5, ~~or~~ CSC409H5, ~~or~~ CSC420H5, ~~or~~ CSC427H5, ~~or~~ CSC477H5, ~~or~~ CSC490H5.

\* Please be advised that the PEY Co-op Program only applies to UTM Computer Science students in their second year of study. For more information about the PEY Co-op Program, including eligibility requirements, please visit the [Experiential and International Opportunities](#) page of the UTM Academic Calendar.

2. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.

#### **Description of Proposed Changes:**

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-

requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

1. Now CSC376 is in the new robotics teaching lab that we have. We would like to make it be an integrative learning course to fulfill that requirement of students to take an integrative learning course.
2. Use the suggested language from Dean's Office for the new PEY co-op program.
3. Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

**Resource Implications:**

None. The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

Computer Science - Specialist (Science)

**Completion Requirements:**

12.0-13.0 credits are required.

**First Year:**

1. CSC108H5 and CSC148H5 and ISP100H5
2. MAT102H5
3. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5

**Second Year:**

1. CSC207H5 and CSC209H5 and CSC236H5 and CSC258H5 and CSC263H5
2. MAT223H5 or MAT240H5
3. MAT232H5 or MAT233H5 or MAT257Y5
4. STA246H5 or STA256H5 or ECO227Y5

**Higher Years:**

1. CSC311H5 and CSC343H5 and CSC363H5 and CSC369H5 and CSC373H5
2. CSC358H5 or CSC458H5
3. 2.0 credits from any 300/400 level CSC course or GGR335H5 or GGR337H5 or GGR437H5. At least 1.0 credit must come from 400-level courses, and no more than 1.0 credit of GGR courses may count to this requirement.

**NOTE :**

1. In addition to the course requirements above, students must complete an integrative learning experience. This requirement may be met by **participating in the Professional Experience Year (PEY) Co-op program \* or by completing taking at least** one of the following half-courses: CSC318H5, ~~or~~ CSC367H5, ~~or~~ CSC375H5, **CSC376H5**, ~~or~~ CSC409H5, ~~or~~ CSC420H5, ~~or~~ CSC427H5, ~~or~~ CSC477H5, ~~or~~ CSC490H5.

\* Please be advised that the PEY Co-op Program only applies to UTM Computer Science students in their second year of study. For more information about the PEY Co-op Program, including eligibility requirements, please visit the [Experiential and International Opportunities](#) page of the UTM Academic Calendar.

2. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.

**Description of Proposed Changes:**

(a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

(b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

1. Now CSC376 is in the new robotics teaching lab that we have. We would like to make it be an integrative learning course to fulfill that requirement of students to take an integrative learning course.
2. Use the suggested language from Dean's Office for the new PEY co-op program.
3. Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.

**Resource Implications:**

None. The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

Information Security - Specialist (Science)

**Completion Requirements:**

12.5-13.0 credits are required.

**First Year:**

1. CSC108H5 and CSC148H5 and ISP100H5
2. MAT102H5
3. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5 or MAT233H5
4. MAT223H5 or MAT240H5

**Second Year:**

1. CSC207H5 and CSC209H5 and CSC236H5 and CSC258H5 and CSC263H5



2. MAT224H5 or MAT240H5
3. MAT232H5 or MAT257Y
4. STA246H5 or STA256H5 or ECO227Y5

**Third Year:**

1. CSC343H5 and CSC347H5 and CSC363H5 and CSC369H5 and CSC373H5
2. MAT301H5 and MAT302H5

**Fourth Year:**

1. CSC358H5 or CSC458H5
2. 1.0 credit from the following: **CSC409H5** or CSC422H5 or CSC423H5 or CSC427H5 or CSC490H5

**NOTES:**

1. In addition to the course requirements above, students must complete an integrative learning experience. This requirement may be met by **participating in the Professional Experience Year (PEY) Co-op program \* or by completing** ~~taking at least~~ one of the following half-courses: CSC318H5, ~~or~~ CSC367H5, ~~or~~ CSC375H5, **CSC376H5**, ~~or~~ CSC409H5, ~~or~~ CSC420H5, ~~or~~ CSC427H5, ~~or~~ CSC477H5, ~~or~~ CSC490H5.

**\* Please be advised that the PEY Co-op Program only applies to UTM Computer Science students in their second year of study. For more information about the PEY Co-op Program, including eligibility requirements, please visit the [Experiential and International Opportunities](#) page of the UTM Academic Calendar.**

**2. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.**

**Description of Proposed Changes:**

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.

**Rationale:**

1. Adding CSC409H5 so that students would have more courses to choose from.
2. Now CSC376H5 is in the new robotics teaching lab that we have. We would like to make it be an integrative learning course to fulfill that requirement of students to take an integrative learning course.
3. Use the suggested language from Dean's Office for the new PEY co-op program.
4. Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite

requirements.

5. MAT233H5 was removed by mistake in March round.

**Resource Implications:**

None. The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

Mathematical Sciences - Major (Science)

**Enrolment Requirements:**

**Limited Enrolment** — Enrolment in the Major program is limited to students with a minimum of 4.0 credits, including:

1. MAT102H5(minimum 60%);
2. A minimum 60% grade in MAT134H5 or MAT136H5 or MAT139H5 or MAT134Y5 or MAT135Y5 or MAT233H5 (or a minimum 60%) or 50% in MAT159H5 or MAT137Y5 or MAT157Y5; and
3. A minimum cumulative grade point average (CGPA), to be determined annually.
4. All students must complete 4.0 U of T credits before requesting this program. Courses with a grade of CR/NCR will not count as a part of the 4.0 credits required for program entry.

**Completion Requirements:**

8.0 credits are required.

**First Year:**

1. MAT102H5
2. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5
3. MAT223H5 or MAT240H5

**Second Year:**

1. MAT202H5 and MAT244H5
2. [(MAT232H5 or MAT233H5) and MAT236H5] or MAT257Y5
3. MAT224H5 or MAT247H5

**Higher Years:**

1. MAT301H5 and (MAT334H5 or MAT354H5)
2. MAT337H5 or MAT378H5 or MAT392H5 or MAT405H5
3. MAT305H5 or MAT311H5 or MAT332H5
4. MAT302H5 or MAT315H5 or MAT344H5
5. STA256H5 or 0.5 credit of MAT at the 300/400 level, except MAT322H5
6. 0.5 additional credits in MAT at the 400 level

**NOTES:**

1. MAT137H5 and MAT139H5 are recommended.
2. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.

3. Mathematical Majors are strongly encouraged to enroll in MAT240H5 followed by MAT247H5.

4. Students enrolled in this program may participate in the PEY program. For more information visit [www.pey.utoronto.ca](http://www.pey.utoronto.ca)

#### Description of Proposed Changes:

(a) As per discussions at May 2022 SCI curriculum meeting, some consistency desired in how a minimum grade is depicted in entry requirements across MCS programs. Also, consistency desired in how 'minimum 50%' is depicted; stating the grade is unnecessary, as simply listing the course implies that min 50% is needed. Alignment with language of MAT Specialist.

(b) & (c) See the MAT Specialist Program.

(d) Due to updates in eligibility of new (Spring 2022) PEY co-op program, this note no longer applies to MAT Specialist students.

#### Rationale:

(a) See description. (b) & (c) See the Specialist Program. (d) New PEY Co-op program which started in Spring 2022 is only open to "Second-year students .... enrolled in an Information Security or Bioinformatics Specialist or Computer Science Specialist/Major/Minor program..."

### Mathematical Sciences - Minor (Science)

#### Completion Requirements:

4.0 credits in MAT are required, including 1.0 credit of MAT at the 300/400 level.

#### First Year:

1. MAT102H5

2. [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5

#### Second Year:

1. MAT223H5 or MAT240H5

2. [MAT232H5 and (MAT202H5 or MAT224H5 or MAT236H5 or MAT240H5 or MAT244H5 or MAT247H5 or CSC236H5)] or MAT257Y5

#### Higher Years:

1. 1.0 credit of MAT at the 300+ level

#### NOTES:

1. MAT223H5 or MAT240H5 may be taken in the first year.

2. Students may replace the combination [(MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT137H5 and MAT139H5) or (MAT157H5) and (MAT134H5 or MAT136H5 or MAT139H5 or MAT159H5)] or MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5 and MAT232H5 with the combination (MAT133Y5 and MAT233H5)

3. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.

**Description of Proposed Changes:**

- (a) & (d) See the MAT Specialist Program.
- (b) MAT240H5 may be taken in the second term of the first year.
- (c) This is reflecting the change made to the program requirements.

**Rationale:**

- (a) & (d) See the MAT Specialist Program.
- (b) If students choose to take MAT240H5 to replace MAT223H5, then it is recommended to take MAT240H5 in the first year.
- (c) See the description.

## Mathematical Sciences - Specialist (Science)

**Completion Requirements:**

13.5 credits are required.

**First Year:**

1. CSC108H5 and CSC148H5
2. MAT102H5 and MAT240H5
3. [~~MAT137Y5~~ or (MAT137H5 and MAT139H5)] or [~~MAT157Y5~~ or (MAT157H5)] and (MAT139H5 or MAT159H5)] or MAT137Y5 or MAT157Y5

**Second Year:**

1. CSC236H5
2. MAT202H5 and MAT244H5 and MAT247H5 and MAT257Y5
3. STA256H5 and (STA258H5 or STA260H5)

**Higher Years:**

1. MAT301H5 and (MAT334H5 or MAT354H5) and MAT392H5
2. MAT302H5 or MAT315H5
3. 2.0 additional credit from MAT302H5 or MAT309H5 or MAT311H5 or MAT315H5 or MAT332H5 or (MAT337H5 or MAT378H5) or MAT344H5
4. 1.0 additional credits in MAT at the 400 level (MAT401H5 is recommended)
5. 1.0 additional credits at the 300/400 level in CSC or MAT/STA, except MAT322H5
6. 0.5 additional credits in MAT at the 300+level, except MAT322H5

**NOTES:**

1. Mathematical Science Specialists are strongly encouraged to enroll in MAT157H5, MAT159H5, MAT257Y5, and MAT354H5.
2. Students are strongly encouraged to familiarize themselves with the 100-level calculus pre-requisites to select the correct courses.
3. Students may replace MAT257Y5 with [(MAT232H5 or MAT233H5) and MAT236H5], but if they do then MAT337H5 AND MAT405H5 are required as part of "Higher Years".
4. Students who do not feel ready for MAT257Y5 in their Second Year, may wish to take MAT232H5 that year, and then take MAT257Y5 in their Third Year.
5. Students enrolled in this program may participate in the PEY program. For more information visit [www.pey.utoronto.ca](http://www.pey.utoronto.ca)

**Description of Proposed Changes:**

- (a) An equivalent change is proposed for each MCS program. With these changes, students will be able to take a more advanced Differential Calculus course followed by the same or lesser difficulty Integral Calculus course. Course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (b) The note indicates to students that pre-requisites are important. This is because course pre-requisites prevent students from taking a less advanced Differential Calculus course followed by a more advanced Integral Calculus course.
- (c) Due to updates in eligibility of new (Spring 2022) PEY co-op program, this note no longer applies to MAT Specialist students.

**Rationale:**

- (a) & (b) Allowing students this possibility of combining courses was one of the reasons for splitting the Y calculus courses into H courses. Pre-requisites for 100-level calculus pre-requisites already allow this, so this change would align the program requirements with the course pre-requisite requirements.
- (c) New PEY Co-op program which started in Spring 2022 is only open to “Second-year students .... enrolled in an Information Security or Bioinformatics Specialist or Computer Science Specialist/Major/Minor program...”.

**Resource Implications:**

None. The total number of students remains the same, but there might be small changes in each of the 100-level Integral Calculus courses.

## Psychology (UTM), Department of

### 4 New Courses:

JLP285H5: Language, Mind, & Brain

**Contact Hours:**

***Lecture:*** 36

**Description:** Language is often described as a quintessentially human trait. What is the mental machinery underlying this ability? In this course, you will explore questions such as: Do animals have language? How do children learn language? How do we understand and produce language in real time? How does bilingualism work? What can neuroscience tell us about language abilities? What is the relationship between language and thinking?

**Prerequisites:** (LIN101H5 and LIN102H5) OR PSY100Y5

**Corequisites:**

**Exclusions:** JLP374H1, PLIC55H3, PSY374H5

**Recommended Preparation:**

#### **Rationale:**

There is substantial overlap between two courses currently taught in Language Studies (LIN288H5, Introduction to Psycholinguistics and Language Acquisition) and Psychology (PSY274H5, Language, Mind, and Brain). This JLP course will allow students in either department to take a common course that highlights the interdisciplinarity of the language sciences. It also adds an additional instructor (Emily Atkinson, LIN), which would make it possible to offer the course more regularly. For example, neither of the courses it is replacing were taught in the 2021-2022 academic year. This JLP course will replace the current above mentioned LIN and PSY courses, which will be deleted next year following approval of this JLP course. In the meantime, this course (JLP285) and the courses that it is replacing will never be offered in the same year. Additionally, this course will serve as an entry point to a suite of JLP courses at the 300- and 400-level that have been or will be proposed (to date: JLP384H5, JLP388H5, JLP481H5).

JLP285H5 will be taught as 36L with integrated interactive discussion, and will require grader support.

#### **Resources:**

Resource Implication Form submitted.

## JLP483H5: Topics in Adult Psycholinguistics

### **Contact Hours:**

***Lecture:*** 36

**Description:** What is the connection between comprehending, producing, and thinking about language? How do the properties of different languages influence the nature of language processing? How is processing affected by differences across individuals? Drawing on a variety of perspective and methodologies, we will explore contemporary issues and debates in these and other topics.

**Prerequisites:** (LIN288H5 or PSY274H5 or JLP285H5) and 1.0 credit from the following list: (PSY315H5 or JLP315H5) or (PSY374H5 or JLP383H5) or (PSY384H5 or JFL388H5 or JLP388H5) or (LIN318H5 or LIN418H5) or JLP3XXH5 or JLP4XXH5.

### **Corequisites:**

### **Exclusions:**

### **Recommended Preparation:**

### **Rationale:**

Linguistics and Psychology overlap significantly in the area of language processing. With the significant overlap in research interests among certain faculty working in the LIN and PSY programs, this JLP course will allow students from both programs/departments to take an interdisciplinary capstone course, showcasing the fruitful research that obtains in this field, a course, which, if offered jointly, could be offered more frequently (by at least 2 faculty in rotation), giving students more flexibility to take the course in a year that works best for them. Courses with psycholinguistic content are in demand in both departments.

This course will serve as an additional option at the 400-level for students interested in the suite of JLP courses that have been or will be proposed (to date: JLP384H5, JLP388H5, JLP481H5; to be proposed: JLP285H5, JLP383H5, JLP315H5). Prerequisites will be simplified in the future when the original PSY and LIN courses have been deleted from the course list as they are replaced with the new JLP courses.

### **Resources:**

Resource Implication Form submitted.

## PSY401H5: Knowledge Translation: Delivering Scientific Discovery to the Real-World

### **Contact Hours:**

***Seminar:*** 36

**Description:** As a science, psychology investigates why and how humans and nonhuman animals feel, think, and behave in the ways they do. Our discoveries can be harnessed for societal good when the insights gained from psychological research are communicated accurately to the public. In this course, students will participate in seminars to learn to communicate effectively about scientific discoveries and engage in the process of knowledge translation. Students will also work with a Psychology faculty supervisor to create and deliver knowledge translation products.

**Prerequisites:** 1.0 credits in third-year level psychology courses. Commitment from a faculty supervisor via application process.

### **Corequisites:**

### **Exclusions:**

### **Recommended Preparation:**

### **Rationale:**

The proposed course would extend and complement our existing research course offerings. Our existing research courses concentrate on generating or synthesizing scientific knowledge and presenting findings in a scholarly fashion for consumption by academic audiences. In contrast, this course will focus on an aspect of the research process that has been increasingly recognized as critical: communicating scientific knowledge to key stakeholders/communities and the general public, as well as the use/application of scientific knowledge for the benefit of individuals and societies. Students would develop knowledge translation strategies with a faculty supervisor and incorporate insights about effective KT strategies based on the complementary seminar-style discussions of readings and existing KT products. The course will offer opportunities for in-depth learning and synthesis about an area of research, gaining familiarity with knowledge translation principles, creating strategies for communicating about science with stakeholders and the public more generally, developing skills needed to generate knowledge translation products (e.g., website, podcast, invention/technology, community/youth outreach program, policy recommendation report, etc.), and reaching out to/interacting with target audiences.

This course would be offered as 0.5 credits but take place over both semesters (I & II).

### **Resources:**

The course would be run in a manner similar to the existing thesis course; however, we anticipate the most effective approach would be for supervisors to post KT projects/topics that interest them or post interest in supervising a KT project with the topic open and then have students apply to those positions. This approach would require some departmental support in terms of organizing a website/process to advertise openings and collecting applications from students. Similar to the thesis course, students would apply in the term prior to taking the course.



### PSY499Y5: Research Opportunity Program

**Description:** This course provides a rewarding opportunity for students in their fourth year to undertake advanced work in the research project of a faculty member in return for PSY499Y course credit. Participating faculty members post their project descriptions for the following summer and fall/winter sessions in early February and students are invited to apply in early March. See [Experiential and International Opportunities](#) for more details.

**Prerequisites:** Completion of 13.0 FCE and 1.0 300-level credit in Psychology and minimum last AGPA of 3.0 or above.

**Corequisites:**

**Exclusions:**

**Recommended Preparation:**

#### **Rationale:**

A 4th-year ROP is one of the opportunities that qualify as the 4th-year research requirement for Psychology and Neuroscience specialists. However, the only option at the moment is a semester-long PSY499H, and this limits the utility of the ROP program for many faculty members whose research requires a longer time scale than a semester to offer meaningful experiential learning opportunities for undergraduate students. The proposed ROP course would extend and complement our existing research course offerings to provide students with year-long ROP opportunities at the 400 Level. This complements our ROP offerings in years 2 and 3 (PSY299H5, PSY299Y5, PSY399H5, PSY399Y5) to provide another option for students (Specialists) to satisfy senior research requirements.

#### **Consultation:**

Psychology department and ROP office.

#### **Resources:**

None

## 5 Course Modifications:

### PSY201H5: Research Design and Analysis in Psychology I

**Title:** **Introduction to Quantitative** Research ~~Design and Analysis~~ in Psychology I

**Description:** **In this course, you will develop a conceptual understanding of statistics that will improve your data-driven decision-making processes** ~~Basic descriptive~~ **and critical assessment of research findings. Using statistical programming, you will learn practical skills that will help you visualize data, draw insights from graphs, describe data to others, and test predictions using** ~~inferential~~ **statistics.**

**Exclusions:** ECO220Y5 or ECO227Y5 or SOC300Y5 or SOC350H5 or STA215H5 or STA218H5 or STA220H5 or STA256H5 or STA258H5 or PSY201H1 or PSYB07H3 or STAB22H3

**Rationale:**

The previous course description was written in a generic way that would maintain flexibility for different instructors to teach the course. We are updating the course calendar description to best reflect the intended outcomes of the learning experience.

**Resources:**

No change

### PSY202H5: Research Design and Analysis in Psychology II

**Title:** **Introduction to Quantitative** Research ~~Design and Analysis~~ in Psychology II

**Description:**

**Previous:** Design of experiments and more advanced methods of statistical analysis, including complex analysis of variance. [ 24L, 12P ]

**New:** This course builds on the foundation of PSY201H5 to explore a variety of statistical procedures used in psychology research, understand the factors that maximize the validity of research findings, and to develop effective strategies to communicate research findings.

**Exclusions:** ECO220Y5 or ECO227Y5 or STA221H5 or STA256H5 or STA258H5 or BIO360H5 ~~or SOC300Y5~~ or PSY202H1 or PSYC08H3 or STAB27H3

**Rationale:**

The previous course description was written in a generic way that would maintain flexibility for different instructors to teach the course. We are updating the course calendar description to reflect the intended outcomes of the learning experience. SOC300Y5 is no longer offered and has been removed from the list of exclusions.

**Resources:**

None

### PSY309H5: Experimental Design and Theory

#### Description:

**Previous:** Students participate in an immersive learning experience that replicates the process of designing, conducting, analyzing, and presenting a psychological research study. Lecture sessions will introduce best practices in psychological science. Tutorial sessions will prepare students by teaching statistical programming. Students will apply statistical methods, principles and practices to realize a significant, open-ended research project. Students will lead generation of their own research questions, direct their own literature review, propose research methodologies, and work independently on datasets, applying advanced statistical and presentation tools and techniques used in research labs to analyze and present research findings in both written and oral formats.

**New:** You will learn how to interpret and critically evaluate psychological research, including the strengths and limitations of different research designs. You will learn to propose new research, including literature review, hypothesis formulation, anticipated results, and pre-specified analysis planning. Finally, you will also practice presenting your work in a virtual conference setting.

**Prerequisites:** [PSY201H5](#) and [\(PSY202H5](#) (or equivalent) and 1.0 credit in PSY at the 200 level

#### Rationale:

We are updating the course calendar description to reflect modifications to how the course will be taught in future years.

Changing equivalents to be clear to students (reduce confusion). Removing explicit mention of PSY201H5 as it is a necessary prerequisite for PSY202H5. The wording used here is consistent with the wording in other courses, like PSY400Y5 (thesis).

#### Resources:

None

### PSY385H5: Human Factors: Applying Perceptual and Cognitive Research to the World

**Prerequisites:** [At least one of PSY270H5 or PSY272H5 or PSY280H5 or PSY290H5.](#)

#### Rationale:

Expanding the list of prerequisite courses to extend the eligibility for inclusion in the course to a greater number of students.

#### Resources:

None

### PSY490H5: Advanced Topics in Neuroscience

**Prerequisites:** ([PSY270H5](#) or [PSY290H5](#) )**AND** ~~and~~ 1.0 credit from ([PSY346H5](#) or [PSY351H5](#) [PSY352H5](#) or [PSY353H5](#) or [PSY354H5](#) or [PSY355H5](#) or [PSY362H5](#) or [PSY369H5](#) or [PSY372H5](#) or [PSY391H5](#) or [PSY392H5](#) or [PSY393H5](#) [PSY395H5](#) or [PSY397H5](#) or [PSY398H5](#) or [BIO304H5](#) ).

**Rationale:**

Updates to outdated prerequisite requirements that do not reflect recent course additions to our program. Casting a broader net of requirements also reflects flexibility in the way the course is taught by different instructors.

**Resources:**

None

## 5 Retired Courses:

### PSY274H5: Language, Mind, and Brain

**Rationale:**

PSY274H5 is being replaced with an equivalent new JLP course (JLP285H5) starting in Fall 2023. The academic rationale (and benefit) of JLP285H5 is also being presented at the fall '22 curriculum meeting.

### PSY315H5: Language Development

**Rationale:**

PSY315H5 is being replaced with an equivalent new JLP course (JLP315H5) starting in Fall 2023. The academic rationale (and benefit) of JLP315H5 will be presented at the fall '22 curriculum meeting

### PSY374H5: Psycholinguistics

**Rationale:**

PSY374H5 is being replaced with an equivalent new JLP course (JLP383H5) starting in Fall 2023. The academic rationale (and benefit) of JLP383H5 will be presented at the fall '22 curriculum meeting.

### PSY376H5: Psychology of Bilingualism

**Rationale:**

PSY376H5 is being replaced with an equivalent JLP course (JLP388H5) starting in Fall 2023. The academic rationale (and benefit) of JLP388 has been previously presented at Divisional (Humanities and Sciences) curriculum meetings (March '22) and we were encouraged to retire PSY376H5 as soon as possible.

### PSY384H5: Speech Perception and Production

**Rationale:**

PSY384H5 is being replaced with an equivalent JLP course (JLP384H5) starting in Fall 2023. The academic rationale (and benefit) of JLP384 has been previously presented at Divisional (Humanities and Sciences) curriculum meetings (March '22) and we were encouraged to retire PSY384H5 as soon as possible.

## 5 Program Modifications:

### Exceptionality in Human Learning - Specialist (Science)

#### Completion Requirements:

13.0-14.5 credits are required, including at least 5.0 300/400-level credits of which 1.5 must be at the 400-level.

**First Year:** PSY100Y5; (ANT101H5, ANT102H5)/(BIO152H5, BIO153H5)/1.0 credit from BIO202H5, BIO205H5, BIO206H5, BIO207H5/SOC100H5

#### Second Year:

1. PSY201H5/ECO220Y5/ECO227Y5/SOC350H5/~~STA215H5~~/STA218H5/STA220H5/
2. PSY210H5, PSY240H5
3. 0.5 credit from the following: PSY202H5 (or equivalent), PSY270H5, ~~PSY274H5~~, PSY280H5, PSY290H5, **JLP285H5**

#### Higher Years:

1. 3.0 credits from the following: PSY310H5, PSY311H5, PSY312H5, PSY313H5, PSY314H5, ~~PSY315H5~~, PSY316H5, PSY317H5, PSY318H5, PSY319H5, PSY321H5, PSY325H5, **PSY330H5**, PSY331H5, PSY333H5, PSY340H5, PSY341H5, PSY343H5, PSY344H5, PSY346H5, PSY353H5, ~~PSY374H5~~, ~~PSY376H5~~, **PSY385H5** ~~PSY384H5~~, PSY391H5, PSY392H5, PSY393H5, **JLP385H5**, **JLP388H5**, **JLP315H5**, **JLP383H5**, **LP384H5** ~~JLP384H5~~, JLP388H5,
2. PSY442Y5 and at least 0.5 credit from the following: PSY400Y5, **PSY401H5**, PSY403H5, PSY404H5, PSY405H5, PSY406H5, PSY410H5, PSY415H5, PSY440H5, PSY474H5, PSY495H5, PSY499H5, **PSY499Y5**, JLP481H5, **JLP483H5**
3. One of the following:
  - a. 2.0 credits from: ANT202H5, ANT203H5, ANT204H5, ANT205H5, ANT206H5, ANT207H5, ANT211H5, ANT212H5, ANT214H5, ANT215H5, ANT220H5, ANT241H5, ANT306H5, ANT322H5, ANT331H5, ANT332H5, ANT333H5, ANT334H5, ANT335H5, ANT337H5, ANT338H5, ANT341H5, ANT350H5, ANT352H5, ANT362H5, ANT364H5, ANT365H5, ANT401H5, ANT403H5, ANT434H5, ANT437H5, ANT460H5, ANT461H5, ANT462H5
  - b. 2.5 credits from: SOC205H5, SOC209H5, SOC211H5, SOC216H5, SOC219H5, SOC224H5, SOC227H5, SOC240H5, SOC244H5, SOC263H5, SOC275H5, SOC304H5, SOC307H5, SOC310H5, SOC316H5, SOC323H5, SOC332H5, SOC333H5, SOC341H5, SOC352H5, SOC356H5, SOC359H5, SOC371H5, SOC375H5, SOC380H5, SOC456H5, SOC457H5
  - c. 2.0 credits from: BIO202H5, BIO205H5, BIO206H5, BIO207H5, BIO210Y5, BIO315H5, BIO341H5, BIO370Y5, BIO371H5, BIO372H5, BIO375H5, BIO380H5, BIO403H5, BIO407H5, BIO434H5, BIO443H5, BIO476H5, BIO477H5; ANT202H5, ANT203H5, ANT331H5, ANT332H5, ANT333H5, ANT334H5
4. 2.5 additional credits to be selected from the following (no more than 1.0 credit from any one discipline):
  - ANT** - Any course in 3 (a) not counted previously
  - SOC** - Any course in 3 (b) not counted previously
  - BIO** - Any course in 3 (c) not counted previously
  - CHM** - CHM242H5, CHM243H5, CHM341H5, CHM345H5, CHM347H5, CHM361H5, CHM362H5

**ENG** - ENG234H5, ENG384H5

**FRE** - FRE225Y5, FRE355H5

**HIS** - HIS310H5, HIS326Y5, HIS338H5

**LIN** - LIN101H5, LIN102H5, LIN200H5, LIN256H5, LIN258H5, LIN358H5, LIN380H5

**JAL** - JAL253H5, JAL355H5

**PHL** - PHL243H5, PHL244H5, PHL255H5, PHL267H5, PHL271H5, PHL272H5, PHL274H5, PHL277Y5, PHL282H5, PHL283H5, PHL290H5, PHL350H5, PHL355H5, PHL357H5, PHL358H5, PHL367H5, PHL370H5, PHL374H5, PHL376H5

**RLG** - RLG314H5

**WGS** - Any course

**Rationale:**

Necessary updates to course offerings. Although only a small number of students complete the EHL program using Biology credits (most complete program requirements using ANT or SOC credits), we want to draw the attention of prospective students to course/prerequisite requirements in Biology courses.

Neuroscience - Specialist (Science)

**Enrolment Requirements:**

**Limited Enrolment** — Enrolment is limited to students who have:

1. completed 8.0 credits;
2. successfully completed PSY100Y5, BIO152H5, BIO153H5, CHM110H5, CHM120H5 and (MAT132H5, MAT134H5)/~~MAT134Y5~~/(MAT135H5, MAT136H5)/~~MAT135Y5/MAT137Y5~~/(or equivalent) ; ~~MAT157Y5~~;
3. completed PSY201H5, PSY202H5 (or equivalent), PSY290H5, and at least 0.5 credit from: BIO202H5/BIO205H5/BIO206H5/BIO207H5/PSY210H5/PSY270H5/PSY274H5/PSY280H5 with a minimum average of 77%; and
4. a minimum AGPA of 3.0.

Students who do not meet these requirements and/or students who apply after third year must have a psychology and biology average of at least 77% (based on a minimum of PSY201H5, PSY202H5, and the next most recent 1.5 credits completed in psychology and biology courses listed in the Neuroscience Specialist program) as well as an AGPA of at least 3.0. These requirements are based on all courses taken during students' most recent academic year (including Summer, when applicable).

**Completion Requirements:**

11.5-12.0 credits are required, including at least 3.0 credits at the 300/400 level and 1.0 credit at the 400 level.

**First Year:** PSY100Y5; BIO152H5, BIO153H5; CHM110H5, CHM120H5; (MAT132H5, MAT134H5) / (MAT135H5, MAT136H5) / MAT134Y5 / MAT135Y5 / MAT137Y5 / MAT157Y5

**Second Year:**

1. (PSY201H5, PSY202H5)/(STA220H5, STA221H5)/(**BIO259H5** ~~STA215H5~~, BIO360H5) or equivalent
2. BIO202H5; BIO206H5; BIO207H5; PSY290H5
3. one of the following: PSY210H5, PSY270H5, ~~PSY274H5~~, PSY280H5, **JLP285H5**

**Third Year:** 1.0 credit from each of the following three areas:

- a. **Behavioural Neuroscience area:** BIO318Y5, BIO320H5, BIO328H5, PSY316H5, PSY318H5, PSY346H5, PSY352H5, PSY353H5, PSY354H5, PSY355H5, PSY368H5, PSY369H5, PSY385H5, PSY389H5, PSY391H5, PSY392H5, PSY393H5, PSY395H5, PSY397H5, PSY398H5
- b. **Molecular/Cellular Biology area:** BIO314H5, BIO315H5, BIO341H5, BIO347H5, BIO372H5, BIO407H5, BIO476H5, PSY355H5, PSY392H5
- c. **Neurobiology area:** BIO304H5, BIO310H5, BIO380H5, BIO404H5, BIO409H5, PSY318H5, PSY346H5, PSY369H5, PSY393H5, PSY397H5

**Fourth Year:**

1. One seminar from the following: BIO403H5, BIO404H5, BIO406H5, BIO407H5, BIO408H5, **PSY471H5** ~~PSY472H5~~, PSY480H5, PSY490H5, PSY495H5
2. One thesis/research project from the following: BIO481Y5, PSY400Y5, **PSY401H5**, PSY403H5/PSY404H5/PSY405H5/PSY406H5, ~~PSY499H5~~/**PSY499Y5**

#### NOTES:

1. **Students intending to pursue the Neuroscience Specialist program should be aware of minimum grade prerequisite requirements for entry to BIO152H5 (minimum grade of 70% in Grade 12 SBI4U) and CHM110H5 (minimum grade of 70% in Grade 12 SCH4U)**
2. In second year, students are encouraged to consider taking the following courses depending on their planned course of study:
  - BIO202H5 - required for several courses in the Neurobiology area.
  - PSY210H5 - required for several courses in the Behavioural Neuroscience area.
3. Students interested in taking PSY400Y5 in their last year are advised to take PSY309H5 in their third year.

#### Description of Proposed Changes:

Simplifying the selection of math courses to simply say '(or equivalent)'

Modification of acceptable statistics courses to include a new Biology course (BIO259H5).

Substitution of JLP285 in place of PSY274H5

Addition of PSY401H5 and PSY499Y5 to satisfy senior research requirements.

#### Rationale:

Updates to curriculum to reflect proposed changes

### Psychology - Major (Science)

#### Completion Requirements:

6.5-7.0 credits in Psychology are required, including 2.0 at the 300/400 level.

**First Year:** PSY100Y5



**Higher Years:**

1. PSY201H5/ECO220Y5/ECO227Y5/SOC350H5/~~STA215H5~~/STA218H5/STA220H5
2. PSY210H5, PSY290H5
3. one of the following: PSY270H5, ~~PSY274H5~~, PSY280H5, ~~JLP285H5~~
4. one of the following: PSY220H5, PSY230H5, PSY240H5
5. 1.5 credits from the following courses: 0.5 credit must be taken from each group:
  - a. Biological Bases of Behaviour: PSY318H5, PSY346H5, PSY351H5, PSY352H5, PSY353H5, PSY354H5, PSY355H5, PSY362H5, PSY372H5, PSY391H5, PSY392H5, PSY393H5, PSY395H5, PSY397H5, PSY398H5; BIO304H5, BIO310H5, BIO318Y5, BIO328H5
  - b. Perception/Cognition/Communication: PSY312H5, ~~PSY315H5~~, PSY316H5, PSY362H5, PSY371H5, PSY372H5, ~~PSY374H5~~, ~~PSY376H5~~, ~~PSY384H5~~, PSY385H5, PSY387H5, PSY393H5, PSY397H5, ~~JLP315H5~~, ~~JLP383H5~~, JLP384H5, JLP388H5
  - c. Developmental/Abnormal/Social/Personality: PSY310H5, PSY311H5, PSY312H5, PSY313H5, PSY314H5, ~~PSY315H5~~, PSY316H5, PSY317H5, PSY318H5, PSY320H5, PSY321H5, PSY324H5, PSY325H5, PSY327H5, PSY328H5, PSY330H5, PSY331H5, PSY333H5, PSY340H5, PSY341H5, PSY343H5, PSY344H5, PSY345H5, PSY346H5, PSY353H5, ~~JLP315H5~~
6. 1.5 additional credits in Psychology. At least 0.5 must be at the 300/400 level

**NOTE:** A single course can be used to satisfy only one Psychology program requirement.

**Description of Proposed Changes:**

Inclusion of new JLP offerings, removal of equivalent PSY courses.

Removal of STA215H5 (no longer offered)

Addition of new proposed PSY401H5Y, PSY499Y5, and JLP seminar courses.

**Rationale:**

Updates to course offerings and inclusion in our curriculum

**Psychology - Minor (Science)****Completion Requirements:**

4.0-4.5 credits are required, including 1.0 credit at the 300 level or above.

**First Year:** PSY100Y5

**Higher Years:**

1. PSY201H5 or ECO220Y5 or ECO227Y5 or SOC350H5 ~~or STA215H5~~ or STA218H5 or STA220H5
2. PSY290H5
3. PSY270H5 ~~or PSY274H5~~ or PSY280H5 ~~or JLP285H5~~
4. PSY210H5 or PSY220H5 or PSY230H5 or PSY240H5
5. 1.0 credit in PSY at the 300 level or above, excluding PSY399H5 and PSY399Y5

**Description of Proposed Changes:**

removal of STA215H5.  
substitution of JLP285H5 for PSY274H5

**Rationale:**

Updates to programs based on course changes

Psychology - Specialist (Science)

**Completion Requirements:**

10.0-10.5 credits in Psychology are required.

**First Year:** PSY100Y5

**Second Year:**

1. PSY201H5 and PSY202H5 (or equivalent)
2. PSY210H5 and PSY290H5
3. PSY270H5 ~~or PSY274H5~~ or PSY280H5 ~~or JLP285H5~~
4. PSY220H5 or PSY230H5 or PSY240H5
5. 0.5 additional PSY credit at the 200-level

**Third Year:**

1. PSY309H5
2. One laboratory course from the following: PSY319H5 or PSY329H5 or PSY368H5 or PSY369H5 or PSY379H5 or PSY389H5
3. 3.0 credits from the following courses (with a min. 0.5 ~~credits credit~~ from each grouping):
  - a. **Biological Bases of Behaviour:** PSY318H5, PSY346H5, PSY351H5, PSY352H5, PSY353H5, PSY354H5, PSY355H5, PSY362H5, PSY372H5, PSY391H5, PSY392H5, PSY393H5, PSY395H5, PSY397H5, PSY398H5; BIO304H5, BIO310H5, BIO318Y5, BIO328H5
  - b. **Perception/Cognition/Communication:** PSY312H5, ~~PSY315H5~~, PSY316H5, PSY362H5, PSY371H5, PSY372H5, ~~PSY374H5~~, ~~PSY376H5~~, ~~PSY384H5~~, PSY385H5, PSY387H5, PSY393H5, PSY397H5, ~~JLP315H5~~, ~~JLP383H5~~, JLP384H5, JLP388H5
  - c. **Developmental/Abnormal/Social/Personality:** PSY310H5, PSY311H5, PSY312H5, PSY313H5, PSY314H5, ~~PSY315H5~~, PSY316H5, PSY317H5, PSY318H5, PSY320H5, PSY321H5, PSY324H5, PSY325H5, PSY327H5, PSY328H5, PSY330H5, PSY331H5, PSY333H5, PSY340H5, PSY341H5, PSY343H5, PSY344H5, PSY345H5, PSY346H5, PSY353H5, ~~JLP315H5~~

**Fourth Year:**

1. PSY400Y5 ~~or PSY401H5~~ or PSY403H5 or PSY404H5 or PSY405H5 or PSY406H5 or PSY499H5 ~~or PSY499Y5~~
2. 1.0 credit from the following courses: PSY402H5 or PSY410H5 or PSY415H5 or PSY420H5 or PSY424H5 or PSY430H5 or PSY435H5 or PSY440H5 or PSY442Y5 or PSY471H5 or PSY480H5 or PSY490H5 or PSY495H5 or JLP481H5 ~~or JLP483H5~~ or BIO403H5 or BIO407H5 or STA441H5

**NOTE:** A single course can be used to satisfy only one Psychology program requirement.

**Description of Proposed Changes:**

Inclusion of new JLP offerings, removal of equivalent PSY courses.  
Removal of STA215H5 (no longer offered)  
Addition of new proposed PSY401H5Y, PSY499Y5, and JLP seminar courses.

**Rationale:**

Updates to course offerings and inclusion in our curriculum