FOR APPROVAL **PUBLIC** **OPEN SESSION**

TO:	UTSC Academic Affairs Committee
SPONSOR:	Prof. William Gough, Vice-Principal Academic and Dean
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DATE:	Wednesday, March 22, 2023
AGENDA ITEM:	6

ITEM IDENTIFICATION:

Minor Modifications: Undergraduate Curriculum Changes – Sciences, UTSC (for approval)*

JURISDICTIONAL INFORMATION:

University of Toronto Scarborough Academic Affairs Committee (AAC) "is concerned with matters affecting the teaching, learning and research functions of the Campus (*AAC Terms of Reference, 2021, Section 4*)." Under section 5.6 of its terms of reference, the Committee is responsible for approval of "Major and minor modifications to existing degree programs." The AAC has responsibility for the approval of Major and Minor modifications to existing programs as defined by the University of Toronto Quality Assurance Process (*UTQAP, Section 3.1*).

GOVERNANCE PATH:

1. **UTSC Academic Affairs Committee [For Approval] (March 22, 2023)**

PREVIOUS ACTION TAKEN:

No previous action in governance has been taken on this item.

HIGHLIGHTS:

This package includes minor modifications to the undergraduate curriculum, submitted by the UTSC Sciences academic units identified below, which require governance approval. Minor modifications to curriculum are understood as those that do not have a significant impact on program or course learning outcomes. They require governance approval when they modestly change the nature of a program or course.

- The Department of Biological Sciences (Report: Biological Sciences)
    - 4 New Courses
        - BIOD06H3: Advanced Topics in Neural Basis of Motor Control
        - BIOD15H3: Mechanism of Gene Regulation in Health and Disease
        - BIOD24H3: Human Stem Cell Biology and Regenerative Medicine
        - BIOD32H3: Human Respiratory Pathophysiology
- The Department of Physical and Environmental Science (Report: Physical & Environmental Sciences)
    - 3 Program Changes
        - SPECIALIST (CO-OPERATIVE) PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)
        - SPECIALIST PROGRAM IN ENVIRONMENTAL PHYSICS (SCIENCE)
        - SPECIALIST PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)
    - 3 New Courses
        - ESTB05H3: Climate Science for Everyone
        - ESTC37H3: Energy and Sustainability
        - PHYD02Y3: Extended Research Project in Physics and Astrophysics
    - 2 Course Changes
        - CHMC71H3: Medicinal Chemistry: Course code, learning outcome changes
        - CHMD41H3: Physical Organic Chemistry: Course code, learning outcome changes

FINANCIAL IMPLICATIONS:

There are no significant financial implications to the campus operating budget.

RECOMMENDATION:

Be It Resolved,

THAT the proposed Sciences undergraduate curriculum changes for the 2023-24 academic year, as detailed in the respective curriculum reports, be approved.

DOCUMENTATION PROVIDED:

1. 2023-24 Curriculum Cycle Undergraduate Minor Curriculum Modifications for Approval Report: Physical & Environmental Sciences, dated March 22, 2023.
2. 2023-24 Curriculum Cycle Undergraduate Minor Curriculum Modifications for Approval Report: Biological Sciences, dated March 22, 2023.

2023-24 Curriculum Cycle
Undergraduate Minor Curriculum Modifications for Approval
Report: Physical & Environmental Sciences
March 22, 2023

Physical & Environmental Sciences (UTSC), Department of

3 Program Change

SCSPE1995C: SPECIALIST (CO-OPERATIVE) PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)

Title:

Previous: SPECIALIST (CO-OPERATIVE) PROGRAM IN BIOLOGICAL CHEMISTRY (SCIENCE)

New: SPECIALIST (CO-OPERATIVE) PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)

Enrolment Requirements:

Previous:

Enrolment Requirements
The minimum qualifications for entry are 3.5 credits, including BIOA01H3, BIOA02H3, CHMA10H3, CHMA11H3, MATA30H3, [MATA35H3 or MATA36H3], and PHYA10H3, plus a cumulative GPA of at least 2.5.

Current Co-op Students:
Students admitted to a Co-op Degree POSt in their first year of study must request a Co-op Subject POSt on ACORN upon completion of 4.0 credits and must meet the minimum qualifications for entry as noted above.

Prospective Co-op Students:
Prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POSt) must submit a program request on ACORN, and meet the minimum qualifications noted above. Deadlines follow the Limited Enrolment Program Application Deadlines set by the Office of the Registrar each year. Failure to submit the program request on ACORN will result in that student's application not being considered.

New:

Enrolment Requirements
The minimum qualifications for entry are 3.5 credits, including BIOA01H3, BIOA02H3, CHMA10H3, [CHMA11H3 or CHMA12H3], [MATA29H3 or MATA30H3], [MATA35H3 or MATA36H3], and [PHYA10H3 or PHYA11H3], plus a cumulative GPA of at least 2.5.

Current Co-op Students:
Students admitted to a Co-op Degree POSt in their first year of study must request a Co-op Subject POSt on ACORN upon completion of 4.0 credits and must meet the minimum qualifications for entry as noted above.

Prospective Co-op Students:
Prospective Co-op students (i.e., those not yet admitted to a Co-op Degree POSt) must submit a program request on ACORN, and meet the minimum qualifications noted above. Deadlines follow the Limited Enrolment Program Application Deadlines set by the Office of the Registrar each year. Failure to submit the program request on ACORN will result in that student's application not being considered.

Description of Proposed Changes:
1. Program title change to add "Medicinal and" updated this in the program description and program requirement. 2. Enrolment requirements: added MATA29H3 as an option to MATA30H3 and PHYA11H3 as an option to PHYA10H3.

Rationale:
1. The program title is being changed to Co-op Medicinal & Biological Chemistry in order to more accurately reflect the significant amount of medicinally themed courses taken in the non-cop requirements for this program.
2. The enrolment requirement has added additional MAT and PHY courses to provide students with more flexibility.

Impact:

None

Consultations:
DCC Approval: October 12, 2022.

Resource Implications:
None.

Proposal Status:
Under Review

SCSPE1076B: SPECIALIST PROGRAM IN ENVIRONMENTAL PHYSICS (SCIENCE)

Completion Requirements:

Previous:

Program Requirements
Total Requirements: 16.0 credits

First Year (4.0 credits):
CHMA10H3 Introductory Chemistry I: Structure and Bonding
CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms
EESA06H3 Introduction to Planet Earth
MATA23H3 Linear Algebra I
MATA30H3 Calculus I for Physical Sciences
MATA36H3 Calculus II for Physical Sciences
PHYA10H3 Physics I for the Physical Sciences
PHYA21H3 Physics II for the Physical Sciences

Second Year (4.5 credits):
EESB19H3 Mineralogy
MATB41H3 Techniques of Calculus of Several Variables I
MATB42H3 Techniques of Calculus of Several Variables II
MATB44H3 Differential Equations I
PHYB10H3 Intermediate Physics Laboratory I
PHYB21H3 Electricity and Magnetism
PHYB54H3 Mechanics: From Oscillations to Chaos
and
1.0 credit from the following:
EESB02H3 Principles of Geomorphology
EESB03H3 Principles of Climatology
EESB04H3 Principles of Hydrology
EESB05H3 Principles of Soil Science
EESB15H3 Earth History

Third Year (4.0 credits):
EESB20H3 Sedimentology and Stratigraphy
MATC46H3 Differential Equations II
PHYB57H3 Introduction to Scientific Computing
STAB22H3 Statistics I
and
1.5 credits from the following:
EESB21H3 Exploration Geophysics
EESB26H3 Introduction to Global Geophysics
EESC26H3 Seismology and Seismic Methods
PHYB52H3 Thermal Physics
PHYC11H3 Intermediate Physics Laboratory II
PHYC50H3 Electromagnetic Theory
PHYC54H3 Classical Mechanics
and
0.5 credit from the following:
CHMB55H3 Environmental Chemistry
EESC07H3 Groundwater
EESC18H3 Limnology
EESC19H3 Oceanography
EESC20H3 Geochemistry
EESC31H3 Glacial Geology

Fourth Year (3.5 credits):
EESC36H3 Petrology
EESC37H3 Structural Geology
EESD21H3 Geophysical and Climate Data Analysis
PHYD37H3 Introduction to Fluid Mechanics
and
1.5 credits from the following:
ASTC25H3 Astrophysics of Planetary Systems
EESC03H3 Geographic Information Systems and Remote Sensing
EESD02H3 Contaminant Hydrogeology
EESD09H3 Research Project in Environmental Science*

EESD10Y3 Research Project in Environmental Science*
EESD13H3 Environmental Law, Policy and Ethics
EESD33H3 Field Techniques
PHYC14H3 Introduction to Atmospheric Physics
PHYC50H3 Electromagnetic Theory
PHYC54H3 Classical Mechanics
PHYD01H3 Research Project in Physics and Astrophysics*
PHYD26H3 Planetary Geophysics
PHYD38H3 Nonlinear Systems and Chaos
PHYD72H3 Supervised Reading in Physics and Astrophysics*

*no more than two of EESD09H3, EESD10Y3, PHYD01H3, and PHYD72H3 may be counted as fulfilling the program requirements.
Note: Where any course appears on more than one option list, it may only be counted as fulfilling the requirements for one of those lists of options.

Strongly recommended: EESC16H3 Field Camp I or EESD07H3 Field Camp II or EESD33H3 Field Techniques.

New:

Program Requirements
Total Requirements: 16.0 credits

First Year (4.0 credits):
CHMA10H3 Introductory Chemistry I: Structure and Bonding
CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms
EESA06H3 Introduction to Planet Earth
MATA23H3 Linear Algebra I
MATA30H3 Calculus I for Physical Sciences
MATA36H3 Calculus II for Physical Sciences
PHYA10H3 Physics I for the Physical Sciences
PHYA21H3 Physics II for the Physical Sciences

Second Year (4.5 credits):
EESB15H3 Earth History
MATB41H3 Techniques of Calculus of Several Variables I
MATB42H3 Techniques of Calculus of Several Variables II
MATB44H3 Differential Equations I
PHYB10H3 Intermediate Physics Laboratory I
PHYB21H3 Electricity and Magnetism
PHYB54H3 Mechanics: From Oscillations to Chaos
and
1.0 credit from the following:
EESB02H3 Principles of Geomorphology
EESB03H3 Principles of Climatology
EESB04H3 Principles of Hydrology
EESB05H3 Principles of Soil Science
EESB19H3 Mineralogy
EESB21H3 Exploration Geophysics
EESB22H3 Environmental Geophysics
EESB26H3 Introduction to Global Geophysics

Third Year (4.0 credits):
MATC46H3 Differential Equations II
PHYB57H3 Introduction to Scientific Computing
STAB22H3 Statistics I
and
1.5 credits from the following:
EESB21H3 Exploration Geophysics
EESB26H3 Introduction to Global Geophysics
EESC26H3 Seismology and Seismic Methods
PHYB52H3 Thermal Physics
PHYC11H3 Intermediate Physics Laboratory II
PHYC50H3 Electromagnetic Theory
PHYC54H3 Classical Mechanics
and
1.0 credit from the following:
CHMB55H3 Environmental Chemistry
EESB20H3 Sedimentology and Stratigraphy
*EESB22H3 Environmental Geophysics
EESC07H3 Groundwater
EESC18H3 Limnology
EESC19H3 Oceanography
EESC20H3 Geochemistry
EESC31H3 Glacial Geology

*Note: If EESB22H3 has been taken in the second year, it cannot be counted as a requirement for the third year optional course as well.

Fourth Year (3.5 credits):
EESD21H3 Geophysical and Climate Data Analysis
PHYD37H3 Introduction to Fluid Mechanics
and
2.5 credits from the following:
ASTC25H3 Astrophysics of Planetary Systems
EESC03H3 Geographic Information Systems and Remote Sensing
EESC26H3 Seismology and Seismic Methods
EESC36H3 Petrology
EESC37H3 Structural Geology
EESD02H3 Contaminant Hydrogeology
*EESD09H3 Research Project in Environmental Science
*EESD10Y3 Research Project in Environmental Science
EESD13H3 Environmental Law, Policy and Ethics
EESD33H3 Field Techniques
PHYC14H3 Introduction to Atmospheric Physics
PHYC50H3 Electromagnetic Theory
PHYC54H3 Classical Mechanics
*PHYD01H3 Research Project in Physics and Astrophysics]
PHYD02H3 Extended Research Project in Physics and Astrophysics
PHYD26H3 Planetary Geophysics
PHYD38H3 Nonlinear Systems and Chaos
*PHYD72H3 Supervised Reading in Physics and Astrophysics

*no more than 1.0 credit from EESD09H3, EESD10Y3, PHYD01H3, PHYD02Y3 and PHYD72H3 may be counted as fulfilling the program requirements.

Notes:
Where any course appears on more than one option list, it may only be counted as fulfilling the requirements for one of those lists of options.

Strongly recommended: EESC16H3 Field Camp I *or* EESD07H3 Field Camp II *or* EESD33H3 Field Techniques.

The optional courses EESB19H3 Mineralogy and EESC36H3 Petrology and EESC37 Structural Geology are *strongly recommended for students focusing on training as a geophysicist.*

Description of Proposed Changes:
1. Second Year: EESB15H3 has become a required course and swapped places with EESB19H3 which has now become an optional course. 2. Third Year: EESB20H3 has been removed as a required course and moved to an optional course along with EESB22H3 to section 3. Section three requirement has increased by 0.5 credits 3. Fourth Year: EESC36H3 and EESC37H3 have been removed as required courses and moved as optional courses in section 2 of the program requirement. EESC26H3 and PHYD02H3 are being added as optional courses to section 2. Section 2 has increased the credit requirement by 1.0 credits. 4. Important notes have been added

Rationale:
1. This change removes a hidden pre-requisite (currently, required EESB19H3 has optional EESB15H3 as a prerequisite) and broadens the appeal of the program to students interested in non-Solid Earth Environmental Physics. With this change, no required courses have non-required prerequisites.
2. EESB20H3 and EESB22H3 are moving as optional courses to provide students with more flexibility. Increasing the credit requirement to 1.5 will ensure the Third Year requirements remain unchanged due to the removal of two required courses.
3. Removing the two courses as required to optional and adding the additional optional courses to section two provides students overall flexibility to complete this program requirement. Section 2 increases credit by 1.0 credit ensuring the Fourth Year credit requirements remain unchanged due to the removal of required courses.
4. Adding important notes to ensure students understand how many credits can be used for a specific program requirement and provide students with strongly recommended courses specializing in certain areas.

Impact:
None.

Consultations:
DCC Approval: October 12th 2022.

Resource Implications:
None.

Proposal Status:
Under Review

SCSPE1995: SPECIALIST PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)

Title:

Previous: SPECIALIST PROGRAM IN BIOLOGICAL CHEMISTRY (SCIENCE)

New: SPECIALIST PROGRAM IN MEDICINAL AND BIOLOGICAL CHEMISTRY (SCIENCE)

Completion Requirements:

Previous:

Program Requirements
The program requires the completion of the following 14.5 credits:

First Year:

BIOA01H3 Life On Earth: Unifying Principles
BIOA02H3 Life on Earth: Form, Function and Interactions
CHMA10H3 Introductory Chemistry I: Structure and Bonding
[CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms *or* CHMA12H3 Advanced General Chemistry]
MATA30H3 Calculus I for Physical Sciences
[MATA35H3 Calculus II for Biological Sciences *or* MATA36H3 Calculus II for Physical Sciences]
PHYA10H3 Physics I for the Physical Sciences

Second Year:
BIOB10H3 Cell Biology
BIOB11H3 Molecular Aspect of Cellular and Genetic Processes
BIOB12H3 Laboratory for Cell and Molecular Biology
CHMB31H3 Introduction to Inorganic Chemistry
CHMB41H3 Organic Chemistry I
CHMB42H3 Organic Chemistry II

Second or Third Year:
CHMB16H3 Techniques in Analytical Chemistry
CHMB21H3 Chemical Structure and Spectroscopy
CHMB23H3 Introduction to Chemical Thermodynamics and Kinetics: Theory and Practice
STAB22H3 Statistics I

Third Year:
BIOC12H3 Biochemistry I: Proteins and Enzymes
BIOC13H3 Biochemistry II: Bioenergetics and Metabolism
BIOC23H3 Practical Approaches to Biochemistry
CHMC47H3 Bio-Organic Chemistry

Third or Fourth Year:
CHMC11H3 Principles of Analytical Instrumentation
CHMC31Y3 Intermediate Inorganic Chemistry
[CHMC41H3 Organic Reaction Mechanisms *or* CHMC42H3 Organic Synthesis]

Fourth Year:
CHMD79H3 Topics in Biological Chemistry
1.5 credits in D-level or 400-level CHM courses including one of the following courses:
CHMD90Y3 Directed Research
CHMD91H3 Directed Research
CHMD92H3 Advanced Chemistry Laboratory Course
and
at least 0.5 credit from the following:
CHMD47H3 Advanced Bio-Organic Chemistry
CHMD69H3 Chemical Elements in Living Systems
CHMD71H3 Pharmaceutical Chemistry

New:

Program Requirements
The program requires the completion of the following 14.5-15.0 credits:

First Year (4.0 credits):
BIOA01H3 Life On Earth: Unifying Principles
BIOA02H3 Life on Earth: Form, Function and Interactions
CHMA10H3 Introductory Chemistry I: Structure and Bonding
[CHMA11H3 Introductory Chemistry II: Reactions and Mechanisms *or* CHMA12H3 Advanced General Chemistry]
[MATA29H3 Calculus I for Life Sciences *or* MATA30H3 Calculus I for Physical Sciences]
[MATA35H3 Calculus II for Biological Sciences *or* MATA36H3 Calculus II for Physical Sciences]
[PHYA10H3 Physics I for the Physical Sciences *or* PHYA11H3 Physics I for Life Sciences]
STAB22H3 Introduction to Statistics

Second Year (4.5 credits):
BIOB10H3 Cell Biology
BIOB11H3 Molecular Aspect of Cellular and Genetic Processes
BIOB12H3 Laboratory for Cell and Molecular Biology
CHMB16H3 Techniques in Analytical Chemistry
CHMB21H3 Chemical Structure and Spectroscopy
CHMB23H3 Introduction to Chemical Thermodynamics and Kinetics: Theory and Practice
CHMB31H3 Introduction to Inorganic Chemistry
CHMB41H3 Organic Chemistry I
CHMB42H3 Organic Chemistry II

Third Year (4.0-4.5 credits):
BIOC12H3 Biochemistry I: Proteins and Enzymes
BIOC13H3 Biochemistry II: Bioenergetics and Metabolism
BIOC23H3 Practical Approaches to Biochemistry

CHMC11H3 Principles of Analytical Instrumentation
CHMC42H3 Organic Synthesis
CHMC47H3 Bio-Organic Chemistry
CHMC71H3/(CHMD71H3) Medicinal Chemistry
and
0.5 credit from:
CHMC16H3 Analytical Instrumentation
CHMC21H3 Topics in Biophysical Chemistry
CHMC31Y3 Intermediate Inorganic Chemistry

Fourth Year (2.0 credits):
CHMD79H3 Topics in Biological Chemistry
1.5 credits in D-level CHM courses
including
0.5-1.0 credits from the following:
CHMD90Y3 Directed Research
CHMD91H3 Directed Research
CHMD92H3 Advanced Chemistry Laboratory Course
and
0.5 credit from the following:
CHMD41H3/(CHMC41H3) Physical Organic Chemistry
CHMD47H3 Advanced Bio-Organic Chemistry
CHMD69H3 Chemical Elements in Living Systems

Description:

Previous:

For an updated list of Program Supervisors, please visit the Chemistry website.

This program is intended for students who want to specialize in chemistry, and in particular, its applications to and interactions with living systems. The first year of the program emphasizes learning fundamentals across various disciplines, including biology, chemistry, physics, and math. In the second year, additional coursework in chemistry and biology prepares students to merge these disciplines in more specialized courses later in the program. In their third and fourth years, students will explore the complex chemistry of living systems, including proteins, enzymes and metabolism. Students will also learn how chemistry can be used to study and manipulate these systems through courses in pharmaceutical and biological chemistry. In their fourth year, students will have the opportunity to contribute to the creation of scientific knowledge in this field by participating in a directed research project. The combination of coursework and research experience makes this program ideally suited for students who wish to pursue graduate studies in biological chemistry or a related discipline, or to work in biologically chemistry-related industries. It is also excellent preparation for students wishing to pursue professional schools such as medicine, pharmacy or law.

The biological chemistry specialist program is accredited by the Canadian Society for Chemistry (CSC). It meets the national standards of education required by the CSC, ensuring that graduating students possess skills in both the core chemical concepts and practical laboratory skills that are necessary to thrive in today's workforce. Graduates of these programs will receive a certificate stating that they have completed a nationally accredited chemistry program.

New:

For an updated list of Program Supervisors, please visit the Chemistry website.

Chemistry is an integral component of medical science, and fundamentally impacts key aspects of modern medicine, including diagnosis, prevention, treatment, and understanding of diseases. The Medicinal & Biological Chemistry program is intended for students who want to specialize in chemistry, and in particular, its applications to medicine and broader scientific areas related to human health. The first year of the program emphasizes learning fundamentals across various disciplines, including biology, chemistry, physics, and math. In the second year, additional coursework helps students to build the fundamental connection between chemistry and human health. In their third and fourth years, students will explore more specific topics related to medicinal and biological applications, such as drug development and chemical technologies in diagnosis. In their fourth year, students will have the opportunity to contribute to the creation of scientific knowledge in this field by participating in a directed research project. The combination of coursework and research experience makes this program ideally suited for students who wish to pursue graduate studies in medicinal, pharmaceutical and biological chemistry or a related discipline, or to work in health-related industries. It is also excellent preparation for students wishing to pursue professional schools such as medicine, pharmacy or law.

Enrolment Requirements:

Previous:

Enrolment Requirements
Students may apply to this program after completing at least 4.0 credits including: BIOA01H3, BIOA02H3, CHMA10H3, [CHMA11H3 or CHMA12H3], MATA30H3 and PHYA10H3 with a cumulative grade point average (CGPA) of at least 2.0. Application for admission to the program is made to the registrar through ROSI in April/May and July/August. See the UTSC Office of the Registrar's website for information on the program (Subject POSt) selection.

New:

Enrolment Requirements
Students may apply to this program after completing at least 4.0 credits including: BIOA01H3, BIOA02H3, CHMA10H3, [CHMA11H3 or CHMA12H3], [MATA29H3 or MATA30H3] and [PHYA10H3 or PHYA11H3] with a cumulative grade point average (CGPA) of at least 2.0. Application for admission to the program is made to the registrar through ROSI in April/May and July/August. See the UTSC Office of the Registrar's website for information on the program (Subject POSt) selection.

Description of Proposed Changes:
1. Program title change to add "Medicinal and" and description updated with the removal of the CSC Accreditation paragraph 2. Enrolment requirements: added [MATA29H3 as an option to MATA30H3 and PHYA11H3 as an option to PHYA10H3 3. Program total credit requirement: increased from 14.5 credits to 14.5 credits to 15.0 credits 4. First-Year Requirement: Updated credits detail (4.0 credits). Added MATA29H3 as an option to MATA30H3 and PHYA11H3 as an option to PHYA10H3. Added STAB22H3 as a required course 5. Second-Year Requirement: Updated credit details (4.5 credits). Added CHMB16H3, CHMB21H3 and CHMB23H3 as required courses. Removed STAB22H3 as a required course. 6. Second or Third Year Requirement: Removed "Second or Third Year" from the title and revised it to "Third Year. Updated credit details (4.0 - 4.5 credits). Added BIOC12H3, BIOC13H3, BIOC23H3, CHMC11H3, CHMC42H3, CHMC47H3, and CHMC71H3 as required courses. Removed STAB22H3 and CHMB23H3 as required courses. Moved CHMC16H3 or CHMC21H3 as optional courses and added CHMC31Y3 also as an optional course to CHMC16H3 or CHMC21H3. 7. Third Year: Removed requirement entirely, along with required courses CHMC11H3, CHMC31Y3 and [CHMC41H3 or CHMC42H3]. 8. Fourth Year: Updated credit details (2.0 credits). Reworded the 1.5 credit and 0.5 credit bin options. Removed 400-level from 1.5 credits bin option. Added replaced CHMD71H3 with CHMD41H3 as an optional course for the 0.5 credit bin requirement.

Rationale:
1. The program title is being changed to Medicinal & Biological Chemistry in order to more accurately reflect the significant amount of medicinally themed courses and skills required to complete this program. The program description has consequently also been updated to reflect the new title and highlight medical themes and information. The existing CSC Accreditation is tied to the current program title. The department will seek to accredit the new version of the program once the changes are in place. Once approved, a paragraph discussing CSC accreditation will be put back into the program description.
2. The enrolment requirement has added additional MAT and PHY courses to provide students with more flexibility.
3. The total program credit requirement has increased by a total of 0.5 credits because of the revised third-year 0.5 credit required bin including both H3 (0.5 credit) courses and a Y3 (1.0 credit) course. Depending on which course students select, their total program course count will vary between 14.5 and 15.0.
4. Credit details were added to each year in the program in order to provide additional clarity. Added MATA30H3 as an optional course to MATA29H3 and PHYA11H3 as an optional course to PHYA10H3 to create more flexibility with these credit requirements. Moving STAB22H3 to the first year since this is when this course is typically taken and also creates organization and sequence within the program since all B-level CHM courses will be in the second year and all C-level CHM courses in the third year.
5. Credit details were added to each year in the program to provide additional clarity. Reorganized courses to have all B-level CHM courses taken in the second year create a clearer pathway for students to follow and help to avoid scheduling conflicts (a common issue encountered by students in this program currently) by allowing students to take courses in the correct sequence. Removed STAB22H3 as a required course since this will be taken in the first year.
6. Removed "Second and Third Year" from the title and changed it to just "Third Year" due to the restructuring of B- and C-level courses, this also provides students with a clear path to progress in this program. Credit details were added to each year in the program to provide additional clarity. Credit has a range of 4.0 to 4.5 because in the 0.5 credit required bin both H3 (0.5 credit) courses and a Y3 (1.0 credit) are included. Depending on which course students select, their course choice, students may have a 0.5-1.0 credit difference when completing this requirement. Reorganized courses to remove all B-level courses from this year and only maintain C-level courses to ensure correct sequence order. Moved CHMC16H3 or CHMC21H3 or CHMC31Y3 as optional courses to provide students more flexibility.
7. Removed this requirement as it is no longer required, the course from this requirement has been reorganized according to the year students should enroll in them
8. Reworded the 1.5 and 0.5 credit bins and added total credit details to provide additional clarity. Removed 400-level from 1.5 credit bin since historically, UTSC did not offer enough D-level CHM courses for students to complete their programs locally. This is no longer the case so specifying 400-level CHM courses (courses on other campuses) is no longer appropriate. CHMD71H3 is now CHMC71H3 due to the course level change, this course will be taken in the third year. CHMD41H3 is being added as it is an important course option for students to take to complete this program.

Impact:
Students currently enrolled in the Biological Chemistry Specialist will be allowed to follow the calendar entry in place the year they enrolled, or the revised program proposed herein. Students planning to take CHMD71H to satisfy current program requirements will be permitted to take CHMC71H3 instead, or another D-level CHM credit of their choice. Such accommodations will be made on an individual basis by the program supervisor.

Consultations:
DCC Approval: November 2022.

Resource Implications:
None

Proposal Status:
Under Review

3 New Courses

ESTB05H3: Climate Science for Everyone

Description:
This course provides a conceptual and qualitative overview of climate science and a discussion of climate science misinformation. The course is intended to be accessible to arts and humanities students seeking to better understand and gain fluency in the physical science basis of climate change. Major topics will include the Earth's climate system, reconstruction of past climates, factors that impact the Earth's climate, climate measurements and models, and future climate change scenarios.

Prerequisites: Any 4.0 credits

Exclusions: GGR314H1, GGR377H5

Learning Outcomes:

Students who take ESTB05H3 will be able to qualitatively:

- Distinguish between the greenhouse effect, global warming, and climate change
- Distinguish between weather and climate
- Identify the reservoirs and fluxes of carbon in and out of the atmosphere
- Describe how climate shapes the physical and ecological systems of the planet
- Define radiative forcing and identify key feedbacks affecting Earth's climate
- Contrast past climate change to present-day climate change
- Describe a variety of techniques for measuring climate-related changes in the Earth System
- Describe how climate models work and their limitations
- Contrast climate model projections and weather forecasts
- Identify characteristic signals in climate model projections of future climate change
- Describe the physical changes occurring in Canada due to climate change
- Examine the Paris Agreement through a climate science lens

Methods Assessment:

1. A final written exam (related to Learning Outcomes 1-10, with an emphasis on 7-12).
2. A mid-term written exam (related to Learning Outcomes 1-6)
3. A written assignment, wherein students research and describe the significance of an event or person in the history of climate science (related to Learning Outcomes 3-5).
4. A group presentation, wherein students debunk one of the many myths about climate science and modelling (related to Learning Outcomes 5-9).
5. Bi-weekly tutorial assessments, wherein students will engage with course content via hands-on, inquiry-based activities and complete quizzes or short answer submissions.

Topics Covered:

ESTB05H3 covers several foundational topics in climate science, including:
- An introduction to Earth's atmosphere and climate
- The coupled ocean-atmosphere system
- The carbon cycle
- Earth's energy budget, radiative forcing and climate feedback

ESTB05H3 also covers topics related to the observational and modelling evidence for anthropogenic climate change, including:
- Comparison of climate change of the past to present-day climate change
- Climate measurements (e.g., greenhouse gas concentrations) and Earth observing systems
- Global climate models
- Climate change scenarios and projections

Finally, ESTB05H3 covers topics related to present climate change impacts and mitigation options, including:
- Climate change impacts in Canada
- Climate change commitments and the Paris Agreement
- Geoengineering

Rationale:

The proposed course aims to equip students across a wide range of disciplines and career trajectories, particularly those across the social sciences and humanities, with a foundational understanding of climate change science, the ability to navigate interdisciplinary conversations and collaborations connected to climate, and critically assess information and misinformation about climate science. This course will allow EL by collaborating with a variety of partners and stakeholders, including scientists, to facilitate the massive transformations in human systems that addressing the climate crisis requires. This course will support students in the Major Program in Climate Change, Environmental Studies, and will also be a natural sciences breadth course for all students.

Consultation:

RO Approval: May 13, 2021
DCC Approval: May 25, 2021

Resources:

ESTB05H3 will be taught by the current faculty (Karen Smith and Dan Weaver). This course will require additional TA support, which is covered by the unit's existing budget. No additional resources are required.

Overlap with Existing Courses: GGR314H1 (UTSG) and GGR377H5 (ITM) have a significant overlap with ESTB05H3 and are therefore being listed as exclusions.

ESTC37H3: Energy and Sustainability

Description:

This course will address energy systems and policy, focusing on opportunities and constraints for sustainable energy transitions. The course introduces energy systems, including how energy is used in society, decarbonization pathways for energy, and the social and political challenges of transitioning to zero carbon and resilient energy systems. Drawing on real-world case studies, students will learn about energy sources, end uses, technologies, institutions, politics, policy tools and the social and ecological impacts of energy. Students will learn integrated and interdisciplinary approaches to energy systems analysis and gain skills in imagining and planning sustainable energy futures.

Prerequisites: 10.0 credits including ESTB04H3

Exclusions: ENV350H1

Learning Outcomes

By the end of this course, students will be able to:
- Describe basic concepts related to energy sources, energy end use, and energy technology
- Describe key components of Canadian energy policy and institutions
- Describe the challenges and opportunities for sustainable energy transitions
- Analyze the interaction of technical, policy, and social aspects of energy systems
- Evaluate the sustainability of energy systems and energy technologies
- Communicate complex concepts concisely

Methods Assessment:

Energy Case Study (10%)
The Rough Guide to Fossil Free Canada: Proposal (5%)
The Rough Guide to Fossil Free Canada: Report (30%)
The Rough Guide to Fossil Free Canada: Presentation (15%)
Participation (5%)
Final Exam (35%)

Participation
Participation marks will be based on the quantity and, in particular, the quality of participation in the class. Students are expected to do the assigned readings before class and come prepared for critical discussion.
Learning outcomes:
- Communicate complex concepts concisely

Energy Case Study: Opportunities and Challenges for Sustainable Energy Transitions
Instructions for students: Write a case study of an aspect of an energy system in Canada and critically analyze the opportunities and challenges for sustainable energy transitions. Describe the sources of energy supply and consumption related to your case study and relevant climate and energy policies. Describe relevant institutions for energy and climate policy-making. Describe major stakeholders, vested interests, and change agents. Analyze the opportunities for sustainable energy transitions and the challenges that will need to be overcome. 1500 words.

Topics Covered:
1. Energy in society
2. Decarbonization pathways for energy systems
3. Introduction to energy sources and uses in Canada, as well as sustainability challenges
4. Sustainable energy as a social and political challenge: path dependency, vested interests, and overcoming carbon lock-in, energy poverty and issues of justice, democratization and decentralization
5. Energy systems modelling and analysis
6. Energy sources, end uses, technologies, institutions, politics, policy tools and the social and ecological impacts of energy through case studies:
- Germany: policy innovation and transition from coal and nuclear to wind and solar
- Indigenous and community owned renewable energy in Ontario
- Japan and nuclear power
- Energy efficiency and buildings in Canada
- Oil pipeline in North America
- Norway and electric vehicles
- Site C hydroelectric dam in British Columbia
7. Timelines and empowering energy transitions

Rationale:
This course expands DPES course offerings to also cover climate change mitigation in-depth. Given the urgency and wide applicability of climate change mitigation to various careers, the department expects demand for this course from students across UTSC. This course will be required for the new Major Program in Climate Change. In the program, this course will provide the general foundation from years 1 and 2 and forms part of our upper-year course offerings that delve more deeply into specialized climate change topics. This course will address energy systems and policy, focusing on opportunities and constraints for sustainable energy transitions in Canada and the Global North. No other course in this new program or at UTSC takes an integrated approach to climate mitigation and covers energy systems and policy in depth.

Consultation:
RO Approval: May 4th, 2021
DCC Approval: May 25th, 2021

Resources:
This course will be taught by current faculty (Dr. Tozer). Additional TA resources are required, the Dean's Office supported funding TA resources on Jan 16, 2023.
Budget Implications:

Overlap with Existing Courses:
ENV350H1 (UTSG) has significant overlap with this course and therefore is listed as an exclusion.

PHYD02Y3: Extended Research Project in Physics and Astrophysics

Description:

Introduces students to a current research topic in physics or astrophysics under the supervision of a faculty member. Students undertake an independent project that can be of a theoretical, computational, or experimental nature. Evaluation is by the supervising faculty member in consultation with the course supervisor. Students must obtain consent from the course supervisor to enroll in this course.

Prerequisites: 14.0 credits and cGPA of at least 3.0 and permission from the coordinator.

Exclusions: PHY478H, PHY479Y1, PHYD01H3

Learning Outcomes

After completing this course, students will be able to:
- Perform detailed calculations specifically connected to the research topic
- Use research methods and tools appropriate to the research topic
- Describe the research topic, its significance and connections to the existing literature
- Be able to identify specific research questions, goals, and methods needed to carry out a research project
- Create benchmarks for accomplishing a larger research project
- Identify potential challenges to research and strategize approaches to overcome them
- Write a high-quality research report detailing the work done during a project
- Create and deliver an oral presentation summarizing a research project

Methods Assessment:

Research projects will be evaluated by:
- Research project proposal (20%)
- Progress reports (15%)
- Final Research Report (35%)
- Final Presentation (30%)

These assessments will evaluate the research, analysis, and scientific writing and communication skills developed throughout the project.
In addition, regular meetings with the supervisor will involve formative feedback and evaluation.

Topics Covered:
Physics and astrophysics topics will be covered depending on the specific research project selected by the supervisor and student.

Rationale:
Students taking the Specialist program in Physics & Astrophysics must complete an independent research or study courses, e.g., PHYD01H3 or PHYD72H3. Students in other physics specialists and major programs have the option to take these courses to fulfill their program requirements as well. However, there have been numerous cases where potential good research projects cannot be undertaken by students because there is not enough time in a single term. The creation of this new year-long research project course will widen the possible projects available for students. Also, this aligns with the practice downtown at UTSG, which has a single-term (PHY478H1) and full-year option (PHY479Y1) for their students to complete an independent research course. PHYD02Y3 is not to be used to complete a PHYD01H3 project at a slower pace given the expected depth of knowledge that the student must acquire and demonstrate through the final presentation and written report in PHYD02Y3.

Consultation:
RO Approval:: October 15th, 2022
DCC Approval: October 12th, 2022

Resources:
Department's faculty member, Dan Weaver will teach this course. No TA resources are required, and no additional resources are needed.
Budget Implications:

Overlap with Existing Courses:
- PHYD01H3 offers a single-term independent research project. PHYD02Y3 will provide the ability of students to do a research project like in PHYD01H3 but over a longer (2-term/year-long) timeframe. Student cannot take both courses due to this significant overlap and therefore this course is listed as an exclusion.
- Similarly, PHY478H and PHY479Y (UTSG) courses also have a significant overlap with this course and are therefore also listed as course exclusions.

2 Course Changes

CHMD71H3: Medicinal Chemistry

New Course Code: CHMC71H3

Title:
Previous: Pharmaceutical Chemistry
New: Medicinal Chemistry

Prerequisites:
Previous: [CHMC41H3 or CHMC42H3] and CHMC47H3
New: CHMC47H3

Exclusions
Previous: CHM440H1, CHM444H5
New: (CHMD71H3), CHM440H1, CHM444H5

Recommended Preparation:
Previous: [BIOC12H3 and BIOC13H3] or CHMB62H3
New: BIOC12H3 or CHMB62H3

Note:
Previous: Students are cautioned that CHMD69H3 is not offered in the same academic year as CHMD71H3.
New:

Learning Outcomes
Students can predict the outcome of reaction sequences, propose reaction mechanisms and devise synthetic routes to molecules of moderate complexity using reactions taught in the course and those taught in previous organic chemistry courses such as CHMB41H3/CHMB42H3/CHMC47H3. In addition, students are expected to understand the different aspects of drug discovery such as the organization of pharmaceutical companies and the steps taken to find, and then prepare drug candidates, as well as the various stages of drug testing prior to the approval of drug candidates. Students will be able to identify different classes of pharmaceuticals, commonly used medications from each class, and the reactions and synthetic process(es) used in developing these pharmaceutical agents.

Methods of Assessment
Method of Assessment will remain the same

Topics Covered
The course will cover the following topics: i) rational drug design ii) combinatorial synthesis, iii) drug-receptor interactions, iv) drug metabolism, v) drug toxicity and vi) pharmacodynamics and pharmacokinetics. These topics rely on the foundation material covered in B-level courses and provide a stepping stone for more advanced material in D-level courses.

Rationale:
1. The course level, learning outcomes, and topics covered are changing from D-level to C-level since this course covers a range of important topics related to pharmaceutical and medicinal chemistry. The foundation for these topics is laid primarily in the second year, along with CHMC47H3 a fall-semester course. Moving this course from the 4th year to the 3rd year will allow our students to learn these fundamentally important topics earlier, preparing them to take more specialized courses in their final year, and opening the door for them to complete medicinal chemistry-related research projects as part of their directed research courses. Lastly, the change allows us to position this course as a core course in the modified Medicinal & Biological Chemistry Specialist program. The learning outcomes and topics covered have been revised to ensure that the courses is suitable for 3rd-year students taking advanced C-level courses.
2. The course title changed since the terms “Pharmaceutical Chemistry” and “Medicinal Chemistry” are similar in meaning and often used interchangeably by chemists. Switching the course title to Medicinal Chemistry will better echo its thematic importance to the modified specialist program (Biological Chemistry Specialist à Medicinal & Biological Chemistry Specialist; see accompanying documentation) as well as place more emphasis on the relevance of this course to the medical sciences.
3. The course prerequisite changes will provide students with more enrolment flexibility
4. The recommended preparation has removed BIOC13H3 since students would no longer be completing BIOC13H3 before CHMC71H3.
5. Added existing course code CHMD71H3 as an exclusion
6. Removed note related to CHMD69H3 because it is no longer relevant as the courses are not offered in alternating years.

Consultation:
RO Course Approval: Nov 11, 2022.
DCC Approval: November 2022

Resources:
The course will require 30-40 additional TA hours for marking support from the Dean's Office, approved on January 31, 2023. This request is a part of the resources allocated for the SAMIH revamping Specialist Program in Medicinal Chemistry.

CHMC41H3: Physical Organic Chemistry

New Course Code: CHMD41H3

Title:
Previous: Organic Reaction Mechanisms
New: Physical Organic Chemistry

Description:
Previous: Theory and mechanisms of organic reactions; principles of structure, introduction to aromaticity, spectroscopy and polymers. Theories of bonding. The laboratory experiments are designed to complement the topics covered in lectures. Offered in odd numbered years, alternating years with CHMC42H3. This course includes a four hour laboratory every week.
New: This course offers an in-depth understanding of organic chemistry by systematically exploring the factors and principles that govern organic reactions. The first half of the course covers fundamentals including boding theories, kinetics, thermodynamics, transition state theory, isotope effects, and Hammett equations. In the second half, these topics are applied to the study of different types of organic reactions, such as nucleophilic substitutions, polar additions/eliminations, pericyclic reactions and radical reactions.

Exclusions:
Previous: CHM341H5, CHM348H1
New: (CHMC41H3), CHM341H5, CHM348H1, CHM443H1

Learning Outcomes
Students will be expected to apply physical organic chemistry principles to organic reactions found in the primary literature, with an emphasis on thermodynamics and kinetics as underlying principles to organic reactions. The students are going to further develop and apply analytical, research and critical thinking skills in this field, and understand the current research areas of interest from both fundamental and applied science.

Topics Covered
Topics covered: 1. Thermodynamics and Kinetics 2. Organic photochemistry 3. Free radical reactions 4. Nucleophilic substitutions and eliminations 5. Acid-base catalysis 6. Enzyme catalysis 7. Kinetic resolution

Methods of Assessment
The course will add a higher-level writing assignment, with students completing a review of a relevant research topic found in the current primary literature. The paper will include an accompanying oral presentation.

Rationale:

1. The course level, learning outcomes, method of assessment and topics covered have changed from C-level to D-level change. Historically, CHMC41H3 and CHMC42H3 were offered in alternating years due to limited teaching resources. There is now adequate teaching expertise in our department to offer these courses yearly. Decoupling these courses allows the department to move CHMC41H3 into the fourth year. This course is better suited to the fourth year as the topics are quite specialized. The course is important for students who are interested in theoretical aspects of organic chemistry, but is likely too specific for other students; moving the course to the 4th year will allow this course to become an optional course for interested students rather than required by so many program students. The learning outcomes, methods of assessment, and topics covered have also been revised to ensure the course is appropriate for 4th-year-advanced students.
2. The course title and description have been changed as the current title does not accurately reflect the content of the course.
3. The course exclusion has changed to add the existing course code CHMD41H3 and CHM443H1 due to significant overlapping content.

Consultation:
RO Approval: Nov. 11, 2022.
DCC Approval: November 2022.

Resources: None.

Revision Proposal

No Committee

2023-24 Curriculum Cycle
Undergraduate Minor Curriculum Modifications for Approval
Report: Biological Sciences

March 22, 2023

Biological Sciences (UTSC), Department of

4 New Courses - No Committee

BIOD06H3: Advanced Topics in Neural Basis of Motor Control

Impact on Programs: This Proposal triggers modifications in the unit's programs(s)

Description:

Lecture/seminar-based course addressing advanced topics in the neural basis of motor control in vertebrates. The emphasis will be placed on cellular-level understanding of how motor circuits

Enrolment Limits:

Prerequisites:

BIOC32H3 or NROC34H3 or NROC64H3 or NROC69H3

Methods Assessment:

Students will be assessed using the following assignments and exams:
-Reading critiques: Students will summarize and critique research articles related to motor circuit analysis. (learning outcomes 1, 2, 3)
-Group presentation (30 min): Student teams will critically summarize a research article during an oral presentation. (learning outcomes 1, 2, 3, 4, 6)
-Midterm: Students will write the abstract and discussion for an article they have not seen, but that is closely related to the topics covered. (learning outcomes 1, 2, 3)
-Grant proposal: Each student will write an 8-page proposal that tests a hypothesis about motor circuit function. (learning outcomes 1, 2, 3, 5)
-Final exam: Students will answer essay questions covering all of the topics in the course. (learning outcomes 1, 2, 3)

Breadth Requirements:

Natural Sciences

University of Toronto Scarborough

CNC Allowed:

Y

Credit Value:

fixed: 0.5

Topics Covered:

Motor systems to be covered:
Spinal cord and hindbrain (central pattern generators for locomotion, respiration, and eye movement)
Superior colliculus (spatially guided movement)
Cerebellum (motor adaptation)
Basal ganglia (motor selection)
Cortex (motor planning and preparation)

Rationale:

This course is proposed to fill a gap in the current curriculum for the Major and Specialist Programs in Human Biology offered by Department of Biological Sciences at UTSC.

Movement is ultimately what underlies human activity. Regardless of its complexity, our movement is planned and executed by motor circuits in the brain. Thus, in-depth understanding of these circuits is important for students who study Human Biology. Currently, Biological Sciences does not offer a course that covers this topic. The main objective of this course is to provide the most up-to-date account of how motor circuits are distributed across the brain and how each circuit operates at cellular level and controls a specific aspect of movement. The emphasis will be placed on how critical the use of diverse vertebrate model systems and techniques has been for the advancement of the field. Importantly, it will fill a gap in the development of mastery in program learning outcomes specifically involving model building, limitations of model systems and the advancement of new technologies.

This course is designed to fill this gap while supplementing existing courses that touch upon related topics. These courses include 1) BIOD43H3 that teaches animal movement and exercise with an emphasis on muscle physiology and metabolism, 2) BIOD07H3 that provides a broad overview of neural circuit analysis with an emphasis on new methodologies, and 3) BIOD33H3 that covers physiological systems that respond to environmental changes.
This will not replace an existing course.

Consultation:

Registrar's office for course code approval September 19, 2022
DCC September 13, 2022

Resources:

This course will be taught by Professor Koyama, full-time faculty member in the department as part of her regular teaching load.
This course will require 35 hours of TA support. Additional resources will be required for the 35 hours of TA support above the departments existing budget.
Budget Implications:

Overlap with Existing Courses:

None.

Estimated Enrolment:

35

Instructor:

Dr. Minoru Koyama

Proposal Status:

Under Review

BIOD15H3: Mechanism of Gene Regulation in Health and Disease

Impact on Programs: This Proposal triggers modifications in the unit's programs(s)

Description:

Complex mechanisms of gene regulation (e.g., epigenetics, epitranscriptomics, regulatory RNAs) govern life-trajectories in health and disease. This advanced lecture, problem-based learning and seminar course equips students with critical thinking tools to dissect advanced concepts in genetics, including biological embedding, transgenerational inheritance, genetic determinism, gene therapy, and ethics in 21st century transgenics.

Enrolment Limits:

Prerequisites:

BIOC15H3

Methods Assessment:

• Problem based learning exercises (learning outcomes 1-5). Groups will be given a controversial case study and are expected to dissect the case study from different perspectives. This will teach students to deeply think about multi-faceted problems, evaluate contradicting evidence, and articulate complex problems.
• Constructive feedback exercises (learning outcomes 5). Each problem-based learning group will be expected to provide constructive feedback to a peer group. This will engage groups in each other's presentations and promote collaborative problem solving and discussion.
• Exams (outcomes 1-4). long answer test where students are expected to perform research to answer conceptual questions. This is an opportunity to apply the skills learned in groups at an individual level.
• Seminars.(outcomes 2-5) Students will be asked to critically evaluate an assigned paper. Students will be asked to present papers around four "M's": Motivation (for the study), Methods, Main results, Missed opportunities. Students will also be asked to present a layman's elevator pitch and to contextualize the paper in the field. This will hone students' skills in reading and interpreting scientific evidence, placing papers in their larger context, and effectively communicating research.
• Group papers (outcomes 2-5). Students will perfect the same skills as in the seminar presentation in writing.
• Participation (outcome 5). Participation is essential for this course. Students will learn how to participate in discussions where controversial and opposing views are voiced, in a respectful manner. Emphasis will be given to providing constructive feedback and acknowledging diverse viewpoints.

Breadth Requirements:

Natural Sciences

University of Toronto Scarborough

CNC Allowed:

Y

Credit Value:

fixed: 0.5

Topics Covered:

• Gene regulatory (e.g., epigenetics, epitranscriptomics, regulatory RNAs) processes and how they interact with the environment to guide life trajectories in health and disease
• Modern tools to manipulate gene expression, gene therapy, and ethics
• Direct and direct evidence for and against genetic determinism
• Transgenerational inheritance of acquired traits

Rationale:

This course is designed to add to the curriculum in two ways:
1- Teach students advanced topics in genetics and gene regulation which are currently not covered in detail in any existing course. This elevates existing Program learning outcomes in this area to mastery
2- Expand the offering of D-level courses that develop student's transferable skills (critical thinking, literature analysis and critique, constructive feedback, and teamwork).

This course tackles advanced concepts in a rapidly advancing field which has revolutionized the way we understand how the environment interacts with genes to guide biological function, life trajectories, and behavioural outcomes which supports concepts incorporated into a number of our programs. The course is designed for students with a strong foundation in genetics a course in a number of our programs who want to develop extensive expertise in the subject and have an interest in pursuing academic or non-academic careers in genetics research, gene therapy, medical genetics, and/or genetic counseling.

Thus supporting the existing learning outcomes in five of our most popular programs both Specialist and Major in Human Biology, Major in Molecular Biology, Immunology and Disease and the Specialist (co-op and non-co-op)in Molecular Biology and Biotechnology and to provide important flexibility to student choice in subject area expertise at the fourth year level while providing mastery in data interpretation, critical thinking and communication skills and importantly insight into the role of ethics in this advancing field.

This course does not replace an existing course. There are not similar courses taught in other academic units

Consultation:

Registrar's office regarding course code approval: September 19, 2022
DCC September 13, 2022

Resources:

This course will be taught by Professor Ina Anreiter, a full-time faculty member in the department as part of her regular teaching load.
The course will require 35 hours of TA support above the departments existing budget.

Overlap with Existing Courses:

There is no significant overlap with other courses.

Estimated Enrolment:

35

Instructor:

Dr. Ina Anreiter

Proposal Status:

Under Review

BIOD24H3: Human Stem Cell Biology and Regenerative Medicine

Impact on Programs: This Proposal triggers modifications in the unit's programs(s)

Description:

In this lecture seminar course, we will explore how human stem cells generate the diverse cell types of the human body, and how they can be harnessed to understand and treat diseases that arise during embryonic development or during aging. We will also discuss current ethical issues that guide research practices and policies, including the destruction of human embryos for research, gene editing, and the premature clinical translation of stem cell interventions.

Enrolment Limits:

Prerequisites:

BIOC19H3

Exclusions:

CSB329H1

Methods Assessment:

Midterm and final exams (to support Learning Outcome 1): These exams will include a combination of short answer, and critical application questions to assess the students' understanding of foundational principles in stem cell biology and their applications to experimental design and data interpretation.

Research proposal (to support Learning Outcomes 1, 2 , 3 and 4): Students will write a research proposal on investigating a disease mechanism or developing a therapeutic strategy. The proposal will comprise a graphical abstract of the project, an original hypothesis, specific research aims, expected results, and a description of the impact and significance of the work. The proposal will challenge students to design studies that potentially contribute new knowledge to the field of stem cell biology and regenerative medicine.

Formal debate (to support Learning Outcomes 3, 4 and 5): Teams of students will debate resolutions linked to current ethical issues in stem cell research. The debate format will

comprise opening statements of affirmative and negative arguments, a cross-examination period, and a rebuttal period. The debates will encourage students to explore multiple perspectives and attitudes surrounding ethical issues and develop confidence to defend and question their positions.

Breadth Requirements:

Natural Sciences

University of Toronto Scarborough

CNC Allowed:

Y

Credit Value:

fixed: 0.5

Topics Covered:
• Review of human embryonic development
• Pluripotency and reprogramming
• Differentiation and transdifferentiation
• Adult stem cells and regeneration
• Experimental approaches and tools to study stem cell biology
• Stem cells in disease modelling and therapeutics
• Current ethical issues in stem cell research

Rationale:
The proposed course is distinctively focused on human stem cell biology and its practical applications to disease modeling and regenerative medicine. At present, UTSC Biology does not offer such a course in its undergraduate curriculum, and the limited overlap in content with CSB329 makes it a unique offering at UofT. Expertise in this field will expand student career opportunities in Canadian academic and industrial research settings and in government health/policy management settings, particularly in cancer biology, neuroscience, biotechnology, and biopharmaceuticals.

This course will support and enrich the curriculum for UTSC's specialist programs in Human Biology and Molecular Biology and Biotechnology. The upper years of both programs emphasize the integration of molecular and cellular biological processes with human physiology, health, and disease. Using somatic cells generated from human stem cells as unique model systems, this course will explore mechanisms of disease etiology during embryonic development or during aging and therapeutic strategies devised through gene editing, biochemical studies, imaging, and functional assays.

This course builds upon foundational principles taught in BIOC19H3 Animal Developmental Biology, including the genetic, molecular, and cellular mechanisms that drive animal development from a fertilized egg. This fourth year courses will provide a opportunity for students that have completed BIOC19, (Developmental Biology) to expand into a specific subject area that was not available to our students prior to the development of this course.

Consultation:
Registrar's office regarding course code approval: August 4, 2022
DCC September 13, 2022

Resources:
This course will be taught by Professor Gan, full-time faculty member in the department as part of her regular teaching load.
This course will require 35 hours of TA support above the departments existing budget.

Overlap with Existing Courses:
The content of this new course partially overlaps with CSB329H1 Stem Cell Biology: Developmental Models and Cell-based Therapeutics, which emphasizes stem cells in non-mammalian organisms and their contributions to early developmental events but only briefly discusses the role of stem cells in mammalian embryonic and postnatal development and cell-based therapeutic applications.

Estimated Enrolment:
35

Instructor:
Dr. Kathlyn Gan

Proposal Status:
Under Review

BIOD32H3: Human Respiratory Pathophysiology

Impact on Programs: This Proposal triggers modifications in the unit's programs(s)

Description:

This course will examine how lung disease and other respiratory insults affect pulmonary physiology and lung function. Topics will include methods used to diagnose respiratory disease, pulmonary function in patients with various lung diseases as well as treatment options for both lung disease and lung failure.

Enrolment Limits:

Prerequisites:

[BIOC34H3 or CSB346H1 or PSL301H1]

Methods Assessment:

1) Midterm and final exam.
The two exams will consist of questions given in advance of the exam as well as questions (multiple choice) that will appear de novo on the exam. The exams will be application-based /critical thinking-based exams that will evaluate the students understanding and application of major themes that have been developed during the course (learning objectives 1-5)
2) Two major group assignments: oral presentations on assigned case studies.
Students will be asked to critically evaluate and effectively communicate case studies relevant to the major themes of the course. Through these group activities students will expand and enhance skills in leadership, communication, cooperation and importantly advance their problem-solving strategies in formal setting. These assignments will help to focus all of the learning outcomes under a single umbrella allowing the students to achieve a multi-faceted and comprehensive understanding of lung pathophysiology (leaning objectives 1-8).

Breadth Requirements:

Natural Sciences

University of Toronto Scarborough

CNC Allowed:

Y

Credit Value:

fixed: 0.5

Topics Covered:
1) Pulmonary function - ventilation and gas exchange.
2) Pulmonary function tests.
3) Obstructive lung diseases.
4) Restrictive lung diseases.
5) Pulmonary vascular diseases.
6) Environmental, occupational, neoplastic and infections lung diseases.
7) Function and treatment (e.g., oxygen therapy and mechanical ventilation) of the failing lung.

Rationale:
This course (Human Respiratory Pathophysiology) aims to increase the human-related course offerings at the fourth year level in the major in Human Biology and the Specialist in Human Biology The material covered in the course is highly topical given the current COVID-19 pandemic and the strong potential for future emergent diseases that affect the respiratory system. This course addresses a critical program learning outcome: interdisciplinary foundations that inform human actions in environmental, technological and societal issues.

This course will provide important flexibility to student choice in subject area expertise at the fourth-year level, provide enhancement in the area of important concepts in the field of human health, and develop skills in data interpretation, critical thinking and communication skills

This course will serve students in both the Specialist and Major Programs in Human Biology.

This course will not replace any existing courses.

This course offers a distinct new topic that is not taught in the Department of Biological Sciences at UTSC. Similar courses are not offered through the Faculty of Arts and Sciences.

Consultation:
Consultation with Professor Aarthi Ashok on June 24, 2022 and June 27, 2022 on potential overlap between this course and BIOD29H3.
RO Approval date: July 6, 2022
DCC Approval date: September 13, 2022

Resources:
This course has resource implications.
This course will be taught by Professor Stephen Reid, a full-time faculty member in the department as part of his regular teaching load.
This course will require 50 hours of TA support above the departments existing budget.

Overlap with Existing Courses:
Currently the Department of Biological Sciences at UTSC offers BIOD29H3 (Pathology of Human Disease) taught by Professor Aarthi Ashok. BIOD29H3 does cover some aspects of respiratory diseases, but the coverage is from a molecular biology perspective not a physiological one and as such these courses are completely distinct.

Estimated Enrolment:
50

Instructor:
Dr. Stephen Reid

Proposal Status:
Under Review