COUNCIL OF THE FACULTY OF SCIENCE

Notice of Meeting
Tuesday, 8 December 2015
3:00pm – 4:30pm
306 Lumbers

Agenda

1. Call to Order and Approval of Agenda

2. Chair’s Remarks

3. Approval of Minutes from November 10, 2015 meeting

4. Business Arising

5. Dean’s Remarks

6. Other Business
   Presentation by Sushanta Mitra, Associate Vice-President, Research: York’s Plan for the Intensification and Enhancement of Research (PIER)

7. Associate Dean’s and Bethune College Master’s Remarks

8. Reports from Science Representatives on Senate Committees

9. Reports from Committees
   Science Curriculum Committee (consent item)

10. Inquiries and Communications
    Senate Synopsis: 620th Meeting of Senate: November 26, 2015
Minutes


Guests: D. D’Angelo, D. Bacinello, H. McLellan, B. Sheeler

1. Call to Order and Approval of Agenda

The Chair of Council, Prof. Valeria Tsoukanova, called the meeting to order. A motion was moved to alter the sequence of the Agenda such that the Provost and VP – Administration would be able to present to council as soon as they arrived at the meeting.

Council moved, seconded and carried that the agenda be approved with this change.

2. Chair’s Remarks

The Chair of Council, Prof. Tsoukanova welcomed Council members to the meeting and noted the large attendance at this meeting.
3. Approval of Minutes from 13 October, 2015 meeting

Minutes of the 13 October, 2015 were approved.

4. Business Arising

There was no business arising from the Minutes.

5. Dean’s Remarks

The Dean congratulated the following faculty members:
- Ken Davey on the honorary doctorate from York.
- Demian Ifa on Petro Canada Young Innovator Award.
- Derek Wilson on NSERC CRD grant (~$1M)
- Sampa Bhadra on Breakthrough Prize to T2K et al.
- Physics & Astronomy on *The Martian* event.
- Zayed Amro for his Genomics project being awarded $7.3M to breed Canadian winter-hardy honeybees. He was also featured on CTV live on 10 Nov 2015.

The Dean highlighted the following upcoming events:
- Nov 12 – The Science of Science Fiction series, Dr. Scheid ‘Cloning’ and Dr. Tulin ‘Dark Universe’
- Nov 24 – FSc Honours & Awards Ceremony featuring keynote speaker Dan Riskin (MSc ’00) co-host of Daily Planet on the Discovery Channel, author, and evolutionary Biologist.
- Nov 28 – Science@50 Celebrations: Legacies Breakfast followed by The York Circle lecture series featuring Marshall McCall who will deliver his popular CAP lecture: ‘Structure in the Near Universe and its Relevance to Your Life’.
- Dec 11 – inaugural York Science Form: Dark Matter and the Dinosaurs, presentation by Lisa Randall, plus panel with Wendy Taylor and Sean Tulin.

The Dean informed members of the proposed Strategic Plan for the Faculty based on input received from faculty members, staff, departments and student surveys. He summarized the emerging priorities as follows:

Advancing Research Excellence:
- Increase the number of research chairs (e.g., CRC hires, endowed/industry chair)
- Build ‘critical mass’ in selected research areas (e.g., materials science, biology of disease, others?)
- Enhance research opportunities for undergraduates (e.g., summer awards, ‘vouchers’ for top students?)
- Increase/diversity external research funding (e.g., support large apps, CRDs, foundation support)
- Improve support for research infrastructure & equipment

Enriching Teaching & Learning:
- Develop innovative & appealing academic programs (e.g., iSci, online/blended, neuroscience, Markham)
- Renew full-time faculty complement.
- Foster a culture of pedagogical innovation (role of CoTL? Role of alternate stream faculty?)

Promoting Student Success:
- Enhance experiential learning & PD opportunities (e.g., Mitacs placements, co-op, summer research)
- Work with Bethune College, streamline student advising and support.
- Raise funds to support student scholarships & awards.
- Foster a sense of community among graduate students postdocs.

Enhancing Broader Engagement and Impact:
- Raise the profile of Science at York (e.g., public events, youth programs, media, YFile)
- Promote recognition of faculty, staff, students & alumni
Recent Actions:
- Creation of Dean’s Undergraduate Research Awards
- Initial donation from alumni Scott Tanner
- Seeking funds for graduate student support

It was moved, seconded and carried that the meeting be extended by 15 minutes.

6. Associate Deans’ and Bethune Master’s Remarks

AD – EJ Janse van Rensburg informed Council that a call will go out regarding the annual CV exercise. Updated CV’s are due in the Dean’s office by Friday, 4 December 2015.

Dean Jayawardhan spoke on behalf of AD – S. Morin and he updated members that several nominations for the York Research Chairs Competition have been received and will be forwarded to the VPRI’s office by December 1, 2015.

On behalf of AD – P. Cribb, Dean Jayawardhana informed members that on the enrolment front the faculty saw a positive growth for Fall 2015 with international enrolments up by 11% and domestic enrolments up by 3%. FFTE’s are also slightly above target around 3%.

Bethune College Master - J. Amanatides informed members of the York University Science Alumni Network Inaugural Dinner that is scheduled for Tuesday, 17 November at 6:30pm in the Paul Delaney Gallery. He encouraged all to inform alumni.

He further informed members that funding is available for any faculty member who would be interested in attending the Society for Teaching and Learning in Higher Education conference (in London Ontario, June 21-14) and presenting a workshop at Bethune when they come back.

7. Reports from Science Representatives on Senate Committees

Logan Donaldson, FSc representative on Senate’s Academic Policy, Planning and Research Committee informed Council that Senate APPRC is currently working with the senate and administration to produce the PIER (intensification of research), IIRP (institutional resource plan) and UAP (main academic plan) documents that are the foundation for the future priorities of the university. He encouraged all FSc faculty and staff to attend the community town halls and to contact him so that he can vocalize the faculty’s needs and priorities regarding research intensification.

8. Reports from Committees

8.1 Executive Committee: Vacancies Report on Senate and FSc Committees

Council moved, seconded and carried all proposed changes to the vacancies report on FSc Committees.

8.2 Science Curriculum Committee

The Consent Agenda item was deemed approved by Council.

9. Other Business

The presentation by Provost Rhonda Lenton & VP Gary Brewer on Sharp Budget Model and IIRP is posted on
the FSc Governance. Passport York login is required to access the page.

Following the presentation a brief discussion ensued.

The meeting adjourned.

V. Tsoukanova, Chair of Council

A. Mun-Shimoda, Secretary of Council

J. Sequeira, Assistant Secretary of Council
York University  
COUNCIL OF THE FACULTY OF SCIENCE  
Report of the Science Curriculum Committee  
December 2015

The Faculty of Science Curriculum Committee has reviewed proposals for changes to course information and degree requirements and recommends to the Executive Committee that the following changes be submitted to Council for approval.

Details regarding these proposals (and regarding other minor changes to Calendar/Repository course descriptions and prerequisites which were approved by the Committee but are not reported here) are included in the working papers November 24, 2015, meeting of the Curriculum Committee, which are on file for your inspection in the Office of the Dean, with all members of the Curriculum Committee or by contacting the Secretary of the Committee at jpearson@yorku.ca

1. Natural Science

1.1 New course: SC/NATS 1515 3.0 “Atmospheric Pollution”
1.2 New course: SC/NATS 1525 3.0 “Extraterrestrial Life: A Modern Discussion to include Historical, Religious and Cultural Aspects”

2. Chemistry

2.1 Change in degree requirements: Honours Major BSc in Chemistry
2.2 New course: SC/CHEM 2081 3.0 “Techniques in Analytical Chemistry”
2.3 New course: SC/CHEM 2082 3.0 “Techniques in Analytical Chemistry”
2.4 New course: SC/CHEM 2083 3.0 “Chemical Instrumentation”

3. Physics

3.1 Change in degree requirements: Specialized Honours Physics
3.2 Change in title: SC/BPHS 4080 3.0 “Biophysics I”

4. Biology

4.1 Remove Note: SC/BIOL 4700 3.0 “Current Topics in Environmental Biology”
4.2 Change in degree requirements: Environmental Biology Program

5. Mathematics

5.1 New course: SC/MATH 3250 3.0 “Mathematical Biology”
# CURRICULUM COMMITTEE TEMPLATE

## NEW COURSE PROPOSAL FORM

<table>
<thead>
<tr>
<th>Faculty:</th>
<th>FSc</th>
</tr>
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<tbody>
<tr>
<td>Department:</td>
<td>Natural Science (NATS)</td>
</tr>
<tr>
<td>Date of Submission:</td>
<td>November 21, 2015</td>
</tr>
<tr>
<td>Course Number:</td>
<td>NATS 1515</td>
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<tr>
<td>Var:</td>
<td></td>
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<tr>
<td>Academic Credit Weight:</td>
<td>3</td>
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### Course Title:
The official name of the course as it will appear in the Undergraduate Calendar and on the Repository

- Atmospheric Pollution

### Short Title:
Appears on any documents where space is limited - e.g. transcripts and lecture schedules - maximum 40 characters

- Atmospheric Pollution

With every new course proposal it is the Departmental/Divisional responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments/divisions is necessary to determine degree credit exclusions and/or cross-listed courses.
Brief Course Description:

Maximum 40 words or 200 characters.

The course description should be carefully written to convey what the course is about. It should be followed by a statement of prerequisites and corequisites, if applicable. This description appears in the calendar.

For editorial consistency, and in consideration of the various uses of the Calendars, verbs should be in the present tense (i.e., "This course analyzes the nature and extent of...," rather than "This course will analyze...")

The course encompasses the evolution of the Earth’s atmosphere from its creation to the present throughout several stages of development. The course proceeds to examine the history of atmospheric pollution from natural causes such as volcanoes, natural fires, desert dust, etc., to pollution caused by humans prior to the industrial revolution arising from the burning of wood and the clearing of land. Subsequently, modern day pollution due to the burning of fossil fuels and production of other anthropogenic harmful chemicals will be discussed. Different forms of pollution such as smog and acid rain are discussed and past successes in dealing with these types of pollution are recounted. The course concludes with topics on new policies and technologies that can be considered to ameliorate the deleterious effects of atmospheric pollution, such as the usage of green energy (solar, wind, fuel cell, geothermal, biomass, etc.).

Course Credit Exclusion: SC/NATS1840 6.0, SC/NATS1750 6.0

Generic Course Description:

This is the description of the “Parent/Generic course” for Special Topics courses under which variances of the “Generic” course can be offered in different years (Max. 40 words). Generic course descriptions are published in the calendar.

Please list all degree credit exclusions, prerequisites, integrated courses, and notes below the course description (these will be in addition to the 40 word brief course description).
The following syllabus is proposed for this course. Details on the process of data collection (who was charged with the collection, how was it performed, how was the feedback used to modify the ongoing monitoring practices, etc) to inform the science models and public policies will be discussed.

1- **The history of discovery for atmospheric chemicals.** In this section the important atmospheric gaseous constituents are examined. Some historical accounts of the discovery of these gaseous compounds will be given (3 hours).

2- **The evolution of the Earth’s atmosphere.** Our global atmosphere evolved through several stages to arrive at its present day composition. There were three principle evolutionary stages. The hydrogen-helium mix in the first stage was blown away by increased solar activity and replaced by a new atmosphere in the second stage due to volcanic activity comprising mainly of nitrogen, carbon dioxide, hydrogen and water vapour. After the formation of the oceans and the emergence of life and photosynthesis, carbon dioxide was consumed and oxygen produced in the third stage. (5 hours)

3- **Structure and composition of the present day atmosphere.** Composition and temperature-pressure structure of today’s atmosphere is discussed. Different layers of the atmosphere such as the troposphere, stratosphere, etc., are introduced. (3 hours).

4- **Urban air pollution.** Composition and chemistry of photo-chemical smog, formation of inversion layer, role of aerosols in formation of smog and regulations pertaining to urban air pollution are discussed (3 hours).

5- **Effects of pollution on visibility, UV radiation and atmospheric optics.** Photochemical smog affects visibility and colour in the atmosphere through absorption and scattering. These processes are introduced and discussed briefly (5 hours).

6- **Indoor air pollution.** The sources of indoor air pollution and sick building syndrome are examined. Regulations regarding indoor air pollution are discussed (3 hours).

7- **Acid deposition and global stratospheric ozone reduction.** Both of these effects are mostly caused by anthropogenic activities. Acid deposition is caused by burning of fossil fuels such as coal in power plants and smelters. Ozone reduction is caused by release of CFC’s. Success stories about controlling these harmful gaseous discharges, such as recovery efforts in Sudbury, Ontario (controlling acid deposition) and the Montreal protocol (Banning CFC’s) are discussed. Measures taken to limit the emission of pollutants from power plants such as installation of scrubbers, injection of limestone, mercury monitors and capturing technology are discussed (5 hours).

8- **The greenhouse effect and climate change.** The Greenhouse
The Greenhouse effect is a natural phenomenon on Earth whereby the reflected radiation from the Earth’s surface is trapped by certain atmospheric gases keeping the planet warmer than in its absence. The Greenhouse effect is important, as without it the Earth would have evolved into a cold and uninhabitable planet. However, excess greenhouse gases in the atmosphere is one of the causes of the problem of climate change. The nearly 30 billion tons of CO₂ that are discharged into the atmosphere annually (along with other greenhouse gas emissions such as methane and nitrous oxide), increases the trapping of the infrared radiation re-emitted from the Earth and can lead to negative consequences. Other major effects of climate change include changes in rainfall, rising sea levels and melting of the arctic ice-cap. Many examples of climate change around the world will be discussed (4 hours).

9- Plans to reduce the harmful effects of atmospheric pollution and climate change. The switch to alternative sources of energy such as solar, wind, geothermal, fusion, biomass, etc. represent possible alternatives to protect our planet against harmful effects of atmospheric pollution and climate change. Although, green technology has its disadvantages which need to be considered, ways to reduce these consequences have to be found. For instance, wind turbine noise is a cause of headaches and sleeplessness among residents who reside nearby. A solution would be to locate them at appropriate minimum distances from residential areas or install them off-shore, where wind intensities are higher and the distance sufficiently far away from residential areas. Carbon sequestering, reducing deforestation, building a super grid and improving the pollution profile of existing fossil fuels are other possible solutions that might help to reduce the effects of atmospheric pollution and climate change and will be discussed in detail (5 hours).

**Total: 36 hours.**

**Key learning objectives:**

On completion of the course, students will

1- Recount the historical evolution of the Earth’s atmosphere.
2- Describe the composition and chemistry of urban pollution.
3- Identify the composition and sources of indoor pollution.
4- Recognize the harmful effects of pollution on the environment.
5- Define atmospheric optical phenomena and changes in visibility and sky colour due to pollution.
6- Identify measures that are needed to address atmospheric pollution and climate change.
7- Understand measurement techniques and problems,
challenges and advantages associated with atmospheric pollution and climate change.

8- Describe the nature of science as a way of knowing, and illustrate how the development of key advances in science rely on the outcome of scientific investigation.
Course Design:
Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged.

Please detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication or on-campus attendance.

Alternatively, please explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Instruction:
1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department/division members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

Three lecture hours per week. Online content and quizzes.

- Weekly office hours
- Encouraging formation of study groups.
- Active participation in class likely through the use of Clicker questions and group activities.

1. 1 section per year
2. Several (Carl Wolfe, Mary Armour)
3. Rez Mani

Lecture hours: Twice a week, 1.5 hour per lecture.
Office hours: One hour per week, or by appointment.

Materials will be posted on Moodle

Students need to study an average of 6 hours per week for this course.

36 hours of lecturing.
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

3 assignments (30%)
Assignments include some conceptual questions where students need to describe a particular topic such as indoor air pollution and its sources or distinguish between several different measures for dealing with atmospheric pollution. Students need to distinguish between pros and cons of different measures. There will also be some numerical questions related to atmospheric pollution.

2 midterms (40%)
Multiple choice questions and descriptive questions.

Final (30%)
Multiple choice questions and descriptive questions.

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.


Other recommended references:


Steacie science and engineering Library has numerous references for atmospheric sciences as both Journals and books.
Other Resources:

A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain.

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

Course Rationale:

The following points should be addressed in the rationale:

- How the course contributes to the educational objectives of the unit and of the Faculty.
- The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.
- The expected enrolment in the course.

Natural Science provides for the non-science student a window on the scientific process and what science has discovered. In particular, 3.0 credit offerings have been generated to allow the students more flexibility when selecting their General Education courses and also allow more faculty flexibility in teaching courses.

In particular, this course promotes understanding of atmospheric pollution. Climate change which may come about as a result of gaseous discharge into the atmosphere, will affect every individual on the planet. Hence the new generation needs to be aware of the oncoming changes and possible solutions.

The course has some material is common with NATS 1840 and also NATS1750 (Earth and its atmosphere) but focusses specifically on air pollution and its assessment, consequences, and solutions compared to those broader survey courses.

Expected enrollment: 150-200 students

Normal classroom facility is required.

Internet access for classroom.
Faculty and Department/Division Approval for Cross-listings:

If the course is to be cross-listed with another department/division this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

<table>
<thead>
<tr>
<th>Dept.</th>
<th>Signature (Authorizing cross-list)</th>
<th>Dept./Division</th>
<th>Date</th>
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CCAS 02/04/19
I have reviewed the course proposal and attached bibliography for NATS1515 – Atmospheric Pollution and can state that the York University Libraries have the required resources to support this undergraduate level course.

Please be aware that the library offers the following services to help students with their research:
- A librarian can go to the classroom or tutorial and introduce students to the various resources available at the library including electronic journals, newspaper indexes and other databases.
- A librarian is also available for individual consultations with students to help them find the materials they need for their research.
- A librarian can be available as a user on the course Moodle page to answer student questions using the Forum discussion, provide links to resources in the course, and post handouts presented in face-to-face instruction.

The following electronic resources licensed by the library may be of help to the students in this course:
- **Scopus** is the world’s largest abstract and citation database of peer-reviewed literature. It has many articles that are relevant to natural science and specifically, astronomy. Additionally, it contains citation information.
- **Web of Science** is an extensive database that has very good coverage of sciences including astronomy and physics. Additionally, it allows for citation search.
- **General Science Abstracts**: This database indexes general science topics such as astronomy. It is appropriate for beginning undergraduate natural science students.
- **GeoRef** is a unique multidisciplinary database that is Useful for undergraduate and graduate level earth science, earth space and science, and geography students.
- **JSTOR** is used by millions for research, teaching, and learning. With more than a thousand academic journals and over 1 million images, letters, and other primary sources, JSTOR is one of the world’s most trusted sources for academic content.

A more complete listing of resources is available at the following LibGuides:
- Natural Science LibGuide [http://researchguides.library.yorku.ca/natural-science](http://researchguides.library.yorku.ca/natural-science)

Please note that the Steacie and Scott Libraries have extensive collections of books and reference materials that are relevant to this course.

In summary, I state that we are well positioned to support this course.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Sarah Shujah, Science Librarian  
Steacie Science & Engineering Library  
416-736-2100 x33945  
sshujah@yorku.ca
## NEW COURSE PROPOSAL FORM

**Faculty:**
Indicate all relevant Faculty(ies)

<table>
<thead>
<tr>
<th>Faculty</th>
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<tbody>
<tr>
<td>FSc</td>
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**Department:**
Indicate department and course prefix (e.g. Languages, GER)

<table>
<thead>
<tr>
<th>Department</th>
<th>Date of Submission</th>
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<tbody>
<tr>
<td>Natural Science</td>
<td>November 15, 2015</td>
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**Course Number:**
Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is “C”)

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Var</th>
<th>Academic Credit Weight</th>
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<tbody>
<tr>
<td>1525</td>
<td></td>
<td>3</td>
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**Course Title:**
The official name of the course as it will appear in the Undergraduate Calendar and on the Repository

<table>
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<tr>
<td>Extraterrestrial Life: A Modern Discussion to include Historical, Religious and Cultural Aspects</td>
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</table>

**Short Title:**
Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 characters**

<table>
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</tr>
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<tbody>
<tr>
<td>Extraterrestrial life</td>
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*With every new course proposal it is the Department’s responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.*
This course explores the history of humankind’s search for life beyond Earth. With an introduction to the beliefs of ancient Greeks, we will embark on a journey to explore the ideas of many famous scientists such as Galileo, Kepler, Newton and Darwin on the existence of extraterrestrials. We will then examine some of the interesting topics that have resurfaced in the field of science and religion following the recent discoveries in the fields of exoplanetary science and astrobiology. We will explore the spectrum of modern positions of different religions with regard to a potential discovery of extraterrestrial life. Finally, we will discuss some of the cultural, political and sociological aspects of a discovery of extraterrestrial life.

Note: Course Credit Exclusions: SC/NATS1880 6.0 and SC/NATS1745 6.0.
This course explores humankind's attempts, from antiquity to the end of the 20th century, to find an answer to one of the greatest mysteries of nature: "are we alone in the universe?". By examining the thoughts and beliefs of famous scientists such as Copernicus, Galileo, Kepler, Huygens, Newton and Darwin, on the existence of life elsewhere in the universe, students will be introduced to the role of religious convictions in the formation and development of some of the scientific ideas in the past.

One of the objectives of this course is to present the extraterrestrial life debate as an excellent historical instance of how science and religion interact. Students will be acquainted with a number of issues where historically, the belief in the existence of extraterrestrials and Christian doctrines appeared to clash. This discussion will be complemented by briefly discussing the case for Judaism and Islam. The course will then explore a number of the revolutionary interpretations put forward by both scientists and theologians which eventually led to the contemporary spectrum of religious positions with regard to ET life.

An overview of our home planet Earth, its characteristics as a planet and its place in the Solar System and the Milky Way galaxy will be followed by the search to date for exoplanets. The different techniques used to search for exoplanets will be summarized and the over-arching analysis that has led to the expectation of billions of planets in our galaxy alone will be discussed.

Students will also gain some insights into the attempts made to potentially make contact with extraterrestrials and the controversies such attempts have brought about. Finally, cultural and political impacts of a discovery of extraterrestrial life and more specifically extraterrestrial intelligence will be discussed and some of the post-detection protocols will be reviewed. No prior background in science is assumed.

Upon completion of this course, students will be able to:
(4) describe key concepts of extraterrestrial life debate and their origins
(5) analyze the main historical causes of the clash between the belief in the existence of extraterrestrials and Abrahamic religions
(6) describe the importance of extraterrestrial life debate as a modern frontier for the interaction of science and religion
(7) explore the spectrum of the religious positions with regard to a potential discovery of extraterrestrial life
(8) explain the basics of our current knowledge about extra-solar planets and their conditions to sustain life
(9) Describe the nature of science as a way of knowing, and illustrate how the development of key advances in science rely on the outcome of scientific investigation..
Course Design:
Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve “face-to-face” communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Three hours of lecture per week as well as weekly tutorials and some online content.

- Weekly office hours will be held and help sessions will be arranged before the midterm and final exams.

- The weekly tutorials will be spent on 40-minute group assignments/discussions. These sessions will focus on providing a more comprehensive understanding of some of the concepts that are only briefly discussed in lectures due to lecture time constraints. Each group will consist of 4-5 students discussing the theme idea of the tutorial session and responding to some key questions on the topic. These sessions will be led by the instructor with the aid of the TAs. The instructor and the TAs will be available during the sessions to help students explore potential responses to the questions distributed at the beginning of each tutorial.

- Online Moodle quizzes partly based on class material and partly based on independent assigned readings. These readings are chiefly focused on our contemporary understanding of a number of scientific concepts in astronomy and biology, the history of which is discussed during lectures.

- Final essay of 1800-2000 words (not including the references): The preparation of final essay for this course consists of two steps. Students registered in the course must choose a topic a week before the midterm and submit a two-paragraph proposal and will receive the approval along with a feedback from the instructor along with their midterm marks. They will have to submit the essay during the last session of the class. The list of potential topics is endless. They may pick to examine the views of a scientist, or theologian (contemporary or historical). In case of considering the views of a historical figure, they may focus on a detailed presentation of the views of a certain individual or may discuss how our present knowledge of astrobiology has proved the position of a certain individual with respect to the ET life wrong or right. They may also focus on cultural, psychological, political, sociological or religious aspects of a potential discovery of extraterrestrial life. Another suggested topic is to pick a relevant science fiction book (or alternatively a movie) and examine the veracity/feasibility of the ideas presented with the help of the knowledge they acquire during this course.

- Clicker questions will be used to account for participation.
Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. One section per year
2. Several people including Paul Delaney, Michael De Robertis
3. Parandis Tajbakhsh
4. Three hours of lecture as well as weekly tutorials. In addition, regular office hours will be held every week
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

1. 10% Participation
2. 10% Group Assignments (submitted at the end of each tutorial)
3. 10% Online Quizzes
4. 25% Midterm
5. 35% Final exam
6. 10% Final Essay

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Required Reading:

1. Parandis Tajbakhsh (ed.), Course Packet for Extraterrestrial Life: A Modern Discussion to include Historical, Religious and Cultural Aspects

Suggested Supplementary Sources:

Other Resources:
A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain.

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

Course Rationale:
The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

---

Astrobiology is an interdisciplinary field which examines the origins and evolution of life in the universe. Considering the recent success of astronomers in detecting more than 1500 extrasolar planets, astrobiology is emerging as a prominent scientific field. Contrary to physics and chemistry however, the history of astrobiology is not taught in the universities. This course aims to introduce students to the extraterrestrial life debate from antiquity to modern times and in doing so it significantly promotes the value of interdisciplinarity because of the nature of the topic.

Extraterrestrial life debate is a fascinating amalgam of history of science and the development of scientific methods as well as a narrative of the role of theology in reasoning of some of the greatest scientists of all times. It brings to light unknown aspects of lives of astronomers, philosophers and intellectuals by describing their thoughts and beliefs in the existence of life beyond Earth and their efforts to find other inhabited worlds.

It also makes an excellent instance of how religion and science can be presumed as to be either in conflict or in harmony and where and how the current boundaries between science and religion originated and evolved. By exploring the spectrum of positions taken by different religions and even sects within a religion, students will be exposed to a prime example of interaction between science and religion.

In addition, students are introduced to some of the most recent discoveries in the fields of astrobiology and will examine some of the cultural, political and sociological impacts of a potential discovery of extraterrestrial life on our civilization and our beliefs.

By encouraging students to draw parallels between the beliefs of prominent astronomers of the enlightenment era and our current understanding of astrobiology during in class discussions, students will develop critical skills such as critiquing scientific works and will become familiar with the basics of debating in favour of a position based on available facts. The inclusion of a final essay as part of the method of evaluation promotes independent learning and research skills.

The expected registration for this course is 150-200 students.
Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

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I have reviewed the course proposal and attached bibliography for NATS 1525 3.0 - Extraterrestrial Life and can state that the York University Libraries have the required resources to support this undergraduate level course.

Please be aware that the library offers the following services to help students with their ICT Controversy Paper and Tutorial assignments:

- A librarian can go to the classroom or tutorial and introduce students to the various resources available at the library including electronic journals, newspaper indexes and other databases.
- The other option is to hold a tutorial session for each tutorial section in the library computer lab to provide a hands-on learning opportunity for students to research resources in the library.
- A librarian is also available for individual consultations with students to help them find the materials they need for their research.
- A librarian can be available as a user on the course Moodle page to answer student questions using the Forum discussion, provide links to resources in the course, and post handouts presented in face-to-face instruction.

The following electronic resources licensed by the library may be of help to the students in this course:

- **Scopus** is the world’s largest abstract and citation database of peer-reviewed literature. It has many articles that are relevant to natural science, and information and communication technologies (ICT’s). Additionally, it contains citation information.
- **Web of Science** is an extensive database that has very good coverage of sciences including science and technology issues. Additionally, it allows for citation search.
- **Sociological Abstracts** is an extremely large and interdisciplinary index to scholarly articles on the study of religion as a social phenomenon.
- **General Science Abstracts** is appropriate for beginning undergraduate science and natural science students who need to search general science topics.
- **Scholars Portal** is a single search screen that provides access to multiple databases for searching literature in a variety of disciplines. This is an excellent extensive resource suitable for first year students learning the research process.

A more complete listing of resources is available at the following LibGuides:

- Natural Sciences LibGuide [http://researchguides.library.yorku.ca/nats](http://researchguides.library.yorku.ca/nats)
- Religion LibGuide [http://researchguides.library.yorku.ca/religion](http://researchguides.library.yorku.ca/religion)

Please note that the Steacie and Scott Libraries have extensive collections of books and reference materials that are relevant to this course.

In summary, I state that we are well positioned to support this course.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Sarah Shujah, Science Librarian
Steacie Science & Engineering Library
416-736-2100 x33945
sshujah@yorku.ca
Changes to Existing Course

Faculty: Science

Department: Chemistry

Date of Submission: Oct. 20, 2015

Course Number: 

Effective Session: F16

Course Title: Honours Major BSc in Chemistry

Type of Change:

- [ ] in pre-requisite(s)/co-requisite(s)
- [ ] in course number/level
- [ ] in credit value
- [ ] in title (max. 40 characters for short title)
- [ ] in Calendar description (max. 40 words or 200 characters)
- [x] other (please specify): degree requirements
- [ ] in cross-listing
- [ ] in degree credit exclusion(s)
- [ ] regularize course (from Special Topics)
- [ ] in course format/mode of delivery *
- [ ] retire/expire course

Change From: see next page

To:
The program core is defined as (28 credits): SC/CHEM 1000 3.00; SC/CHEM 1001 3.00; SC/CHEM 2011 3.00; SC/CHEM 2020 3.00 and SC/CHEM 2021 3.00; SC/CHEM 2030 3.00; SC/CHEM 2080 4.00; SC/CHEM 3000 3.00; SC/CHEM 3001 3.00.

Note: SC/BIOL 1500 3.00 and SC/BIOL 1000 3.00 and SC/BIOL 1001 3.00 are strongly recommended for students lacking OAC or 12U biology.

In the applied chemistry area, the Department of Chemistry offers a Specialized Honours program stream in pharmaceutical and biological chemistry (see below). In addition, students may develop a concentration in analytical chemistry, or materials chemistry, for which they should consult the Department of Chemistry on course selection.

### Honours Programs

#### Specialized Honours Program

[...]

#### Honours Major Program

A. General education:
   - non-science requirement: 12 credits;
   - mathematics: SC/MATH 1013 3.00; SC/MATH 1014 3.00;
   - computer science: one of LE/EECS 1520 3.00, LE/EECS 1540 3.00 or LE/EECS 1020 3.00;
   - foundational science: SC/PHYS 1410 6.00 or SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00 (not necessarily in year one).

B. Major requirements:
   - The program core as specified above (28 credits);
   - SC/CHEM 2050 4.00 (or SC/BIOL 2070 3.00 and one of SC/BCHM 2020 3.00 or SC/BIOIL 2020 3.00, in which case SC/BIOL1000 3.00 and SC/BIOL 1001 3.00 are pre-requisites);
   - SC/CHEM 3030 3.00 or SC/CHEM 3050 3.00 or SC/CHEM 3080 4.00 (SC/CHEM 3080 4.00 is recommended to facilitate employment in industry);
   - at least twelve credits in chemistry at the 4000 level, of which at least six must be in three-credit courses (being mindful of 3000-level prerequisites for 4000-level courses; some 4000-level courses can be taken in Year 3).

C. Science breadth: at least 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the general education requirement.
D. Upper level requirement: a minimum of 42 credits at the
3000 level or above.

E. Additional elective credits, as required, for an overall
total of 120 credits.

F. Standing requirements: to graduate in an Honours
program requires successful completion of all Faculty
requirements and departmental required courses and a
minimum cumulative credit-weighted grade point average
of 5.00 (C+) over all courses completed.

Honours Major Program (York-Seneca
Coregistration Option)

A. General education:
• non-science requirement: 12 credits;
• mathematics: SC/MATH 1013 3.00; SC/MATH 1014
  3.00;
• computer science: one of LE/EECS 1520 3.00,
  LE/EECS 1530 3.00, LE/EECS 1540 3.00 or LE/EECS
  1020 3.00;
• foundational science: SC/PHYS 1410 6.00 or SC/PHYS
  1420 6.00 or SC/PHYS 1010 6.00 (not necessarily in
  year one).

B. Major requirements:
• SC/CHEM 1000 3.00; SC/CHEM 1001 3.00; SC/CHEM
  2011 3.00; SC/CHEM 2020 3.00; SC/CHEM 2021 3.00;
  SC/CHEM 2030 3.00; SC/CHEM 2050 4.00 (or SC/Biol
  2070 3.00 and one of SC/BCHM 2020 3.00 or SC/Biol
  2020 3.00, in which case SC/Biol1000 3.00 and
  SC/Biol 1001 3.00 are pre-requisites), SC/CHEM 2080
  4.00; SC/CHEM 3000 3.00;
• at least 6 and up to 15 credits in SC/SENE 2000- or
  3000-level courses (at Seneca College)
• at least twelve credits in chemistry at the 4000 level, of
  which at least six must be in three-credit courses (being
  mindful of 3000-level prerequisites for 4000-level
  courses; some 4000-level courses can be taken in Year
  3)
• a minimum total of 21 credits in SC/CHEM or SC/SENE
  courses at the 3000 level or above.

C. Science breadth: at least 24 credits in science
disciplines other than in SC/CHEM or SC/SENE courses,
of which three credits must be at the 2000 level or
above. 15 of these 24 credits are satisfied by the general
education requirement.

D. Upper level requirement: a minimum of 42 credits at
the 3000 level or above (the Major requirements
specified above satisfy a minimum of 21 upper-level
credits).

E. Additional elective credits, as required, for an overall
total of 120 credits.

F. Standing requirements: to graduate in an Honours
program requires successful completion of all Faculty
requirements and departmental required courses and a
minimum cumulative credit-weighted grade point average
of 5.00 (C+) over all courses completed.
Rationale:
The proposed version of the existing degree will allow qualified York students to get valuable hands-on experience in instrument-intensive lab work, Good Laboratory Practices and Good Manufacturing Practices within a select group of courses offered at Seneca College while coregistered there for one term under Senate’s 2013 regulation on Coregistration. Enrolment limits will apply in accordance with Seneca’s capacity. We anticipate that these measures will bolster incoming enrolments, student engagement, retention and satisfaction. We also anticipate that Seneca graduates will be more enticed to come to York afterward as they will be able to reduce their overall requirements to earn a BSc degree by earning credit for more of their courses.

In accord with the Senate guidelines, the coregistration option would be restricted to Honours students having completed at least 24 credits at York and maintained standing. Students would take up to 15 credits (5 courses) in one term while co-registered at Seneca College. We would have our students use the coregistration option in their third year to ensure that they have sufficient prerequisite background. Those students who lose Honours standing would be automatically transferred to the 3-year BSc program.

Seneca has indicated that they could best accommodate York students in Winter term. In the Fall term previous, interested and qualified students would, in consultation with the department, select and enroll in and pay fees for up to 5 SC/SENE courses for the Winter term from a broader list that will encompass analytical, pharmaceutical and materials areas. Each York SC/SENE course on the list will correspond to one existing Seneca course. Each will have been selected in consultation with Seneca for the amount and nature of the lab work. Each will bear a 2xxx or 3xxx course number, in accord with the level, as well as the Seneca course title. Each will have specified York and/or Seneca prerequisites (and/or corequisites), as well as course credit exclusions of York SC/CHEM and/or SC/SENE and/or other Seneca courses already excluded. The courses will be run and administered by Seneca College, in accord with their deadlines, grading schemes, policies and procedures for reappraisal, deferred standing and so forth. Petitions for waiver of regulations and deadlines will be considered by York’s Faculty of Science and Senate’s policy on repeated courses will apply. Enrollment limits in each such course may apply. York’s Registrar will receive the earned grades from Seneca as well as an invoice for their work. The SC/SENE courses and grades will appear on the York transcript, and the grades will count in the York grade point averages after conversion, as required to the York letter grade scale.

Students coming from Seneca College will, as part of their transfer credit assessments, be accorded equivalencies for SC/SENE courses if they have already taken the corresponding courses at Seneca and these will be useful for fulfilling a York degree.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised ‘Course Design’ and ‘Method of Instruction’ information.
**Faculty:**
Indicate all relevant Faculty(ies)

| Science |

**Department:**
Indicate department and course prefix (e.g. Languages, GER)

| Chemistry SENE | Date of Submission: | Nov. 17, 2015 |

**Course Number:**
Special Topics courses include variance (e.g. HUMA 3000C 6.0, Variance is “C”)  

| 2081 | Var: | 3 |

**Course Title:**
The official name of the course as it will appear in the Undergraduate Calendar and on the Repository

| Techniques in Analytical Chemistry |

**Short Title:**
Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 characters**

| Techniques in Analytical Chemistry |

With every new course proposal it is the Department’s responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.
This is a one-semester, laboratory oriented subject, intended to introduce students to selected techniques of chemical analysis that are widely used in the industry: UV-Vis spectrophotometry, Classical column chromatography (normal phase), High Pressure Liquid Chromatography (reversed phase), Gas Chromatography. The theoretical lectures provide a basic understanding of the analytical procedures. The laboratory classes provide hands-on training for the analytical techniques presented in the theoretical course, and familiarize the student with the application of the respective techniques in a regulated industrial environment. To accomplish the above, the students must be able to combine their prior knowledge of chemistry and mathematics with the new terms and concepts taught in this course. Not open to students having completed SC/SENE 2082 3.0 or Seneca College courses TAC333 or TAC357. Prerequisites: SC/CHEM 1001 3.0 and SC/MATH 1014 3.0 (or Seneca courses CHM273 and MTH273). Course credit exclusion: SC/CHEM 3080 4.0.
Expanded Course Description:

Please provide a detailed course description, including topics / theories and learning objectives, as it will appear in supplemental calendars.

Topics
UV-Vis spectrophotometry
Classical column chromatography
High Pressure Liquid Chromatography
Infrared Spectrophotometry
Gas Chromatography

Learning Outcomes
Upon completion of this subject, the student will be able to:
1) Speak and write freely, using the basic terminology of analytical chemistry and particularly of chromatography, in practical situations that are specific to the respective fields.
2) Make rational adjustments to the experimental conditions of each analytical procedure, interpret results and troubleshoot common unexpected situations, based on understanding the underlying processes.
3) Pack and use a classical chromatographic column for preparative chromatographic applications.
4) Set-up high pressure liquid chromatographic (HPLC) and gas chromatographic (GC) instrumentation, prepare and run samples for HPLC and GC, analyze and report quantitative data using automated software.
5) Determine the identity of an analyte in a sample using the HPLC or GC technique.
6) Operate Agilent chromatographic instruments under ChemStation software.
7) Manipulate chromatographic data for external and internal standard analysis.
8) Assess the quality of a chromatographic separation in terms of resolution and plate count parameters.
Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve “face-to-face” communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).

2. Number of department members currently competent to teach the course.

3. Instructor(s) likely to teach the course in the coming year.

4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

2 Term Tests (10% each) 20%
Laboratory Reports 40%
Final Examination 40%

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

Offered, administered and monitored by Seneca College.
Supported by the Seneca College library.

Texts and laboratory manuals made available by Seneca College.
Other Resources:
A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain.

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

Course Rationale:
The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

This is one of a series of courses that Seneca College offers its Chemical Laboratory Technician (Pharmaceutical) diploma students. It is therefore an existing course.
It is a course that offers extensive relevant hands-on experience in the subject matter for its students.
Through the Coregistration option, York students will be able to take this course as part of their York degree.

Space and equipment provided and maintained by Seneca College.
Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

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With every new course proposal it is the Department's responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.
This subject focuses on the study of chromatography, and its application to analytical chemistry. Students will be provided with basic chromatographic fundamentals, upon which the basis for column chromatography, gas chromatography and liquid chromatography will be discussed. Considerable emphasis will be placed on the laboratory section, from which the student will gain experience on the chromatographic instrumentation, methods of analysis, sample preparation and ChemStation software. Not open to students having completed SC/SENE 2081 3.0 or Seneca College course TAC333 or TAC357.

Prerequisites: SC/CHEM 1001 3.0 and SC/MATH 1014 3.0 (or Seneca courses CHM273 and MTH273).

Course credit exclusion: SC/CHEM 3080 4.0.
Expanded Course Description:

Please provide a detailed course description, including topics / theories and learning objectives, as it will appear in supplemental calendars.

Topics
Sampling concepts, Chromatographic Separation concepts, Column Chromatography, High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC)

Learning Outcomes
Upon successful completion of this course, the student will:
- have demonstrated an understanding of the basic chromatographic separation principles.
- have demonstrated a specific understanding of components and operation of column chromatographs, gas chromatographs (GC) and high performance liquid chromatographs (HPLC).
- be able to apply chromatographic principles to determine the identity of an analyte in a mixture.
- be able to apply any of the following: external standard methods of analysis, internal standard methods of analysis, and standard addition, including spiking, methods of analysis, to quantitatively determine the composition of an analyte in a mixture.
- have demonstrated a basic understanding of the operation of HP ChemStation software
Course Design:
Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Instruction:
1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

Offered as TAC357, administered and monitored by Seneca College. Made available to York students according to availability at Seneca College. Instructors provided by Seneca College.
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

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Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Offered as TAC357, administered and monitored by Seneca College. Supported by the Seneca College library.

Texts and laboratory manuals made available by Seneca College.
Other Resources:
A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain.

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

Space and equipment provided and maintained by Seneca College.

Course Rationale:
The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

This is one of a series of courses that Seneca College offers its Chemical Engineering Technology diploma students. It is therefore an existing course. It is a course that offers extensive relevant hands-on experience in the subject matter for its students. Through the Coregistration option, York students will be able to take this course as part of their York degree.
**Faculty and Department Approval for Cross-listings:**

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

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Accessible format can be provided upon request.
Committee on Academic Standards, Curriculum and Pedagogy Template

New Course Proposal Form

Faculty:
Indicate all relevant Faculty(ies)

Science

Department:
Indicate department and course prefix (e.g. Languages, GER)

Chemistry SENE

Date of Submission:
Nov. 17, 2015

Course Number:
Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is “C”)

2083 Var:

Academic Credit Weight:
Indicate both the fee, and MTCU weight if different from academic weight (e.g. AC=6, FEE=8, MET=6)

3

Course Title:
The official name of the course as it will appear in the Undergraduate Calendar and on the Repository

Chemical Instrumentation

Short Title:
Appears on any documents where space is limited - e.g. transcripts and lecture schedules - maximum 40 characters

Chemical Instrumentation

With every new course proposal it is the Department’s responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.
A general coverage of common optical laboratory instruments is presented. Topics covered include colorimetry, ultraviolet, visible and infrared region spectrophotometry, fluorimetry, turbidity, nephelometry, and emission spectrometry (flame/arc/spark/ICP). The theory of these instrumental methods will be supported by hands-on laboratory techniques. Not open to students having completed Seneca College course CMI333.

Prerequisites: SC/CHEM 1001 3.0 and SC/MATH 1014 3.0 (or Seneca courses CHM273 and MTH273).
Topics

Lecture component
Colorimetry and Spectrophotometry
Ultraviolet, Visible and Infrared Spectrophotometry
Fluorimetry
Turbidimetry and Nephelometry
Atomic Emission Spectrometry

Lab component
Colorimetry
Visible Spectrophotometry
Turbidimetric Analysis
Ultraviolet Spectrophotometry
Infrared Spectrophotometry
Fluorescence

Learning Outcomes
Upon successful completion of this course, the student will:

- have a fundamental understanding of the theory behind colorimetric, visible, ultraviolet, infrared, and fluorimetric instrumentation
- this will include an understanding of instrumental schematics and the function of the principal components in these instruments.
- have gained an understanding of the evolution of instrumentation and therefore understand the reasons for the next generation of instruments
- have an understanding of the advantages, disadvantages and applications for these instruments
- have hands-on laboratory experience with visible, ultraviolet, infrared and fluorimetric instruments
- have laboratory experience preparing one and two-component standards

Essential Employability Skills

- Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfils the purpose and meets the needs of the audience.
- Respond to written, spoken, or visual messages in a manner that ensures effective communication.
- Execute mathematical operations accurately. Apply a systematic approach to solve problems.
- Use a variety of thinking skills to anticipate and solve problems. Locate, select, organize, and document information using appropriate technology and information systems.
- Show respect for diverse opinions, values, belief systems, and contributions of others.
- Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
- Manage the use of time and other resources to complete...
projects.
• Take responsibility for one's own actions, decisions, and consequences.
Course Design:
Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Instruction:
1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

Offered as CMI333, administered and monitored by Seneca College. Made available to York students according to availability at Seneca College. Instructors provided by Seneca College.
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

2 Term Tests (15% each) 30%
Laboratory Reports 40%
Final Examination 30%

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Offered as CMI333, administered and monitored by Seneca College. Supported by the Seneca College library.

Texts and laboratory manuals made available by Seneca College.
Other Resources:
A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain.

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

Space and equipment provided and maintained by Seneca College.

Course Rationale:
The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

This is one of a series of courses that Seneca College offers its Chemical Laboratory Technician (Pharmaceutical) and Chemical Engineering Technologist diploma students. It is therefore an existing course. It is a course that offers extensive relevant hands-on experience in the subject matter for its students. Through the Coregistration option, York students will be able to take this course as part of their York degree.
Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

Dept: __________________________
Signature (Authorizing cross-listing) Department __________________________ Date

Dept: __________________________
Signature (Authorizing cross-listing) Department __________________________ Date

Dept: __________________________
Signature (Authorizing cross-listing) Department __________________________ Date

Accessible format can be provided upon request.
### Faculty of Science
Curriculum Committee
352 Lumbers Building

#### Changes to Existing Courses & Degree Programs

<table>
<thead>
<tr>
<th>Department:</th>
<th>Physics and Astronomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Submission:</td>
<td>Oct. 2015</td>
</tr>
<tr>
<td>Effective Session:</td>
<td>FW 2016-2017</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Course Number:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Course Title:</td>
<td>Specialized Honours Biophysics</td>
</tr>
</tbody>
</table>

**Type of Change:**

- [x] in degree requirements
- [ ] in course number/level
- [ ] in credit value
- [ ] in title (max. 40 characters for short title)
- [ ] in Calendar description (max. 40 words or 200 characters)
- [ ] in pre/co-requisite(s)
- [ ] in cross-listing
- [ ] in degree credit exclusion(s)
- [ ] regularize course (from Special Topics)
- [ ] in course format/mode of delivery *
- [ ] retire/expire course
- [ ] other (please specify):
1) The program core:

- SC/BIOL 1000 3.00 and SC/BIOL 1001 3.00 (or SC/BIOL 1010 6.00); SC/BIOL 2020 3.00; SC/BIOL 2021 3.00; SC/BIOL 2040 3.00; SC/BIOL 2070 3.00;
- SC/BPHS 2090 3.00; SC/BPHS 4080 3.00; SC/BPHS 4090 4.00;
- SC/CHEM 1000 3.00; SC/CHEM 1001 3.00;
- SC/MATH 1025 3.00; SC/MATH 2015 3.00; SC/MATH 2271 3.00;
- SC/PHYS 1010 6.00; SC/PHYS 2010 3.00; SC/PHYS 2020 3.00; SC/PHYS 2213 3.00; SC/PHYS 3030 3.00; SC/PHYS 3040 6.00; SC/PHYS 4061 3.00.

2) Non-Science requirement: 12 credits

3) Additional required courses:

- 3020 3.00, SC/PHYS 3050 3.00, SC/PHYS 3090 3.00, SC/PHYS 3150 3.00, SC/PHYS 3220 3.00, SC/PHYS 3320 3.00, SC/PHYS 4010 3.00, SC/PHYS 4011 3.00, SC/PHYS 4020 3.00, SC/PHYS 4040 3.00, SC/PHYS 4050 3.00, SC/PHYS 4120 3.00;
- 3051 3.00, SC/BIOL 3060 4.00, SC/BIOL 3100 3.00, SC/BIOL 3120 3.00; SC/BIOL 3130 3.00, SC/BIOL 3150 3.00/SC/BIOL 3150 4.00, SC/BIOL 3155 3.00, SC/BIOL 4030 3.00, SC/BIOL 4061 3.00, SC/BIOL 4141 3.00, SC/BIOL 4150 3.00, SC/BIOL 4151 3.00, SC/BIOL 4160 3.00, SC/CHEM 2020 3.00, SC/CHEM 2021 3.00, SC/CHEM 4092 3.00, SC/CHEM 4093 3.00, HH/KINE 2031 3.00, HH/KINE 4470 3.00.

4) Upper level requirements:

At least 42 credits at the 3000 or higher level, including at least 12 major credits at the 4000 level.

5) Additional elective credits, as required for an overall total of at least 120 credits.

Rationale:

Change required due to BPHS 4090 4.00 being changed to BPHS 4090 3.00. Furthermore, experience in the degree in solving physical problems computationally is being strengthened by the addition of PHYS 2030 3.00 'Computational Methods for Physicists and Engineers', resulting in a 120-credit degree. Finally, HH/KINE 4455 3.0 'Movement Analysis Laboratory' is added as an explicit option; this lab course (2 hours lecture, 2 hours lab) devoted to motion tracking and analysis is an outstanding option for students interested in biomechanics, and is taught by the same instructor as the existing option HH/KINE 4470 'Muscle and Joint Biomechanics'.

Revised form Oct. 3/2002
<table>
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<tr>
<th><strong>Department:</strong></th>
<th>Physics and Astronomy</th>
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<tr>
<td><strong>Course Number:</strong></td>
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<tr>
<td><strong>Course Title:</strong></td>
<td>Biophysics I</td>
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<tr>
<td><strong>Date of Submission:</strong></td>
<td>Oct. 2015</td>
</tr>
<tr>
<td><strong>Effective Session:</strong></td>
<td>FW 2016-2017</td>
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<td>retire/expire course</td>
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<td>other (please specify):</td>
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<td>Change From:</td>
<td>To:</td>
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<tr>
<td>4080 3.00 Biophysics I</td>
<td>4080 3.00 Cellular Electrodynamics</td>
</tr>
</tbody>
</table>

**Rationale:**

BPHS 4080 and BPHS 4090 (Biophysics I and Biophysics II) will be offered only every other year in the future. We wish to rename both courses because they are no longer necessarily taken in sequence. The adopted title accurately describes the content covered in this existing course.
### Changes to Existing Courses & Degree

#### Form 2

**Faculty of Science**  
Curriculum Committee  
352 Lumbers Building

<table>
<thead>
<tr>
<th>Department:</th>
<th>BIOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number:</td>
<td>BIOL 4700</td>
</tr>
<tr>
<td>Course Title:</td>
<td>Current Topics in Environmental Biology</td>
</tr>
<tr>
<td>Date of Submission:</td>
<td>November 1, 2015</td>
</tr>
<tr>
<td>Effective Session:</td>
<td>F/W 2016</td>
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</table>

#### Type of Change:

- [ ] in degree requirements
- [ ] in course number/level
- [ ] in credit value
- [ ] in title (max. 40 characters for short title)
- [ ] in Calendar description (max. 40 words or 200 characters)
- [ ] in pre/co-requisite(s)
- [ ] in cross-listing
- [ ] in degree credit exclusion(s)
- [ ] regularize course (from Special Topics)
- [ ] in course format/mode of delivery *
- [ ] retire/expire course
- [ ] other (please specify): remove note

#### Change From:

A review of recent advances in environmental biology with an emphasis on current research, experimental design and biological methods. Three lecture hours per week. One term. Three credits. Prerequisites: SC/BIOL 2050 4.00 and SC/BIOL 2060 3.00. Note: Available only to upper-year students enrolled in an Honours program in Environmental Biology and Honours Environmental Science (Life Sciences Stream).

#### To:

A review of recent advances in environmental biology with an emphasis on current research, experimental design and biological methods. Three lecture hours per week. One term. Three credits. Prerequisites: SC/BIOL 2050 4.00 and SC/BIOL 2060 3.00.

#### Rationale:

The department would like to open the course to Biology majors – Biology majors have been enrolling routinely anyway, but currently require permission of the course director – removing the note will make enrolment easier. As it is a fourth year course, the restriction to upper-year students is redundant.

---

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department/divisions is required. Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form (Form 1) in order to ensure that all the required information is included. * Note: If there is a technology component to the course, a statement is required from ATSG indicating whether resources are adequate to support the course.
Faculty of Science + Engineering
Curriculum Committee
352 Lumbers Building

Changes to Existing Courses & Degree

Department: Biology
Course Number: N/A
Course Title: Environmental Biology Program
Date of Submission: October 1, 2015
Effective Session: FW 2016

Type of Change:
- [x] in degree requirements
- [ ] in course number/level
- [ ] in credit value
- [ ] in title (max. 40 characters for short title)
- [ ] in Calendar description (max. 40 words or 200 characters)
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- [ ] in cross-listing
- [ ] in degree credit exclusion(s)
- [ ] regularize course (from Special Topics)
- [ ] retire/expire course
- [ ] other (please specify):

Change From: See attached page
To: See attached page

Rationale: We are updating program requirements to include a new course (BIOL 4710 Integrative Environmental Physiology) as an option for all Environmental Biology degrees as well as adding existing courses that were unintentionally omitted from some degree programs:
- SC/ENVB 3170 3.0 Population and Community Ecology
- SC/ENVB 4000 3.0/8.0 Honours Thesis
- SC/ENVB 4200 3.0 Selected Readings in Biology
- SC/ENVB 4245 3.0 Conservation Biology
- SC/BIOL 4255 3.0 Biodiversity
- SC/ENVB 4700 3.0 Current Topics in Environmental Biology
- SC/BIOL 4710 3.0 Integrative Environmental Physiology

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department/divisions is required. Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form (Form 1) in order to ensure that all the required information is included. * Note: If there is a technology component to the course, a statement is required from ATSG indicating whether resources are adequate to support the course.
<table>
<thead>
<tr>
<th>Change From</th>
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</thead>
<tbody>
<tr>
<td>The program core (35 or 36 credits) is defined as:</td>
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</tr>
<tr>
<td>• SC/Biol 1000 3.00 and SC/Biol 1001 3.00 (or SC/Biol 1010 6.00);</td>
<td>• SC/Biol 1000 3.00 and SC/Biol 1001 3.00 (or SC/Biol 1010 6.00);</td>
</tr>
<tr>
<td>• SC/Envb 2050 4.00; SC/Biol 2060 3.00;</td>
<td>• SC/Envb 2050 4.00; SC/Biol 2060 3.00;</td>
</tr>
<tr>
<td>• SC/Biol 2070 3.00 or SC/Biol 2010 4.00, SC/Biol 2030 4.00. (Both SC/Chem 2020 3.00 and SC/Chem 2021 3.00 may replace one of the two 4 credit biology courses);</td>
<td>• SC/Biol 2070 3.00 or SC/Biol 2010 4.00, SC/Biol 2030 4.00. (Both SC/Chem 2020 3.00 and SC/Chem 2021 3.00 may replace one of the two 4 credit biology courses);</td>
</tr>
<tr>
<td>• additional courses as required for a total of at least 18 2000-level credits chosen from the following: SC/Biol 2010 4.00, SC/Biol 2021 3.00, SC/Biol 2040 3.00, SC/Biol 2070 3.00, SC/CHEM 2020 3.00, SC/CHEM 2021 3.00;</td>
<td>• additional courses as required for a total of at least 18 2000-level credits chosen from the following: SC/Biol 2010 4.00, SC/Biol 2021 3.00, SC/Biol 2040 3.00, SC/Biol 2070 3.00, SC/CHEM 2020 3.00, SC/CHEM 2021 3.00;</td>
</tr>
<tr>
<td>• SC/Envb 3001 2.00 or SC/Envb 3001 3.00; SC/Biol 3170 3.00;</td>
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</tr>
<tr>
<td>• SC/Biol 4245 3.00; SC/Biol 4255 3.00.</td>
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</tr>
<tr>
<td><strong>Note:</strong> both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/Biol 2020 3.00 and SC/CHEM 2020 3.00 if they are chosen in the program core.</td>
<td><strong>Note:</strong> both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/Biol 2020 3.00 and SC/CHEM 2020 3.00 if they are chosen in the program core.</td>
</tr>
</tbody>
</table>

**Bachelor Program**

**A. General education:**
- non-science requirement: 12 credits. ES/ENVS 1000 6.00, ES/ENVS 1000 6.00 is recommended for students interested in taking additional environmental studies courses;
- mathematics: SC/MATH 1505 6.00 or six credits from SC/MATH 1013 3.00, SC/MATH 1014 3.00, SC/MATH 1025 3.00;
- computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;
- foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/Biol 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.

**B. Major requirement:**
- the program core, as specified above (35 or 36 credits);
- additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology and biology courses of which at least 12 credits are at the 3000 or higher level: SC/Envb 3002 2.00, SC/Envb 3002 3.00, SC/Biol 3150 4.00, SC/Biol 3200 3.00, SC/Envb 3250 4.00, SC/Envb 3270 3.00, SC/Envb 3280 3.00, SC/Envb 3290 4.00, SC/Biol 3500 3.00, SC/Biol 4085 3.00, SC/Envb 4095 3.00, SC/Envb 4230 4.00, SC/Envb 4250 3.00, SC/Envb 4265 3.00, SC/Biol 4305 3.00, SC/Biol 4390 3.00;
- SC/GEOG 1400 6.00.

**C. Science breadth:** 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

**D. Upper level:** a minimum of 18 credits at the 3000 level.
or above.
E. Additional elective credits, as required, for an overall total of 90 credits.
F. Standing requirements: a minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).  

### Honours Programs

#### Honours Major Program

<table>
<thead>
<tr>
<th>A. General education:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• non-science requirement: 12 credits. ES/ENVS 1000 6.00, ES/ENVS 1000 6.00 is recommended for students interested in taking additional environmental studies courses;</td>
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<tr>
<td>• mathematics: SC/MATH 1505 6.00 or six credits from SC/MATH 1013 3.00, SC/MATH 1014 3.00, SC/MATH 1025 3.00. (Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00.);</td>
</tr>
<tr>
<td>• computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;</td>
</tr>
<tr>
<td>• foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.</td>
</tr>
</tbody>
</table>

*Note:* both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00 in the program core.

#### B. Major requirements:

- The program core as specified above (35 or 36 credits);
- SC/ENVB 4700 3.00;
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: SC/ENVB 3002 2.00, SC/ENVB 3002 3.00, SC/BIOL 3150 4.00, SC/BIOL 3200 3.00, SC/ENVB 3250 4.00, SC/ENVB 3270 3.00, SC/ENVB 3280 3.00, SC/ENVB 3290 4.00, SC/BIOL 3500 3.00, SC/BIOL 4085 3.00, SC/ENVB 4095 3.00, SC/ENVB 4230 4.00, SC/ENVB 4250 3.00, SC/ENVB 4265 3.00, SC/BIOL 4305 3.00, SC/BIOL 4390 3.00; |
- SC/GEOG 1400 6.00.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.
E. Additional elective credits, as required, for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

#### D. Upper level: a minimum of 18 credits at the 3000 level or above.
E. Additional elective credits, as required, for an overall total of 90 credits.
F. Standing requirements: a minimum overall grade point average of 4.00 (C) is required in order to be eligible to graduate with a BSc degree (bachelor program).  

### Honours Programs

#### Honours Major Program

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</table>

*Note:* both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00 in the program core.

#### B. Major requirements:

- The program core as specified above (35 or 36 credits);
- SC/ENVB 4700 3.00;
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: SC/ENVB 3002 2.00, SC/ENVB 3002 3.00, SC/BIOL 3150 4.00, SC/BIOL 3200 3.00, SC/ENVB 3250 4.00, SC/ENVB 3270 3.00, SC/ENVB 3280 3.00, SC/ENVB 3290 4.00, SC/BIOL 3500 3.00, SC/BIOL 4085 3.00, SC/ENVB 4095 3.00, SC/ENVB 4230 4.00, SC/ENVB 4250 3.00, SC/ENVB 4265 3.00, SC/BIOL 4305 3.00, SC/BIOL 4390 3.00; |
- SC/GEOG 1400 6.00.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements.

D. Upper level: a minimum of 42 credits at the 3000 level or above.
requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

Honours Double Major Program
All BSc Honours degree candidates should consult departmental advisors as early as possible concerning course requirements for particular Honours Double Major programs. Possible subject combinations for BSc Honours Double Major degree programs are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

A. General education:

- non-science requirement: 12 credits. ES/ENVS 1000, 6.00 ES/ENVS 1000 6.00 is recommended for students interested in taking additional environmental studies courses:
  - mathematics: SC/MATH 1505 6.00 or six credits from SC/MATH 1013 3.00, SC/MATH 1014 3.00, SC/MATH 1025 3.00. (Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00.);
  - computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;
  - foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/Biol 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.

B. Major requirements:

- SC/Biol 1000 3.00 and SC/Biol 1001 3.00 or SC/Biol 1010 6.00;
- SC/EnVb 2050 4.00; SC/Biol 2060 3.00; any two of SC/Biol 2010 4.00, SC/Biol 2020 3.00, SC/Biol 2031 3.00, SC/Biol 2030 4.00, SC/Biol 2040 3.00, SC/Biol 2070 3.00. Both SC/CHEM 2020 3.00 and SC/CHEM2021 3.00 may replace one of these two biology courses;
- SC/EnVb 3001 2.00 or SC/EnVb 3001 3.00;
- additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: SC/EnVb 3002 2.00, SC/EnVb 3002 3.00, SC/Biol 3150 4.00, SC/Biol 3200 3.00, SC/EnVb 3250 4.00, SC/EnVb 3270 3.00, SC/EnVb 3280 3.00, SC/EnVb 3290 4.00, SC/EnVb 3290 3.00, SC/Biol 3500 3.00, SC/Biol 4085 3.00, SC/EnVb 4095 3.00, SC/EnVb 4230 4.00, SC/EnVb 4250 3.00, SC/EnVb 4265 3.00, SC/Biol 4305 3.00, SC/Biol 4390 3.00;

C. Science breadth: 24 credits in science disciplines

E. Additional elective credits, as required, for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

Honours Double Major Program
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  - computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;
  - foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/Biol 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.

B. Major requirements:

- SC/Biol 1000 3.00 and SC/Biol 1001 3.00 or SC/Biol 1010 6.00;
- SC/EnVb 2050 4.00; SC/Biol 2060 3.00; any two of SC/Biol 2010 4.00, SC/Biol 2020 3.00, SC/Biol 2031 3.00, SC/Biol 2030 4.00, SC/Biol 2040 3.00, SC/Biol 2070 3.00. Both SC/CHEM 2020 3.00 and SC/CHEM2021 3.00 may replace one of these two biology courses;
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C. Science breadth: 24 credits in science disciplines

E. Additional elective credits, as required, for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.
outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the above requirements. Satisfied if the second major is another science discipline.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

**Honours Major/Minor Program**

An Honours Major in environmental biology may be combined with an Honours Minor in another subject area in a BSc Honours Major/Minor degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

A. General education:

- non-science requirement: 12 credits. ES/ENVS 1000 6.00, ES/ENVS 1000 6.00 is recommended for students interested in taking additional environmental studies courses;
- mathematics: SC/MATH 1505 6.00 or six credits from SC/MATH 1013 3.00, SC/MATH 1014 3.00, SC/MATH 1025 3.00. (Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00.);
- computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;
- foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.

B. Major requirements:

- the program core as specified above (35 to 36 credits);
- SC/ENVB 4700 3.00;
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: SC/ENVB 3002 2.00, SC/ENVB 3002 3.00, SC/BIOL 3150 4.00, SC/BIOL 3200 3.00, SC/ENVB 3250 4.00, SC/ENVB 3270 3.00, SC/ENVB 3280 3.00, SC/ENVB 3290 4.00, SC/BIOL 3500 3.00, SC/BIOL 4085 3.00, SC/ENVB 4095 3.00, SC/ENVB 4230 4.00, SC/ENVB 4250 3.00, SC/ENVB 4265 3.00, SC/ENVB 3290 4.00, SC/BIOL 3500 3.00, SC/BIOL 4085 3.00, SC/ENVB 4095 3.00, SC/ENVB 4230 4.00, SC/ENVB 4250 3.00, SC/ENVB 4270 3.00, SC/BIOL 4255 3.00, SC/ENVB 4265 3.00, SC/BIOL 4305 3.00, SC/BIOL 4390 3.00, SC/ENVB 4700 3.00, SC/BIOL 4710 3.00.

C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the above requirements. Satisfied if the second major is another science discipline.

D. Upper level: a minimum of 42 credits at the 3000 level or above.

E. Additional elective credits, as required, for an overall total of 120 credits.

F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

**Honours Major/Minor Program**

An Honours Major in environmental biology may be combined with an Honours Minor in another subject area in a BSc Honours Major/Minor degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.

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- mathematics: SC/MATH 1505 6.00 or six credits from SC/MATH 1013 3.00, SC/MATH 1014 3.00, SC/MATH 1025 3.00. (Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00.);
- computer science: LE/EECS 1520 3.00 or LE/EECS 1530 3.00 or LE/EECS 1540 3.00;
- foundational science: six credits from SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00), SC/PHYS 1410 6.00, SC/PHYS 1420 6.00 or SC/PHYS 1010 6.00.

B. Major requirements:

- the program core as specified above (35 to 36 credits);
- SC/ENVB 4700 3.00;
- additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology and biology courses,
SC/Biol 4305 3.00, SC/Biol 4390 3.00;
- SC/GEOG 1400 6.00;
- the course requirements for the minor.
C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. Satisfied if the minor is another science discipline.
D. Upper level: a minimum of 42 credits at the 3000 level or above.
E. Additional elective credits, as required, for an overall total of 120 credits.
F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

Honours Minor
An Honours minor in environmental biology may be combined with an Honours major in another subject area. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section of this calendar.
- SC/Biol 1000 3.00 and SC/Biol 1001 3.00 or SC/Biol 1010 6.00;
- SC/Envb 2050 4.00; SC/Biol 2060 3.00; any two of SC/Biol 2010 4.00, SC/Biol 2020 3.00, SC/Biol 2021 3.00, SC/Biol 2030 4.00, SC/Biol 2040 3.00. (Both SC/CHEM 2020 3.00 and SC/CHEM 2021 3.00 may substitute for one of these two biology courses.);
- SC/Envb 3001 2.00 or SC/Envb 3001 3.00;
- additional credits from the following list of courses for an overall total of at least nine credits from environmental biology and biology courses at the 3000 or 4000 level: SC/Envb 3002 2.00, SC/Envb 3002 3.00, SC/Biol 3150 4.00, SC/Biol 3200 3.00, SC/Biol 3200 4.00, SC/Envb 3270 3.00, SC/Envb 3280 3.00, SC/Envb 3290 4.00, SC/Envb 3290 4.00, SC/Envb 3500 3.00, SC/Envb 4000 3.00/8.00, SC/Biol 4085 3.00, SC/Envb 4095 3.00, SC/Envb 4200 3.00, SC/Envb 4230 4.00, SC/Envb 4250 3.00, SC/Envb 4265 3.00, SC/Biol 4305 3.00, SC/Biol 4390 3.00, SC/Biol 4710 3.00;
- SC/GEOG 1400 6.00;
- the course requirements for the minor.
C. Science breadth: 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. Satisfied if the minor is another science discipline.
D. Upper level: a minimum of 42 credits at the 3000 level or above.
E. Additional elective credits, as required, for an overall total of 120 credits.
F. Standing requirements: to graduate in an Honours program requires successful completion of all Faculty requirements and departmental required courses, a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all environmental biology and biology courses completed, and a minimum cumulative credit-weighted grade point average of 5.00 (C+) over all courses completed.

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- additional credits from the above listed environmental biology and biology courses at the 2000 or higher level, as required for an overall total of at least 30 environmental biology or biology credits.

including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: SC/Envb 3002 2.00, SC/Envb 3002 3.00, SC/Biol 3150 4.00, SC/Biol 3200 3.00, SC/Envb 3250 4.00, SC/Envb 3270 3.00, SC/Envb 3280 3.00, SC/Envb 3290 4.00, SC/Biol 3500 3.00, SC/Envb 4000 3.00/8.00, SC/Biol 4085 3.00, SC/Envb 4095 3.00, SC/Envb 4200 3.00, SC/Envb 4230 4.00, SC/Envb 4250 3.00, SC/Biol 4305 3.00, SC/Biol 4390 3.00, SC/Biol 4710 3.00;
<table>
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<th>Course Code</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>SC/ENVB 4265</td>
<td>3.00</td>
</tr>
<tr>
<td>SC/BIOL 4305</td>
<td>3.00</td>
</tr>
<tr>
<td>SC/BIOL 4390</td>
<td>3.00</td>
</tr>
<tr>
<td>SC/ENVB 4700</td>
<td>3.00</td>
</tr>
<tr>
<td>SC/BIOL 4710</td>
<td>3.00</td>
</tr>
</tbody>
</table>

additional credits from the above listed environmental biology and biology courses at the 2000 or higher level, as required for an overall total of at least 30 environmental biology or biology credits.
Committee on Curriculum and Academic Standards

New Course Proposal Form

Faculty: Indicate all relevant Faculty(ies) i.e. AP/SC/MATH

SC/MATH

Department: Indicate department and course prefix (e.g. Languages, GER)

Mathematics and Statistics

Date of Submission: April 2012

Math

Course Number: Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is “C”) 3250 Var:

Academic Credit Weight: Indicate both the fee, and MET weight if different from academic weight (e.g. AC=6, FEE=8, MET=6)

3

Course Title: The official name of the course as it will appear in the Undergraduate Calendar and on the Repository

Mathematical Biology

Short Title: Appears on any documents where space is limited - e.g. transcripts and lecture schedules - maximum 40 characters

Mathematical Biology

With every new course proposal it is the Departmental/Divisional responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments/divisions is necessary to determine degree credit exclusions and/or cross-listed courses.
This course introduces the student to mathematical modelling with applications in biology in related fields such as chemistry, ecology and health. There is an emphasis on case studies and problem solving skills. Topics include discrete and continuous models describing population dynamics, population health, chemical reactions and biological structures.

Prerequisites: Registration in an Honours Program in Mathematics and Statistics, completion of the mathematics/statistics core and SC/CSE 1560, or permission of the instructor.
This course will introduce the student to mathematical modelling with applications in biology in related fields such as chemistry, biology, ecology and health. There is an emphasis on case studies and problem solving skills. Topics include:

1) Discrete time models: difference equations, stability analysis, Markov chains

2) Continuous models: ordinary differential equations, stability analysis, Markov processes

3) Change in Space and Time: partial differential equations, networks

4) There will be modules where focus will be on a particular application
   1. Populations Growth
      1. Logistic model
      2. Predator Prey
      3. Competition between two species
   2. Population health
      1. SI, SIS, SIR, SEIR, SIRS, SEIRS models
      2. Basic reproduction ratio – survival function method, next generation method, Jacobian
      3. Network model
      4. in-host model of viral dynamics
   3. Models of Molecular Events
      1. Michaelis-Menten kinetics
   4. Neurons
      1. Neural Networks

The course involves a communication requirement:

- Students will write reflection papers (repeat, relate, reflect) on mathematical models and their applications
- Students will write project proposal and final papers
• Student will give presentations on their projects to the class

This course involves a technology requirement

• Students will use Maple and MATLAB and/or other computer software applications to develop, analyze and present results of their models

Learning objectives: Students will be able to

• demonstrate independent and critical thinking
• identify appropriate problem solving techniques for a particular problem at hand
• represent and model biological problems in multiple forms: concrete, graphical, numerical, algebraic, and with technology
• make connections among mathematical concepts
• communicate their conjectures, reasonings and proofs orally, in writing and with visual aids
• reflect on the use of mathematics in representing biological processes
• integrate relevant knowledge and pose questions across a wide range of basic mathematics, applied mathematics and statistics
• apply a range of techniques effectively to solve problems in mathematics and statistics and in the applications of mathematics and statistics, including theory, deduction, approximation, and simulation, and present multiple pathways for a given problem
• construct, analyze, and interpret mathematical models for a variety of real-life problems, drawing on a wide range of areas of mathematics and a wide range of tools
• use computer programs and algorithms: both numerical and graphical, to obtain useful approximate solutions to mathematical problems and to present and visualize numerical results and reasoning appropriately
• analyze data using appropriate concepts and techniques from statistics and mathematics and present the results with appropriate vocabulary, formulae and graphical displays
• learn new mathematical concepts, methods and tools from the literature, and texts and be able to apply them appropriately in biological contexts
• communicate mathematical concepts, models, reasoning, explanation, interpretation and solutions clearly and effectively in multiple ways and to audiences inside and outside of mathematics: oral presentations, written reports, visually and with physical models, and present explanations for selecting
these methods

- identify and describe some of the current intellectual and ethical issues and challenges within the field of mathematics biology and the applications of mathematics to biology
Course Design:
Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged. Please detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication or on-campus attendance. Alternatively, please explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Instruction:
1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department/division members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained OR in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

Some of the time allocated to lectures will be spent in the computer lab (most likely the Gauss Lab in S110 Ross, maintained by the Department of Mathematics and Statistics). Maple and Matlab will be used. Students will be required to work individually as well as in small groups.

Individual and group projects, individual reflections, and communication with peers and the instructor will be essential components of the course.

1. One section in the winter term.
2. Currently, 5 department members are competent to teach this course.
3. J. Heffernan
4. 3 class hours per week for one term.
Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided. If the course is to be integrated, the additional requirements for graduate students are to be listed. If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
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<tbody>
<tr>
<td>40%</td>
<td>Regular homework assignments</td>
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<tr>
<td>10%</td>
<td>Class and lab participation, including weekly reflection papers and peer assessments</td>
</tr>
<tr>
<td>50%</td>
<td>Projects</td>
</tr>
<tr>
<td>5%</td>
<td>Project proposal</td>
</tr>
<tr>
<td>5%</td>
<td>Project discussion, meeting with professor</td>
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<tr>
<td>5%</td>
<td>Progress report</td>
</tr>
<tr>
<td>10%</td>
<td>Project presentation</td>
</tr>
<tr>
<td>25%</td>
<td>Final written report</td>
</tr>
</tbody>
</table>

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES
The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course. Also please list any online resources.

If the course is to be integrated (graduate/undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied. LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Reading list:


O Diekman and JAP Heesterbeek, Mathematical Epidemiology of Infectious Diseases, John Wiley & Son.


Other Resources:
A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain. COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

The Gauss Lab (S110 Ross), administered by the Department of Mathematics and Statistics, has suitable resources and software for this course (MATLAB, Maple). No new resources are required.
Mathematical Biology is a field of Applied Mathematics that has been experiencing much growth over the past few years. The proposed course is a result of a new program proposal for a degree in Mathematical Biology.

The expected enrolment is about 20-30 students.
Faculty and Department/Division Approval for Cross-listings:
If the course is to be cross-listed with another department/division this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women’s Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

<table>
<thead>
<tr>
<th>Dept.: ________________________________</th>
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<tbody>
<tr>
<td>Signature (Authorizing cross-list)</td>
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<td>Date</td>
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</table>

CCAS 02/04/19
Remarks
The Chair of Senate, Professor George Comninel, advised that the December meeting would not be held unless there was pressing business, and wished Senators well as the Fall Term came to a close.

The President, Dr Mamdouh Shoukri, celebrated recent notable accomplishments by members of the York community, commented on a transformative donation in support of Global Health from Victor Dahdaleh, and pointed to another encouraging rise in reputational indicators in the Maclean’s annual university rankings while identifying areas in which strides must be made. Dr Shoukri also provided Senators with a copy of correspondence from the Executive Heads of Ontario Universities to the Executive Director of the provincial government’s University Funding Model Reform initiative. Finally, efforts are underway to ensure that York responds swiftly and appropriately to provisions in the provincial government’s Sexual Violence and Harassment Action Plan Act.

The President’s monthly “Kudos Report” can be accessed from the agenda package.

Reports
Under the auspices of the Academic Policy, Planning and Research Committee Provost Rhonda Lenton and Vice-President Finance and Administration presented a joint report covering a wide range of topics, including:

- the overall context for academic planning
- enrolments and complements (current data and planning assumptions)
- the budget context for academic planning
- Markham Campus planning
- working groups established to make recommendations flowing out of the Institutional Integrated Resource Plan (endorsed by Senate in September 2015)
- implementation of the SHARP budget model

The report can be accessed from the Senate meeting Website with other material for the meeting.

Approvals
Senate approved the chartering of a Global Health Research Institute for a term beginning January 1, 2016 and ending June 30, 2021 as recommended by the Academic Policy, Planning and Research Committee.

Senate approved recommendations made by the Academic Standards, Curriculum and Pedagogy Committee to:
The Senate of York University

Synopsis

- establish a PhD Program in Nursing, Faculty of Graduate Studies
- amend the requirements for the MA Program in Cinema and Media Studies, Graduate Program in Cinema & Media Studies, Faculty of Graduate Studies
- add a Delayed-Entry Option for the International Bachelor of Business Administration Program (iBBA), Schulich School of Business

Notice of Motion to Establish a New Degree Type

ASCP gave notice of its intention to recommend at a future meeting the establishment of a Degree of Master of Real Estate and Infrastructure, Schulich School of Business / Faculty of Graduate Studies (at the same meeting it will recommend approval of an MREI degree program).

University Academic Plan 2015-2020

Academic Policy, Planning and Research advised that it had received submissions from most Faculty Councils and was poised to review the results of a community survey in which there were more than 600 respondents. The survey and other input received during the recent consultation phase of the UAP renewal process will inform a discussion paper which will help animate discussion at a special forum on the next University Academic Plan at 9:00 a.m. on Thursday, December 10 in Founders Assembly Hall. An invitation will be forwarded in the near future.

Committee Information Reports

Senate Executive informed Senators of the following:

- the advancement by two weeks of the June meeting of Senate to avoid a conflict with convocation ceremonies
- its approval of members of Senate Committees nominated by Faculty Councils
- a high participation rate by Senators in balloting to determine Senate’s nominees to the Presidential Search Committees and the timelines for announcing the membership of the committee
- vacancies on Academic Standards, Curriculum and Pedagogy, Awards, Tenure and Promotions and Tenure and Promotions Appeals
- its approval of the 2015-2016 membership lists for the Councils of Arts, Media, Performance and Design, Health, Lassonde, Liberal Arts and Professional Studies, Osgoode and Schulich
- the presentation, likely in January, of proposed amendments to Senate’s Rules and Procedures

Academic Standards, Curriculum and Pedagogy reported that minor revisions had been made to the sessional dates for Summer 2016 terms (posted online with the agenda package).

Please refer to the full Senate agenda posted online for additional information.