

Minutes of the Third Senate Meeting
November 4, 2011, 3:00 pm, RL RM 235

Present: A. Abd-El-Aziz, D. Buck, L. Chilton, D. Coll, J. Coles, S. Dawson, D. Desserud, B. Déziel, G. Doran, I. Dowbiggin, M. Doyle, A. Duncan, K. Gottschall-Pass, F. Gray, D. Hooper, P. Hooper, K. Kielly, R. Livingstone, J. MacAulay, G. MacDonald, J. Randall, D. Reynolds, K. Schultz, H. Stryhn, M. Sweeney-Nixon, S. Wiebe, J. Sentance, N. Kujundzic, A. MacFarlane, M. MacInnis, L. Pack, A. Smallwood

Regrets: M. Arfken, W. Bradley, B. Campbell, R. Domike, A. López, L. Edwards, D. Murnaghan, K. Tilleczek, B. Wagner

Absent: G. Germain, C. Lacroix, S. Opps, M. Turnbull

The President called the meeting to order.

1. Approval of the Agenda

Moved (R. Déziel/F. Gray): to approve the agenda.

Carried.

2. Approval of the Minutes of October 14, 2011

Moved (R. Livingstone/Jeanette MacAulay): to approve the minutes of October 14, 2011.

Carried.

3. Business Arising from October 14, 2011 Meeting

The Secretary to Senate informed Senators that the Senate Handbook will be delayed approximately 1 month owing to additional detailed work required. The extra time allotted will help ensure all information presented to Senate will be accurate.

4. President's Report

Highlights include:

- UPEI's L.M. Montgomery Institute names Swedish visiting Scholar
- Deloitte name ScreenScape a Company to Watch
- UPEI in fourth place in MacLean's rankings
- UPEI Calendar Dates - September - December 2011
- Special Event: CTPAX: An Evening of One-Act Plays by Anton Checkov

General

The President acknowledged and welcomed the Engineering Faculty members and many Engineering students who came in support of the new Engineering degree being proposed at this meeting of Senate.

Dean of Veterinary Medicine (Power Point Presentation): At the invitation of Senate, the first of the Deans to present on their college, school or faculty was Dr. Reynolds, Dean of Veterinary Medicine. Dr. Reynolds was pleased to report the highlights of the AVC, in this its 25th anniversary year, including: the AVC History/Mission, Leadership Teams, Programs/Learning, DMV Statistics across the Atlantic Provinces, AVC Graduates in Atlantic

Canada, AVC Opportunities in research discoveries, employment opportunities and professional services/training, and Community Outreach Programs, AVC Accomplishments and Future Directions.

The President thanked Dr. Reynolds for his very informative presentation and advised Senate that the Dean of Business will present at the next meeting.

5. Senate Reports

Nominating Committee Report

Moved (L. Chilton/M. Sweeney-Nixon): to approve the Nominating Report –

Honorary Degree Committee

Faculty Member - David Sims

Alumni - Kim Blanchard and Lori Pendelton

Research Grants Committee

Undergrad Student - Emily MacKinnon

Research Advisory Committee - Two Faculty Members required (3 nominated)

Tarek Saleh (Health Sciences)

Ye (George) Jia (Social Sciences)

Scott Lee (Humanities)

Vote took place and Ye (George) Jia and Scott Lee were declared elected

Carried

Academic Review and Planning Committee

Moved (J. Randall/D. Dessured): that Senate approve a department name change in the Faculty of Arts from the Department of Political Studies to the Department of Political Science.

There was considerable discussion on the name change and the merits of having a research methods course offered within the Department. The minutes will show that it is the advice of Senate to consider the creation of such a course within Political Science.

1 Abstention

Carried

Moved (J. Randall/ R. Déziel): that the description for **specialization** in the University Calendar be revised to read as follows:

Specialization: a specialization is an approved selection of specific courses (15-~~27~~ 30 semester hours) internal to a major that represents a focused subject area of study. In the case of Business, education, ~~and~~ Nursing and Engineering students, where specializations are available, a specialization is internal to the degree requirements. **NOTE:** for graduate programs, specialization refers to a focused area of study and/or research within the structure of a specific graduate program, as defined internally for that program.

Carried

Moved (J. Randall/L. Chilton): that a description for cross-listed courses be added to the University Calendar to read as follows:

Cross-listed course: a) a cross-listed course is a single course offered for registration under two or more departments, is taught at the same time, by the same instructor, and in the same location. The course has the same title and content/assessment methods. Prerequisite requirements may vary and the course prefix is different, e.g. W ST 435 is cross-listed with PSY 435; or b) a cross-listed course is a single course offered for registration in the same department, e.g. at the 300/500 level or the 400/600 level, and is taught at the same time, by the same instructor, and in the same location. The courses have a different number, and the content/assessment methods vary based upon the level of course taught.

Following discussion, and recognizing the complexity of program areas that house a number of cross-listed courses, a friendly amendment was made to the meaning of a cross listed course, as follows: a) a cross-listed course is a single course offered for registration under two or more ~~departments~~ programs, is taught at the same time,

Carried

Moved (J. Randall/K. Gottschall-Pass): that the university offer, through the Department of Engineering in the Faculty of Science, a program of study leading to a Bachelor of Science in Engineering, the content and structure of which shall be described in the attached submission.

The Chair of the Engineering program was invited to provide a summary of the proposal and the rationale for coming forward with a degree proposal at this time. Prof. Champion indicated that UPEI has had an Engineering Diploma for 35 years and there has been a growing interest in expanding the program to include a degree. This degree initiative has broad support from the campus in that all the science departments are directly involved in the program delivery. Senators were very supportive of the Engineering degree and were interested to know about the new fee structure proposed and the level of program review that occurs prior to a degree coming forward to Senate. The Vice President Academic responded that matters of fees and the level of Committee review at ARPC and other levels, Department, Department Chairs, and Faculty of Science are handled in great detail and proposals do not come forward to Senate without careful attention and rigorous analysis.

Modifications to the current diploma program coupled with a unique curriculum design focusing on an integrated Engineering degree are strongly supported by students and faculty. When asked for a student perspective on the degree proposal, Philip Hurley stated that having more opportunities for degree studies at UPEI is viewed favorably by students. Currently, many students on the Island have to move to Charlottetown to undertake their diploma studies. Those who wish to complete a degree then have to move again, this time off Island. This degree will open up more opportunities for students.

Carried

Curriculum Report

Moved (J. Randall/D. Desserud): Senate approve the Third Curriculum Report.

- **Faculty of Arts**

Department of Political Studies-~~Science~~ (POLS)

approve the changes to the Political ~~Studies~~-Science areas of the calendar.

- **Faculty of Science**

Department of Biology

approve the following changes to the Biology program:

At the end of the section “BIOLOGY MAJORS PROGRAM”, the first asterisk entry shall be amended as follows:

- * in all streams, at least four of the required Biology electives must have a laboratory or field component. The list of electives that can count toward each stream is given in the table provided below. Biology 440 may not be used to meet this requirement for Biology courses at the 400 level.

Under the heading “List of Courses that may be used toward the specialization areas in Biology”, the third bullet shall be changed to:

Certain Biology 441 (Directed studies) or 442 (Special Topics) courses may be credited to one stream or the other with prior permission of the Chair.

The fourth bullet under this same heading shall be changed to:

Courses that are required components for one stream or the other (e.g. Biology 221 and 326 for the Life Sciences specialization; Biology 222 and 382 in the Environmental Biology specialization; ~~Bio 331 in the General stream~~) can be counted as “alternate” electives for the other specialization. Bio 202, 204 and 206 may also be counted as alternate electives when not used to satisfy core requirements for either specialization in the second year.

Add * Bio 304 - Vertebrate Zoology to Life Sciences Specialization list.

Add * Bio 304 - Vertebrate Zoology to Environmental Biology Specialization list.

Add to the General Biology courses list:

- * Bio 202 - Plant Diversity
- * Bio 204 - Animal Diversity
- * Bio 206 - Microbial Diversity

Department of Chemistry

accept the following changes to the Major in Chemistry:

Requirements for a Major in Chemistry

First Year Physics ~~111~~ 121-122 or 111-112 6 credit hours

The chemistry electives may be chosen from the Chemistry courses numbered: 202, 382, 432, 441, 461, 462, 463, 464, 466, 467, 468, 469, 482 or 483. At least one of the electives must be a 4th year course. The mathematics elective may be selected from Mathematics 221, 242, 252 or 261.

Requirements for Honours in Chemistry

First Year

Physics ~~111~~ 121-122 or 111-112 6 credit hours

Change contact hours for Chemistry 202

Three lecture hours ~~a week; laboratory or field trip every other week.~~ per week and three laboratories during the term (scheduled during the first class).

Department of Computer Science

approve changes to Computer Science courses:

CS 435 to 435 ~~APPLIED~~ COMPUTER GRAPHICS PROGRAMMING

CS 436 ADVANCED COMPUTER GRAPHICS PROGRAMMING

This course builds on the computer graphics programming concepts introduced in CS435.

Students are given a deeper understanding of the components of the 3D graphics pipeline, and how they are used in modern graphical applications. Topics include advanced texture mapping, practical uses of vertex and pixel shaders, screen post-processing, particle systems, and graphics engine design.

PREREQUISITE: ~~CS 261 and Mathematics 261~~ Computer Science 435

Three lecture hours a week.

Computer Science Co-operative Education Program

The Computer Science Co-operative Education Program is an optional five-year program that complements the Bachelor of Science Program in Computer Science with a minimum of four (4) ~~4~~ terms of supervised work experience divided between at least two placements. A placement is the continuous period a student spends with one employer. Each placement can be one work term or two work terms in duration and must start at the beginning of January, May or September. A work term is 14 to 16 weeks in duration but in exceptional circumstances a shorter duration work period may be permitted. Normally, the first work placement commences after the student has completed two years of the BSc degree program.

Students should note that the Co-operative Education Program is not a summer work program. At least one work term will be taken during a regular academic term. A limited number of placements will be available in a given year. Eligibility for a placement will be decided by the Co-op Coordinator and Program Director while hiring decisions for Co-op students are made by the employers.

~~Students are required to apply by early December for a first work term starting in May of the following year, or in early April for a first work term starting the following January.~~ Students who successfully complete all requirements of the program will have a notation entered on their transcript and their degree parchment.

Admission Requirements

Applications to join the Computer Science Co-operative Education Program are made at the end of the first or second academic terms to the Computer Science Co-op Program Director ~~Co-operative Education Coordinator~~. A student must be a full time student majoring in Computer Science at the time of application. In addition to their interest, motivation, and abilities assessed through an interview, students must complete the requirements for the ~~second~~ first year of their undergraduate BSc program in Computer Science with a cumulative average of ~~65%~~ 70% or higher and a Computer Science average of ~~65%~~ 70% or higher to be admitted to the program. ~~These requirements~~ Requirements for a first work term normally include the completion of 60 credit hours towards the BSc Degree at the time of the ~~first~~ placement including CS 151, CS 152, CS 241, CS 252, CS 261, and CS 282. ~~Applicants who have completed 54 credit hours will be considered provided that the required Computer Science core courses are completed at the time of the first placement.~~ Students not admitted may reapply upon completion of their next academic semester.

Continuance Requirements

To remain in the Co-op program, the student must continue to satisfy all the requirements of the BSc Program, and maintain cumulative and Computer Science averages of ~~65%~~ 70%, in addition to achieving satisfactory performance on previous work terms. Students must register for a Co-operative education work term before each work term. They must also attend the seminars and workshops organized to provide the required employment orientation and professional development. They may also be required to give talks to their peers introducing ~~tools and techniques~~ skills and methodology learned on the job.

Program Requirements

In addition to satisfying the requirements for the BSc Program in Computer Science, Co-operative education students must fulfill the following work term requirements:

1. The completion of a minimum of four terms of work experience in approved, academically-relevant, employment situations of 14 to 16 weeks duration each.
2. A satisfactory employer evaluation for each co-op work ~~placement~~ term.
3. The satisfactory completion of a written report as required for each ~~placement~~ work term.
4. Fulfillment of any other requirements specified by the Department, such as the participation in seminars and workshops.

~~A notation will be placed on students' academic transcripts following completion of each work term.~~

Withdrawal Conditions

Students may be required to withdraw from the Co-op Program if:

1. They are dismissed from, discontinue, or fail an appropriate and approved Co-op work term ~~position~~ due to a fault on their part;
2. They fail to submit or successfully complete a work term report;

3. They do not satisfy the continuance requirements including the required course grade average necessary for continuance in Cooperative Education;
4. ~~They are no longer suited for the particular requirements of the Cooperative Education Program for a reason such as failure to abide by the policies and regulations governing the program.~~

Students have the right of appeal under Academic Regulation 12.

Work Term Registration

Students are required to register for all work terms ~~at the Registrar's Office~~, according to normal course registration procedures. ~~Work terms will officially be designated on students' transcripts as pass or fail.~~ A work term course grade is placed on a students' academic transcript following completion of each work term and graded on a pass/fail basis.

Fees

Students pay for their academic courses as they are taken. Students accepted to the Cooperative Education Program are required to pay regular student fees and a Co-operative Education Program Fee (see Calendar section on Fees).

Science Graduate Studies

approve the following new PhD-ESC courses:

ESC 801 - PhD THESIS
ESC 802 - COMMUNICATION STRATEGIES.
ESC 803 - CURRENT ISSUES IN ENVIRONMENTAL IMPACT ASSESSMENT.
ESC 804 - PRACTICAL ISSUES SURROUNDING ENVIRONMENTAL MANAGEMENT.
ESC 871 - ADVANCED STUDIES IN ENVIRONMENTAL TOXICOLOGY.
ESC 872 – ADVANCED STUDIES OF MACROECOLOGY AND BIOGEOGRAPHY.
ESC 873 – CONSERVATION GENETICS.
ESC 875 – QUANTITATIVE METHODS FOR THE ANALYSIS OF ANIMAL MOVEMENT.
ESC 877 – VETERINARY BIostatISTICS
ESC 878 - ISLAND BIOGEOGRAPHY AND CONSERVATION OF INSULAR SYSTEMS.
ESC 879 - ADVANCED TECHNIQUES IN SCANNING ELECTRONIC MICROSCOPY.
ESC 880 – MOLECULAR BIOTECHNOLOGY

Science Graduate Studies

approve the following change to a Calendar entry

FACULTY OF SCIENCE PhD PROGRAMS IN MOLECULAR AND MACROMOLECULAR SCIENCES (MMS) AND ENVIRONMENTAL SCIENCES (ESC)

Structure of the Program

The purpose of this PhD degree program is to provide a doctoral - level research experience for candidates, ensuring that they develop critical thinking, creativity and subject mastery through their program. A secondary objective is to provide a value-added degree containing a significant business (PhD MMS) or environmental communication (PhD ESC) component to the studies. This degree will offer graduate education at the PhD level that meets the needs of the global scientific, business, industry, research and academic environments in Molecular and Macromolecular Sciences, or Environmental Sciences, both identified as ~~one of the~~ constellations of research strength at UPEI.

~~This~~ These degree programs are ~~is~~ research-intensive and will require the student to develop a thesis based around an individual, independent thesis topic. This foundation will be complemented by graduate-level constellation-based courses ~~and selected courses from the School of Business~~, a comprehensive examination and a final oral defence of the thesis. Unless otherwise specified below, the “General Regulations for Graduate Programs” will apply to the Doctorate of Philosophy in Molecular and Macromolecular Sciences and Environmental Sciences degrees.

Admission Requirements

Acceptance into the program will be granted on the basis of qualifications and suitability to fit into the main research endeavours of MMS or ESC members who are also members of the Graduate Faculty with a PhD/Masters supervisory role.

Students must hold a Master of Science degree or its equivalent from a recognized university and have achieved at least a second class standing (70-80%) for this degree. Students may also be admitted to the PhD program by registering in the existing MSc program in Science and transferring to the PhD program after twelve (12) to eighteen (18) months upon the recommendation of their supervisory committee. In special circumstances, highly exceptional students with first-class BSc Honours degrees may be admitted directly to the PhD program (contact the office of the Dean of Science for specific criteria for admission). Evidence will be required that the applicant is capable of undertaking substantial original research. Admission to the MMS or ESC PhD programs is granted on the basis of a recommendation of the Faculty of Science Graduate Studies Committee and explicit supervisory support from a faculty member within the ~~Molecular and Macromolecular Sciences~~ corresponding constellation. Faculty members must demonstrate research funding to cover four years of guaranteed stipend support or exhibit sufficient research progress that funding renewal is expected.

Applicants are encouraged to visit the Faculty of Science Graduate Studies website (<http://www.upei.ca/science/graduatestudies>), and contact faculty members within the MMS or ESC constellations to discuss research interests and to confirm the availability of a position within their group. Secondly, applicants will submit an application package including an application form, official university transcripts for the applicant's complete undergraduate and graduate (if any) record to date, three letters of reference, at least two of which should be from faculty members with a strong familiarity with the applicant's academic and research background, proof of English language proficiency such as TOEFL scores (for applicants whose first language is not English) which meet the minimum scores as listed under the general Admission Requirements in the university Calendar and evidence of the ability to conduct substantial original research including, but not limited to, theses, publications and research presentations.

Residency Requirements

Given the nature of these programs, a minimum of six full terms (two fall, two winter, and two summer terms) is required to complete course work. A maximum period of seven (7) years from the date of registration will be allocated for the completion of the PhD program. Exceptional circumstances will be considered provided that they are supported by the student's supervisor and properly communicated, discussed and supported by the supervisory committee. In all cases, extensions beyond this maximum period must be approved by the Faculty of Science Graduate Studies Committee and the Office of Graduate Studies.

Supervision

In the first semester of the PhD program, each student will be assigned a supervisory committee which will consist of the student's supervisor and three (3) members chosen from UPEI faculty or adjunct faculty within the MMS corresponding constellation (or from the School of Business in the case of MMS)

or a cognate discipline. For MMS students, it is expected that at least two members of the committee will be from the MMS constellation and that at least one member of the committee will have significant business experience, either as a member of the School of Business or as an adjunct or regular faculty member with industrial expertise. The majority of students' time will be engaged in developing their research project, but this experience will be supplemented by coursework ~~in Science and Business~~; specific courses will be chosen in consultation with the supervisory committee.

Research

Independent research will be the major focus of the PhD degree. Normally, the equivalent of at least nine full-time semesters must be devoted to research in fulfillment of the thesis requirement. Summers during which research work is actively conducted may be counted as research semester equivalents. In order to avoid undue prolongation of the time required to complete the degree, the research topic should be identified early and approved by the Supervisory Committee. The research should comprise an extensive body of original research in the candidate's field, making a true contribution exemplifying the student's depth of knowledge, creativity, innovation and proven ability to make significant scientific research contributions. Research progress will be monitored by biannual meetings of the Supervisory Committee as proscribed by the Faculty of Science Graduate Studies Committee. Research involving the use of hazardous materials must follow the Guidelines of the Workplace Hazardous Materials Information System. Research involving animals or humans, must follow established protocols on Animal care and ethics, respectively.

Candidacy Examination

Doctoral students must complete a candidacy examination within two (2) years of entering the PhD program. Students who register as Masters students at UPEI and then transfer into the PhD program must complete their candidacy exam within three (3) years of registering as a graduate student at UPEI. Before the exam, the student must present a basic thesis proposal to the Supervisory Committee and obtain a recommendation that the student proceed with the oral candidacy exam. The supervisory committee will inform the Faculty of Science Graduate Studies Committee of this decision, and will suggest the make-up of the Candidacy Examination Committee.

The Candidacy Examination Committee will consist of two (2) members of the Supervisory Committee and one (1) external faculty member from the University of Prince Edward Island who does not necessarily need to fall within the MMS corresponding research constellation; this third member could be from another scientific research constellation. A designate from the Faculty of Science Graduate Studies Committee will act as Chair of the examination.

The student will then distribute copies of a detailed thesis proposal to the Candidacy Examination Committee and the Faculty of Science Graduate Studies Committee. The latter will schedule a mutually agreeable time and place for the exam. This proposal must be received at least three weeks prior to the scheduled exam. The expanded thesis proposal should address not only the research plan, but also how the student's courses in both MMS and Business relate to the proposed work. The examination begins with a formal presentation by the student not to exceed 30 minutes followed by the candidate being asked to respond to questions from the Examination Committee on topics related to the proposed area of research and general topics in the student's field. ~~as well as how these fields, and the proposed research, relate to business, technology transfer and entrepreneurship~~ (1-2 hours). The questions, while broad in scope, will invariably focus on the student's research proposal and will evaluate the student's expertise in their field. The Examination Committee will then deliberate in a closed session to make a judgment of satisfactory or unsatisfactory. A judgment of satisfactory will result in the student being declared a PhD Candidate. If the judgment is unsatisfactory, the student will be required to re-take the exam within 4 months. A second unsatisfactory judgment will result in the student being required to withdraw from the PhD program. ~~If the student has not previously completed an MSc degree, he or she is then free to enter the MSc program and transfer research and academic coursework.~~

Thesis

Each candidate for the degree of Doctor of Philosophy in Molecular and Macromolecular Sciences or Environmental Sciences is required to submit a thesis based upon the research conducted under supervision described above. The thesis must demonstrate the candidate's capacity for original and independent work, and should include a critical evaluation of work which has previously been done in the field of his or her research. The thesis should emphasize any new conclusions which may be drawn from the candidate's own research. For MMS students, while there is no requirement that the work conducted be directed towards industry, business or commercial applications, students are expected to address the significance and importance of their work to technology, industry and innovation in Canada and the world. General specifications as to type of paper, format, order and binding will be available as necessary.

Examination and Publication

The final oral examination of the PhD thesis will consist of a research seminar, followed by questions from the Doctoral Examination committee. The examination will be public, but members of the audience may only question the candidate upon invitation of the Chair of the Committee. The committee will be chaired by a representative from the Faculty of Science Graduate Studies Committee and will consist of a ~~minimum~~ of five members as follows: Two (2) representatives from the student's supervisory committee, One (1) internal examiner from the University of Prince Edward Island, preferably a faculty member with relevant research experience, and One (1) external examiner from outside the University of Prince Edward Island, preferably from another University or Research Institute, as deemed appropriate, ~~and the student's supervisor(s), sitting on the committee without voting power.~~

The external examiner will be chosen by the Faculty of Science Graduate Studies Committee from a list of three arms-length nominees who should be experts in the candidate's research field. The nominees will be suggested by the Supervisory Committee in consultation with the student. It is preferred if the external examiner can attend the examination in person, however the external examiner can participate via video or audio conference call if this is impractical. Following the examination, the candidate will leave the room and the committee will deliberate upon the decision.

The members of the Examination committee, including the External Examiner, report individually on both the defence and the thesis, the candidate being deemed to have passed if not more than one of the five Examiners votes negatively. An abstention is regarded as a negative vote. If successful, the candidate will be awarded his or her PhD degree ~~and any business designations met by his or her course selection.~~ If unsuccessful, the candidate will be permitted to re-take the examination within 6 months. If unsuccessful in the second attempt, the student will be required to withdraw from the PhD program. If the student has not previously completed an MSc degree, he or she is then free to enter the MSc program and transfer research and academic coursework.

Courses

A) PhD IN MOLECULAR AND MACROMOLECULAR SCIENCES COURSES

Students will be required to take three (3) graduate-level courses in Molecular and Macromolecular Sciences, three (3) graduate-level courses in business, and one (1) capstone course that integrates science and business components. Each student must complete a minimum of three (3) courses within the first 18 months of the degree, which may be a combination of the science and business requirements but must include at least one MMS and one business course. In addition, students should have started their capstone project, although completion of this project is not a requirement for this period.

Following this initial stage of research and coursework, each student will take a candidacy exam adjudicated by a Candidacy Examination Committee, and upon its successful completion will become a PhD candidate. Completion of the remaining required courses, further development of the research project, and preparation of a thesis within a maximum of seven (7) years will culminate in the defence of this body of work in a public forum, adjudicated by the student's supervisory committee and an external

examiner who will be an expert in the student's field of research. If a student, for any reason, withdraws from the PhD program they may elect to enter the MSc program at UPEI if no such degree has been previously obtained.

Prescribed courses

Graduate students are required to register for MMS 801 – PhD thesis throughout their degree program. Additional required constellation-based courses include MMS 802 – Molecules, Macromolecules and the Business of Science and MMS 803 – Directed Studies in Molecular and Macromolecular Sciences. Students are also required to take 2 additional MMS electives at the graduate level. Business requirements include BUS 603 – Marketing Management, BUS 701 – Biotechnology Management and Development and BUS 702 – Commercialization of Biotechnology and Innovations.

GRADUATE COURSES: PHD IN MOLECULAR AND MACROMOLECULAR SCIENCES (MMS)

MMS 801 PHD THESIS

This is a research - oriented course in which students will conduct an original research project, report orally on their work throughout the duration of the degree program, culminating in the submission and defence of a thesis. Students must register in this course each semester to maintain enrolment in the program. It embodies the research component of this program, and serves a primarily bookkeeping purpose.

MMS 802 MOLECULES, MACROMOLECULES AND THE BUSINESS OF SCIENCE

This capstone course highlights the integration between Molecular and Macromolecular Sciences and Business. In conjunction with the Program Coordinators and the PEI BioAlliance, the student will be paired with a receptive industry or government partner to develop a new research idea, direction, or application of potential interest to industry. The student will consult on scientific business ideas within the context of recent literature, scientific expertise, and the current industrial environment, with a focus on entrepreneurship and the development of new scientific products, processes, or markets. The partner in this course will be chosen so that the project will build toward the student's doctoral thesis with integration across all three components (doctoral-level study, MMS, and the business of science) of the program. This cross-sector collaboration will culminate in the student presenting and defending his/her work on the developed concept to industry and academic experts. This six-credit course will take place over a period of two–three semesters.

PREREQUISITE: Admission to PhD program

HOURS OF CREDIT: 6

MMS 803 DIRECTED STUDIES IN MOLECULAR AND MACROMOLECULAR SCIENCES

This course is a thorough study of a selected topic in the Molecular and Macromolecular Sciences constellation. Entry to the course, and the course outline, are subject to the approval of the Supervisory Committee and the Dean of Science. The course may include directed reading, directed research, and discussion with the instructor. The student may be required to prepare a written report and/or present a seminar in the area. Topics must not be directly related to the student's research project, although they may be in the same discipline. Coverage of the topic by the student must include the relevant commercial and business aspects of the field.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

ELECTIVE COURSES

MMS 804 FIELD COURSE IN MARINE DRUG DISCOVERY

This course offering will familiarize students in the areas of marine natural products, marine taxonomy, field based biological assays of relevance to drug discovery, marine microbiology, and biotechnology. Lectures will introduce students to the concepts of field research and their applications to drug discovery. Students will participate in field collections of marine invertebrates. The collected organisms will then be subjected to several biological and chemical assays. Students will present field reports identifying the collected species and any chemical or biological activities observed. The second half of the course will focus on supervised research projects. The project topics will be chosen by the students and instructors. In lieu of a text book, students will be provided with a collection of several publications from the marine natural products literature. These articles will include reviews of marine natural products, reports of recent advances, and founding texts of the field. Course experience in invertebrate zoology at the undergraduate level is strongly recommended.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 805 ADVANCED STUDIES IN NMR SPECTROSCOPY

This course covers the use of Nuclear Magnetic Resonance (NMR) spectrometry used in the determination of structures in Organic and Inorganic Chemistry. Major topics include the theory and use of NMR spectroscopy, in particular the use of 2D experiments and multi-nuclear NMR spectroscopy. Particular emphasis is placed on developing the students' ability to interpret spectra and elucidate the structure of a molecule based on this evidence beyond the undergraduate level, as well as the role NMR has played as a structural tool in the pharmaceutical industry and academia.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 806 ADVANCED TOPICS IN COMPUTATIONAL CHEMISTRY

(See MMS 883)

MMS 807 ADVANCED STUDIES IN INORGANIC REACTION MECHANISMS

This course develops inorganic reaction mechanisms, with an emphasis on catalytic cycles, catalyst development, and the context of these reactions within the polymer, pharmaceutical and consumer product industries. Students will learn how to support reaction mechanisms through appropriate experimentation and spectroscopic characterization of catalysts, reactions and products. Students will examine how new catalysts are developed, patented and brought into commercial use. Major projects include a patent application on an imaginary catalytic system, and a report assessing the commercial relevance of a recent literature discovery.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 808 GREEN CHEMISTRY

This course will develop the fundamentals of greener chemical processes and syntheses. The course will present the principles of green chemistry in the context of case studies within Canadian academia and industry. Coursework and projects will aim to develop synthetic skills, providing students with the tools to propose green synthetic plans for small molecules and polymers while introducing students to wider political and environmental issues which impact on chemical industry.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 809 BIOMATERIALS

This course covers the fundamentals of the synthesis, properties, and biocompatibility of metallic, ceramic, polymeric, and biological materials that come in contact with tissue and biological fluids. Emphasis is placed on using biomaterials for both hard and soft tissue replacement, organ replacement, coatings and adhesives, dental implants, and drug delivery systems. New trends in biomaterials, such as electrically conductive polymers, piezoelectric biomaterials, and solgel processing are discussed, and the recent merging of cell biology and biochemistry with materials is examined.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 810 SOFT CONDENSED MATTER PHYSICS

This course utilizes a variety of tools developed within the general framework of statistical and solid-state physics to study the structural and dynamic properties of a number of important soft-condensed matter systems, including: polymers, liquid crystals, and membranes. Some key topics include: (1) Liquid crystals: elasticity, deformations, surface effects, fluctuations and scattering; (2) Polymers: chain conformations, mixtures and phase behaviour, motion in melts and glasses (viscoelasticity, relaxation, reptation); (3) Membranes: two and three dimensional networks, self-assembly of amphiphiles, thermal fluctuations in membrane shape, bilayer bending and surface curvature. One of the goals of the course is to introduce students to a variety of important analytical methods, including: mean-field theory, density functional theory, Landau-Ginzberg theory, and renormalization-group theory. In addition, a number of key computational methods are employed to explore the properties of some simple polymeric systems, including: Monte Carlo, Molecular Dynamics and Discontinuous Molecular Dynamics.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 811 ADVANCE TOPICS IN MATERIALS CHARACTERIZATION

This course introduces students to instrumentation that is routinely used in materials chemistry. The techniques to be covered include powder X-ray diffraction, thermogravimetric analysis, differential scanning calorimetry, electron microscopy, AC impedance and Raman spectroscopy. The theory behind these techniques will be thoroughly discussed in class, with an emphasis of data interpretation. Students will also gain hands-on experience with these instrumental techniques through laboratory work.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

MMS 813 ADVANCED TECHNIQUES IN SCANNING ELECTRONIC MICROSCOPY

(See HDH 825)

MMS 824 ADVANCED STUDIES IN ENVIRONMENTAL TOXICOLOGY

This course provides an in depth analysis of environmental impacts of the major classes of contaminants including methodologies for environmental impact assessment and monitoring. Effects of environmental contaminants are examined at the ecosystem, organismal, cellular, biochemical and molecular levels.

Additional emphasis is placed on understanding the fate of contaminants of concern in aquatic and terrestrial environments including their environmental chemistry, biogeochemical cycles, and exposure and uptake pathways by organisms. The course consists of lectures, discussions of peer-reviewed literature, case studies, presentations by students and laboratories.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

B) PhD IN ENVIRONMENTAL SCIENCES COURSES

Students will be required to take three (3) mandatory graduate - level courses in Environmental sciences in addition to one (1) elective course in their disciplinary area. Each student is expected to complete these courses within the first 18 months of the degree. Graduate students are required to register for ESC 901 – PhD thesis throughout their degree program. Additional required constellation-based courses include ESC 902 - Communication strategies, ESC 903 - Current issues in Environmental Impact Assessment, and ESC 904 - Practical issues surrounding environmental management. Students are also required to take 1 additional ESC elective at the graduate level (see list below).

ESC 801 PhD THESIS

This is the main science-oriented component of the PhD, and as such, it is a course in which students will conduct an original research project, report orally on this work throughout the course of the degree, culminating in the submission and defence of a dissertation. A formal approval to initiate the research project will be granted after the supervisory committee has been established and a research proposal, including a thorough review of pertinent literature available, is provided by the candidate. Students must register in this course each semester to maintain enrolment in the program. It embodies the research component of this program.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 802 COMMUNICATION STRATEGIES

This workshop-style course is central to the certification in Environmental Communication Strategies and is built on the training offered through UPEI's Centre for Conflict Resolution. This course promotes the development of communication skills in the context of environmental issues and exposes students to direct interaction with representatives from industry, government, community, and the social sciences. The course will also provide broad theoretical and practical knowledge needed to resolve disputes as well as skills training in techniques of mediation, facilitation, and negotiation. Due to the uniqueness of this course, it is considered a critical component towards the development of experience and involvement on the decision making process. The topics addressed during presentations and discussions will be the starting point for the development of written reports that at a later stage will benefit from the feedback from the coordinating faculty, and the representatives of industry, government and community.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 803 CURRENT ISSUES IN ENVIRONMENTAL IMPACT ASSESSMENT

This course is intended to review the theory behind Environmental Impact Assessment (EIA) through the use of case studies that best exemplify project development that prevent or minimize environmental degradation. This course will examine the needs, methods, regulatory frameworks and social implications of EIA with emphasis on recent Canadian case studies. On completion of this course, students will be familiarized with the concept of EIA (its history, principles, key constructs and main steps), the legislative and institutional context of EIA, and will be able to critically examine EIA cases and identify their implications.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ES 804 PRACTICAL ISSUES SURROUNDING ENVIRONMENTAL MANAGEMENT

This course intends to provide hands-on experience to our students by deploying them in NGOs, government agencies, or environmental consulting companies for approximately 75 flexible hours (the equivalent to the number of contact hours typically considered for a course's lectures and laboratory). The primary goal of this course is to expose students of a given environmental discipline into the multiple aspects involved in the actual issues and decision-making process that take place in agencies outside the academic setting. This unique training period (spread from two weeks to an entire semester) will provide human resources to often resource-limited groups/entities that will be chosen by each supervisory committee according to their relevance for the student research focus. Students are expected to gain unprecedented experience and, to some extent, provide actual input into environmental management. The student will prepare a written report and share their experience by giving a public seminar. The supervisory committee in collaboration with the Faculty of Science Graduate Studies Committee will be responsible for identifying an appropriate placement based on the student's discipline and interests.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ELECTIVE COURSES

ESC 862 ADVANCED FRESHWATER ECOLOGY

This course provides advanced study in the ecology of freshwater habitats, particularly those found on Prince Edward Island. The first part of the course concentrates on the physical, chemical, and biological characteristics of fresh waters, classification of freshwater habitats, and applied limnology. A laboratory/field component includes an introduction to water analysis techniques and field equipment, field water analysis, the collection and analysis of biological samples, and the physical properties of water. The second part is a field/lab project on a limnological topic tailored to the student's individual program, and consists of an experimental or observational study coupled with a comprehensive literature review, project write-up, and oral presentation.

NOTE: Credit is not given for both Biology 462 (Limnology) and Biology 862 and ESC 862

ESC 865 ADVANCES IN MARINE ECOLOGY

This course provides an update on relevant areas of ongoing marine research. The first part of the course concentrates on marine ecology topics including benthic-pelagic coupling, dispersal and adult-larval interactions, animal-sediment relationships, biodiversity ecosystem services, encrusting communities and their interactions, and aquatic invasive species. The second part includes participation in regular discussion sessions based on analysis of advanced literature relevant to the discipline and to the student's particular research. Assignments include an essay relevant (but not restricted) to a student's field of

research, and a seminar on a topic relating general ecological hypotheses to the topic addressed in the essay.

NOTE: Credit will not be given for both Biology 465 (Marine Community Ecology) and ESC 865.

HOURS OF CREDIT: 3

3 hours lecture and 3 hours lab/field trip per week, plus discussion group.

ESC 871 ADVANCED STUDIES IN ENVIRONMENTAL TOXICOLOGY

Cross-listed with MMS-824

This course provides an in depth analysis of environmental impacts of the major classes of contaminants including methodologies for environmental impact assessment and monitoring. Effects of environmental contaminants are examined at the ecosystem, organismal, cellular, biochemical and molecular levels. Additional emphasis is placed on understanding the fate of contaminants of concern in aquatic and terrestrial environments including their environmental chemistry, biogeochemical cycles, and exposure and uptake pathways by organisms. The course consists of lectures, discussions of peer-reviewed literature, case studies, presentations by students and laboratories.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

ESC 872 ADVANCED STUDIES OF MACROECOLOGY AND BIOGEOGRAPHY

This course examines our current understanding of the patterns of distribution and abundance of organisms from the integrative perspective of macroecology and biogeography. The first discipline is concerned with understanding patterns at large spatial and temporal scales via the use of large quantitative databases and statistical techniques. The second one is concerned with the study of the patterns of distribution of animal species by integrating information on historical events (e.g., plate tectonics), evolutionary processes, as well as ecological and physiological trends.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

ESC 873 CONSERVATION GENETICS

Conservation genetics is an emerging and topical field of biology that combines molecular genetic approaches with environmental, evolutionary and ecological research under the umbrella of conservation biology. This course will cover a range of research topics pertaining to the conservation of biodiversity including ecological and landscape genetics, contemporary evolution and human-mediated change, invasion biology, genomics for endangered species, and genetics of captive or isolated populations. The course will introduce students to theoretical and experimental approaches to measuring and managing genetic diversity, as well as cultural and ethical issues in conservation biology through lectures, tutorial and case study discussion. Students will have hands-on experience with DNA and molecular marker analysis techniques, lead in-class discussions, write critical reviews of current research, and develop research proposals for selected questions in conservation genetics.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 875 QUANTITATIVE METHODS FOR THE ANALYSIS OF ANIMAL MOVEMENT

A better comprehension of animal movement is vital to interpreting key ecological and evolutionary processes, such as the spatial-temporal patterns of resource selection, foraging behaviour, and predator-prey interactions. As human activities continually alter landscapes and influence the behaviour and movement patterns of organisms, a variety of pressing ecological and health issues are emerging, such as the spread of invasive species and infectious diseases. Hence, advances in our understanding of animal movement will have direct implications in several disciplines including landscape ecology, conservation biology, and wildlife management, as well as those dealing with public health. In this course, the student will investigate the various methods currently employed to study animal movement in complex landscapes.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 877 VETERINARY BIOSTATISTICS

Cross-listed with graduate level course VHM 801. This course provides the student with a working knowledge of the basic statistical techniques used in veterinary science. Topics include descriptive statistics, inferential statistics, non-parametric statistics, analysis of variance, regression and correlation and experimental design.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 878 ISLAND BIOGEOGRAPHY AND CONSERVATION OF INSULAR SYSTEMS

This course examines the several fundamental patterns and processes that characterize biotas and environments on islands and other broadly defined insular systems. Topics covered include earth history and historical biogeography, speciation, dispersal, extinction, island biogeography, assembly and evolution of insular communities, island effect, adaptive radiation, environmental determinism, conservation biology, marine and terrestrial protected areas, and vulnerability of island biotas to terrestrial and aquatic invasive species.

PREREQUISITE: Admission to a graduate program in Science
HOURS OF CREDIT: 3

ESC 879 ADVANCED TECHNIQUES IN SCANNING ELECTRONIC MICROSCOPY

Cross-listed with MMS 813 and HDH 825. This course covers the principles of scanning electron microscopy including techniques used for the preparation of biological or other materials for microscopy and the use of specialized software to analyse surface features of samples. Students will learn to operate

the instrument over the full spectrum of use and will generate their own images and learn to interpret patterns. A microscopical investigation of material relevant to the student's discipline will form the basis of a course project.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

ESC 880 MOLECULAR BIOTECHNOLOGY

This course examines principles of gene manipulation, and the application of molecular biology in all the fields of biotechnology. Recent developments in medicine, agriculture, industry and basic research are considered. Emphasis is placed on reviewing current literature in the field, particularly on areas more closely related to the natural sciences/ environment.

PREREQUISITE: Admission to a graduate program in Science

HOURS OF CREDIT: 3

Carried

6. Other Business

In response to a question, the Chair informed Senate that a review of Global Issues 151 has been completed and report issued in May, 2011. The Vice President Academic will circulate the Executive Summary.

7. Adjournment

Moved (J. Sentance/M. Sweeney-Nixon) to adjourn the meeting at 4:10.

Respectfully submitted,

Kathleen Kielly, Registrar
Secretary to Senate