UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING

Report # 3207

To: Executive Committee
Faculty of Applied Science and Engineering

Re: 1. Curriculum Updates for the 2008/2009 Faculty Calendar
2. Proposed Session Dates for 2008/2009

The Curriculum Committee presents herewith its proposed updates to Chapters 7 and 8 of the 2008/2009 Faculty Calendar. A highlight of these updates is the proposed establishment of a new Engineering Science **Option in Energy Systems**. The committee acknowledges the indispensable leadership of Professor Bryan Karney in the development of this exciting new Option.

Also included in this report are the proposed Session Dates for the 2008/2009 Academic Year, which allow for a full 12.8 weeks of lectures followed by an appropriate examination period in both the Fall Session and the Winter Session.

Respectfully submitted,

Frank Kschischang
Chair, Committee on Curriculum
November 15, 2007

1. Summary of Proposed Curriculum Updates for 2008/2009 Faculty Calendar

Chemical Engineering

Major change: Currently, CHE 200F (Applied Chemistry I) and CHE203S (Applied Chemistry II) have lecture, lab and tutorial components. The lab has moved from the Wallberg building to new facilities in the Lash Miller building, that are shared with the Chemistry Department. There are logistical issues with running the lab in the identical fashion, as we do not have access to the rooms when our lab is not running. Consequently, we propose to remove the lab components from the existing courses, and create a new course – CHE204Y (Applied Chemistry III Laboratory). The overall course weighting, CEAB allocations and course hours remain the same in total; they are simply allocated in a different fashion. The lab will run with students doing experiments in a rotation basis, rather than the same experiment every week.

Minor changes: We propose to renumber EDC230S (Environmental Chemistry) as CHE230S, as only chemical engineering students take this course. We propose to switch the terms in which CHE467 (Environmental Engineering) and CHE469 (Fuel Cells and Electrochemical Conversion Devices) are offered, to accommodate instructor's workloads. We propose to modify the calendar entry for CHE334S (Team Strategies for Engineering Design) to focus specifically on the Process Safety Management aspects of design, rather than design in general. There is no change in program content or in student's hours with any of these proposed changes.

Civil and Mineral Engineering

Civil Engineering:
We propose to make the following changes:

1. replace CIV 101 (Structures, Materials, and Design) with CIV 100 (Mechanics). The description of CIV100 emphasizes the significant basic science content.
2. Change the description of EDV220 and change its title from “Engineering Ecology” to “Urban Engineering Ecology”,
3. change the title of CIV231 from “Transport I – Introduction to Transportation Systems” to “Transport I – Introduction to Urban Transportation Systems”,
4. change the description of CIV368 (Engineering Economics and Decision Making),
5. change the description of CIV523 and rename it from “Geotechnical Design” to “Urban Excavations”,
6. renumber CIV417 (Prestressed Concrete) as CIV517,
7. delete CIV314 (Structural Design) and change the Program Description of the CIV Collaborative Program in Environmental Engineering to replace CIV314 with CIV312 (Steel and Timber Design),
8. change the description of CIV575 (Building Science) to better emphasize the basic science content ,
9. rename CIV321 from “Geomechanics” to “Soil Mechanics”,
10. renumber JVM270 (Fluid Mechanics I) to CIV270.

Mineral Engineering:
We propose to make the following changes:

1. Change the sequencing of technical electives, thereby simplifying the presentation of the program,
2. eliminate technical electives MIN470 (Ventilation and Occupational Health) and CIV477 (Environmental Biotechnology),
3. eliminate one technical elective in each of terms 3F and 3S, thereby returning those terms to 5 courses each,
4. change the Survey Camp code (MIN240) to be consistent with the CIV designation (CIV358) in order to avoid duplicate course codes for a single course.

Electrical and Computer Engineering

Major Changes: These are mainly the second phase of a two-year process amending the sequence of courses taken in Years I and II. These changes were prompted by the need to re-introduce a formal course on complex variables as well as a course in chemistry. Four major changes to Years I and II are proposed:

1. Replace ECE 190 (Discrete Mathematics) with MAT 2XX (Advanced Engineering Mathematics)
    a. ECE 190 was already cancelled last year
    b. we propose to introduce MAT 2XX into Year II. This is a course that combines differential equations with complex analysis, using the Laplace transform as a bridge between the two subjects.
2. Replace MAT 298 (Linear Algebra and Differential Equations) with MAT 188 (Linear Algebra)
    a. MAT 188 was already introduced last year
    b. we propose to cancel MAT 298
3. Replace ECE 298 (Communication and Design I) with APS 104 (Introduction to Materials and Chemistry)
    a. APS 104 was already introduced last year
    b. we propose to cancel ECE 298, moving the first module on communication into the ECE 297 (Formerly ECE 299, Communication and Design II) course.
4. Move ECE 106 (Programming Fundamentals) to 2nd year
    a. ECE 106 was already cancelled last year
    b. we propose to introduce ECE 2YY into Year II

Minor Changes: All other proposed changes to the ECE curriculum are relatively minor, involving course-name and calendar-description changes (for ECE 299, ECE 445, ECE 451, ECE533), moving a 400-level course to 500-level (ECE 468), or adding a laboratory component (to ECE 422), changing the delivery and description of ECE 525.

Engineering Science

Foundation Years: Updates have been proposed for the ESC102 (Praxis 2) and ESC201 (Praxis 3) course descriptions, to better reflect current practice.

Specialization Years: We propose to rename ESC301Y (Praxis V: Option Seminars) as "Engineering Science Option Seminar" and to alter the description of ESC400H1S (Senior Seminar in Engineering Science).

Aerospace Option: We propose to update the descriptions of AER 336 (Scientific Computing) and AER 407 (Space Systems Design) to better reflect current practice.

Biomedical Option: We propose to allow choice of ESC4XX (Engineering Science Capstone Design) **or** MIE439 (Biomechanics) to satisfy the capstone design requirement, and to update the description of BME395 (Cellular Molecular Bioengineering I) to better reflect current practice.

Computer Option: We propose to make a full year thesis the default requirement, but an asterisk in the calendar will note that students can take a half-year thesis and an additional technical elective if they prefer. We also propose to add a CS/HSS elective space in the fourth year (via elimination of a technical elective) to satisfy the faculty requirement on CS/HSS.

Electrical Option: We propose to make the same changes to the thesis and the addition of a CS/HSS elective as in the Computer Option. We propose to modify the description of ECE359 (Energy Conversion) and add the following technical electives in the fourth year: ECE525 (Lasers and Detectors), ECE527 (Passive Photonic Devices), MAT389 (Complex Analysis), and ECE5XX (Lighting).

Infrastructure Option: We propose to change the elective choice in 3F (instead of the option of CIV427 (Geomatics) or CIV321 (Geomechanics), students are to take a technical elective in Civil engineering of their choosing) . We also propose to change the elective choice in 3S (instead of AER372 (Control Systems) or CIV340 (Municipal Engineering), students are to take Control Systems or another technical elective. We propose to make the full-year thesis a requirement. We also propose to add a CS/HSS elective space in the fourth year (via elimination of a technical elective) to satisfy the faculty requirement on CS/HSS. We also propose to add CIV516H1S (Public Transit Operations and Planning) as a technical elective.

Manufacturing Option: We propose to add a notation in the calendar stating that 08-09 is the last year in which the option will be run. We propose to eliminate ECE315 (Switch-Mode Energy Conversion) as a technical elective, and to add a CS/HSS elective space in the fourth year (via elimination of a technical elective) to satisfy the faculty requirement on CS/HSS.

Nanoengineering Option: We propose to add a CS/HSS elective space in the fourth year (via elimination of a technical elective) to satisfy the faculty requirement on CS/HSS. We propose to add ESC4XX (Engineering Science Capstone Design) to meet the capstone requirement and to move MSE550 (Advanced Physical Properties of Nanostructured Materials) from core to elective. We also propose a title and description change for MSE460 (Materials Physics II, formerly Quantum Structures) as well as a description and delivery change to MSE558 (Nanotechnology in Alternate Energy Systems).

Physics Option: We propose to eliminate the current "3 streams" model in favour of a course organization into 3 groups of technical electives from which students choose. We propose to add several technical electives, and to add a CS/HSS elective space in the fourth year (via elimination of a technical elective) to satisfy the faculty requirement on CS/HSS. We also propose to add ESC4XX (Engineering Science Capstone Design), to meet the capstone requirement.

Introduction of the Energy Systems Option (AEESCBASCJ):
Please note: **bolded** courses are new, *italicized* courses are restricted to Engineering Science only. It should also be noted that this new proposed option "passed" a preliminary minimum-path analysis, according to current CEAB requirements.

3F Semester	3S Semester
ECE359 (Energy Conversion)	ECE463 (Electric Drives)
MIE3XX (Mechanical and Thermal Energy Conversion Processes)	***EDV3XX (Design of Hydro and Wind Electric Plants)***
EDV3XX (Terrestrial Energy Systems)	*ECE356 (Linear Systems and Control)*
CHE3XX (Chemical Processes for Energy Storage and Generation)	ECE 413 (Energy Systems and Distributed Generation)
APS3XX (Energy Policy)	*MIE374 (Economic Analysis and Decision Making)*
ESC301Y (Engineering Science Option Seminar)	

4F Semester
ESC499Y Thesis
ECE5XX Introduction to Lighting Systems
Two of:

AER5XX	***Fusion***
CIV575	Building Science
CIV427	Fundamentals of Geomatics Engineering I
CHE469	Fuel Cells and Electrochemical Conversion Devices
ECE533	Advanced Power Electronics
ECE527	Passive Photonic Devices
EDV360	Environmental Impact and Risk Assessment
MIE442	Machine Design
MIE515	Alternative Energy Systems
CHE471	Modelling in Chemical Engineering

CHE553 Electrochemistry
CHE565 Aqueous Process Engineering
Free Elective

4S Semester
ESC4XX ***Energy Systems Capstone Design***
ESC499 Thesis
HS/CSS Elective
Two of:
CHE568 Nuclear Engineering
CHE412 Advanced Reactor Design
MIE315 Design for the Environment
MIE516 Combustion and Fuels
MIE517 Fuel Cell Systems
MSE558 Nanotechnology in Alternate Energy Systems
EDV360 Environmental Impact and Risk Assessment

Materials Engineering

Major Change: We propose to eliminate MSE410 (Industrial Research Project), eliminate MSE489 (Coordinated Program Thesis) and eliminate MSE499 (Thesis), replacing these with MSE498 (Design and Research Project).

Minor Changes: We also propose to make the following changes: modify the descriptions of MSE558 (Nanotechnology in Alternate Energy Systems) and MSE 245 (Organic Material Chemistry and Properties), renumber MSE404 (Extractive Metallurgy) to MSE504, (as mentioned in the Engineering Science section) adjust the description of MSE460 and change its title from "Quantum Structures" to "Materials Physics-II", and renumber MSE461 (Engineered Ceramics) to MSE561.

Mechanical and Industrial Engineering

Program-Independent Changes: We propose to make the following changes.
- MIE100 (Dynamics) description change to emphasize basic science content and delivery
- Add a new course MIE 2xx (Essays in Technology and Culture)
- Add MIE 2xx (Essays in Technology and Culture) to HS/S electives list

Proposed Changes to Mechanical Engineering Program:
- Basic Science adjustments
  - Move MIE333 (Engineering Physics) from 3F to 3W, and make it core
  - Make CHE353 (Engineering Biology) a required course
  - Remove a technical elective in 3W

    - Move MIE302 (Vibrations) and MIE347 (Electromechanical Energy Conversion) to list of tech elective options in 4W and renamed as MIE402 and MIE447, respectively
- Capstone adjustments
    - Remove MIE515 (Alternative Energy Systems) as a capstone option
    - Remove MIE539 (Biomechanics II) as a capstone option
    - Introduce MIE5xx (Integrated Mechanical Systems Design) capstone course
    - Change course description, delivery structure and CEAB AUs for MIE439 (Biomechanics)
    - Add MIE414 (Applied Fluid Mechanics) to the list of capstone courses in 4F
    - Rename MIE406 (MEMS Design and Microfabrication) to MIE506
    - Add MIE506 (MEMS Design and Microfabrication) to list of capstone courses in 4S
- ES+ED (i.e., combined Engineering Science and Engineering Design Aus) control measures
    - Delete MIE512 (Air Pollution: Its Formation and Control)
    - Remove MIE359 (Organization Design) as a technical elective in 4W
    - Add MIE359 (Organization Design) as a complementary studies elective
    - Remove AER336 (Scientific Computing) as a technical elective in 4W
    - Remove EDV220 (Environmental Science) as a technical elective in 4F
    - Remove MSE440 (Biomaterial Processing and Properties) as a technical elective in 4F
- Change delivery for MIE539 (Biomechanics II) from 3/2/- to 3/-/2

Proposed Changes to Industrial Engineering Program:

- Basic Science adjustments
    - Create a Basic Science Technical Elective in 3S
        - Introduce a new Basic Science course, MIE 3YYS (Ecological Systems)
        - Include CHE354 (Cell & Molecular Biology) (to maintain BioEngineering option for IE)
    - Make CHE353 (Engineering Biology) core
        - Remove MIE 333 (Engineering Physics) as an option
    - Remove MIE265 (Introduction to Systems Engineering) from the curriculum
    - Move a complementary studies elective from 3W to 2F
- Responses to low enrollment in specific courses
    - Delete MIE453 (Bioinformatics Systems)
    - Add MIE449 (Human-Computer Interface Design for Complex Systems) to capstone options
    - Change MIE457 (Knowledge Modelling and Management) to MIE557
- Delivery Changes
    - Change format for MIE365 from 3/-/1.5 to 3/-/2

  - Correct format for MIE359 from 3/-/1 to 4/-/-
  - Change format for MIE449 from 2/3/- to 3/2/-
- ES+ED AU control measures
  - Remove CHE354 (Cell & Molecular Biology) as a technical elective in 4W
  - Remove MIE331 (Physiological Control Systems) as a technical elective in 4W
  - Add EDV360 (Environmental Impact & Risk Assessment) as a technical elective in 4W
  -

488 Courses

We propose to revise the descriptions of CHE488, CIV488, ECE488, MIE488 and MSE488 for better consistency with other course descriptions in the calendar.

1.8 New Complementary Studies Courses from the Engineering Communication Program

The Curriculum changes proposed for 2008 involve the introduction of three new elective courses that capitalize on ECP faculty expertise to create a set of advanced communication courses. These new courses will allow students who have an interest in areas of professional writing and communication to develop their critical thinking skills in the context of study of a humanities social science study.

The courses share four key characteristics:

1. All of the courses are HSS elective courses.
2. All courses = 2/0/2
3. Course capped at 25 to allow for intensive communication workshops within the structure of the course
4. Pre-requisites from departmental courses: CHE 397, ECE 299/297, ESC 201, MSE 290

The three new courses are as follows:

APS 3XXH	Language and Power: Rhetoric and the Construction of Ideas
APS 3XYH	Representing Science on Stage
APS 3XZH	Representing Science and Technology in the Popular Media

In the larger life of the Faculty, these new courses represent a relatively minor enterprise; however, they do signal our intention to enable our students to develop their critical thinking and communication abilities in a broad context of HSS study.

2. Proposed Session Dates for 2008/2009

We propose that the Fall Session be scheduled as follows:

First day of classes: Thursday September 4, 2008
Last day of classes: Wednesday December 3, 2008
First day of exams: Friday December 5, 2008
Last day of exams: Friday December 19, 2008

We propose that the Winter Session be scheduled as follows:

First day of classes: Wednesday January 7, 2009
Last day of classes: Tuesday April 14, 2009
First day of exams: Friday April 17, 2009
Last day of exams: Friday May 1, 2009