



MEMORANDUM

To: Executive Committee of Faculty Council (March 22, 2016)
Faculty Council (April 12, 2016)

From: Dr. Graeme Norval
Chair, Undergraduate Curriculum Committee

Date: April 12, 2016

Re: Major Curriculum Changes for 2016-2017 and 2017-2018

REPORT CLASSIFICATION

This is a major policy matter that will be considered by the Executive Committee for endorsing and forwarding to Faculty Council for vote as a regular motion (requiring a simple majority of members present and voting to carry).

BACKGROUND

The Undergraduate Curriculum Committee is tasked with managing the curriculum change process for the Faculty. This report summarizes program course changes for the 2016-2017 and 2017-2018 academic years.

STRUCTURE

1. First Year Program

- a) Change the programming language for APS106: Fundamentals of Computer Programming from "C" to Python.

First year students in the CHE, CIV/MIN, MIE and MSE programs currently take a C-based programming course in the winter term. One of the key findings of the Core Curriculum Review was a consensus amongst students and faculty within these departments that an introduction to the C language in first year is not providing the best preparation for the upper-year courses and experiences within these programs.

This change in the course description is shown as:

APS106H1 S	Fundamentals of Computer Programming	
I- AECHEBASC , I- AECIVBASC , I- AEINDBASC , I- AELMEBASC , I- AEMECBASC , I- AEMMSBASC		Lect./Lab./Tut./Weight 3/2/1/0.50
<p>An introduction to computer systems and software. Topics include the representation of information, algorithms, programming languages, operating systems and software engineering. Emphasis is on the design of algorithms and their implementation in software. Students will develop a competency in the € Python programming language. Laboratory exercises will explore the concepts of structure-based and object-oriented programming using examples drawn from mathematics and engineering applications.</p>		

The proposed change to APS106 will not affect the content and delivery of the programming course taken by ECE and TrackOne students, APS105: Computer Fundamentals. Indeed, the ECE department requires its students learn C in their first year in order to be properly prepared for the second-year ECE program.

Offering two different programming courses in the same term will allow us to provide TrackOne students the opportunity to move into the Python-based course, APS106, if it aligns more closely with their likely program of choice. By default, TrackOne students will be enrolled in the C-based course, APS105, but can switch to APS106 in early November of the fall term.

Students considering transferring from one Core 8 program into another can also request to move into the most relevant programming course at that time. Students requesting transfer into the ECE program at the end of first year will have had to take APS105 (either in the winter term or the T-program version in May/June) or have demonstrated a degree of competence in programming in C through the completion of an acceptable online course, module or program before the start of their second term.

This change will be in effect for the 2016-2017 academic year.

2. Chemical Engineering & Applied Chemistry

- a) It is proposed to change the contact hours for CHE353F: Engineering Biology from 3/0/1 to 2/0/2 to reflect a move towards more student-centred learning.
- b) It is proposed to change the contact hours for CHE451F: Petroleum Processing from 3/0/1 to 3/0/0.

These changes will be in effect for the 2016-2017 academic year.

3. **IBBME**

- a) It is proposed to create a new elective, BME4XXS: Human Whole Body Biomechanics, as 3/2/0.

Course description: This course will introduce students to the basics of human biomechanics, including dynamics of human motion and the neural motor system, and will focus on the adaptability of both of these concepts (positive and negative). Course content will lend itself to an appreciation and understanding of neuromuscular rehabilitation. In addition to a required textbook, engineering applications will also be emphasized using other reading and experimental materials. Lecture material will be complemented by several guest lecturers that introduce advanced sciences in related fields.

Specific topics include:

1. The Force-Motion Relationship
 - a. Describing motion (basic dynamics required for human motion analysis)
 - b. Movement forces (basic kinetics of human motion)
 - c. Movement analysis (basic kinematics of human motion)
 - d. Applications (running/jumping/throwing/practical assessment of standing/walking)
2. The Motor System
 - a. Excitable membranes (Understanding the nervous system; EMG)
 - b. Muscle and motor units (muscle physiology/mechanics)
 - c. Neural control of movement (motor control systems)
3. Adaptability of the Motor System
 - a. Acute adjustments
 - b. Chronic adaptations

The course will have a lab component, some of which will be held in the IBBME design space, and some in the exercise facility of the Toronto Rehab Institute. It will be an elective in the Biomedical Engineering minor; students need to complete either of MIE439S: Biomechanics 1, or BME4XXS, and in Engineering Science's biomedical systems engineering option and robotics engineering option.

This change will be in effect starting in the winter term of the 2016-2017 academic year.

4. **Engineering Communication Program**

Two elective courses are proposed.

- a) The course APS3XX: Writing Lab will be a CS elective and delivered as 2/0/2.

In this course, students will strengthen their communication skills by exploring different expressive voices, each with a different potential to uncover previously

unsuspected ideas. Unlike technical writing, academic writing or creative writing courses, all of which isolate particular skills and voices, this course will show how a synthesis of various voices strengthen each of them. Hence, by exploring one's own poetic, story-telling, scientific and analytic voice, one will become a better analytic, scientific or creative writer.

The course will use writing in various modes as an exploratory process, which is in contrast to how many people view writing – some see it as after-the-fact reporting or documentation and even begin creative writing with predetermined values and an outline. However, other writers begin without a predetermined idea of where their writing is going to lead, with merely a few words or sentences in their minds and a question about what those words or sentences mean or where they might lead. For them, writing is a path of discovery – it is through brainstorming, creating the initial rough drafts and then refining the work through revision that the writers come to understand what their message – the solution to the question that caused them to write in the first place.

Through readings drawn from significant communication theoreticians, the course will go beyond exploration and creativity. Students will use the analysis of communication to examine their own and other people's communication so that their choices become more effective in that they combine knowledge, creativity and understanding of the communication situation.

Learning Objectives: by the end of the course, the student should demonstrate the ability to:

- select appropriate content and approach for audience and purpose
- communicate in poetic, story, analytic or scientific modes
- create elegant and efficient transitions between sections and paragraphs
- utilize clear, correct, and cohesive sentence and paragraph structures
- deliver engaging oral presentations in at least two modes
- use communication theory to analyse communication in specific cases

b) The course APS3XX: Engineering and Social Justice, an HSS elective, will have a delivery mode of 2/0/2.

The purpose of this course is to develop a relationship between engineering students and the concepts of social justice to, as Donna Riley puts it in the abstract to her book on Engineering and Social Justice, “to develop the skill and knowledge set needed to take practical action for change within the profession.” While compatible with the aims of courses currently available in Leadership and in Global Engineering, this course will fill a gap in developing personal responses to ideas of justice, bias and marginalization as it affects engineers and engineering in general, domestically as well as globally, in projects as well as in contexts such as the workplace and academic environment.

The course will have current readings from prominent writers on Engineering and Social Justice, Engineering to Help, and Engineering and Sustainable Community Development. But the course will go beyond conventional response essays and exams,

to foster discussion and rehearse action through techniques developed by Augusto Boal and David Diamond in their work using theatre techniques to practice and critique action.

Topics to be covered include:

- concepts of social justice
- the meaning of “help” in Engineering to Help
- Engineering mindsets
- colonialism and globalization
- racism
- sexism, homophobia and heterosexism
- communication for social justice
- critical thinking for social justice

These changes will be in effect for the 2017-2018 academic year.

PROGRAM(S)

All relevant programs are involved in these changes, and the impact on students in the various programs has been considered.

PROCESS AND CONSULTATION

This proposal has been reviewed and approved by the Undergraduate Curriculum Committee, which is comprised of faculty representatives from each undergraduate program; undergraduate students; the Vice-Dean, Undergraduate Studies; the Chair of First Year; the Associate Dean, Cross-Disciplinary Programs; and the Registrar. The Committee meets regularly and reviews changes to the undergraduate curriculum.

RECOMMENDATION AND MOTION FOR FACULTY COUNCIL

THAT the proposed curriculum changes for the 2016-2017 and 2017-2018 academic years described in Report 3497 be approved.