UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Report No: 3283

To: **Faculty Council**

From: **Dr. Graeme Norval**
Chair, Undergraduate Curriculum Committee

Date: **February 8, 2011 for March 8, 2011 Meeting**

Item: **Engineering Minor in Robotics and Mechatronics**

BACKGROUND:

In addition to academic programs in Core 8 subjects/TrackOne and Engineering Science, undergraduate Engineering students may pursue a number of Minors and Certificates that add breadth and depth to their academic careers. Engineering Minors can be completed within a regular degree and will be noted on transcripts.

The Minor in Robotics and Mechatronics is a collaborative effort among The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, Department of Mechanical and Industrial Engineering, the Institute for Aerospace Studies, and the Institute of Biomaterials and Biomedical Engineering. It is open to all students in the Faculty of Applied Science and Engineering who are interested in learning more about robotics and mechatronics.

PROCESS:

The Undergraduate Curriculum Committee is composed of representatives from each program, the Vice-Dean Undergraduate, the Chair of First Year Studies, the Associate Dean, Cross-Disciplinary Programs, and the Registrar. The Committee meets regularly, and reviews changes to the curriculum.

STRUCTURE:

The requirements for a Robotics and Mechatronics Minor in the Faculty of Applied Science and Engineering are the successful completion of the following courses:
1. One of:
(i) CHE322 – Process Dynamics and Control
(ii) ECE311 – Dynamic Systems and Control
(iii) ECE356 – Linear Systems and Control
(iv) MIE404 – Control Systems I
(v) AER372 – Control Systems

2. One of:
(i) ECE532 – Digital Systems Design
(ii) MIE438 – Microprocessors and Embedded Microcontrollers

3. Four other electives from the list of robotics and mechatronics-designated courses.
4. Of the four elective courses, at least two must be from the Advanced category.
5. Of the six Minor courses required, at most one course can also be a core course in a student's Program or Option, if applicable.
6. A thesis course can count for up to two courses (2 HCEs) toward the six required Minor courses if the thesis is strongly related to robotics or mechatronics. This requires approval by the Director of the Minor.
7. Of the six Minor courses required, not all can have the same course prefix

Introductory Courses

Course Code	Course Title	Exclusions
AER301	*Dynamics*	MIE301
ECE314	Fundamentals of Electrical Energy Systems	ECE349
ECE349	*Introduction to Energy Systems*	ECE314
ECE316	Communication Systems	
ECE331	Analog Electronics	MIE346, ECE354
ECE354	*Electronic Circuits*	ECE331
ECE334	Digital Electronics	MIE346
ECE342	Computer Hardware	
ECE344	Operating Systems	ECE353
ECE353	*Systems Software*	ECE344
ECE345	Algorithms and Data Structures	ECE358
ECE358	*Foundations of Computing*	ECE345
ECE352	*Computer Organization*	
ECE361	Computer Networks I	
MIE301	Kinematics and Dynamics of Machines	AER301
MIE331	Physiological Control Systems	BME350
BME350	*Physiological Control Systems*	MIE331
MIE341	Computer Aided Design I	
MIE346	Analog and Digital Electronics for Mechatronics	ECE331, ECE334

Advanced Courses

Course Code	Course Title	Exclusions	
AER407	*Space Systems Design*		
AER506	*Spacecraft Dynamics and Control*		
AER525	*Robotics*	ECE470	
CHE507	Data-Based Modeling for Prediction and Control		
CSC384	Introduction to Artificial Intelligence		
CSC411	Machine Learning and Data Mining		
CSC428	Human Computer Interaction		
CSC487	Foundations of Computer Vision		
ECE410	Control Systems	ECE557	
ECE557	*Systems Control*	ECE410	
ECE411	Real-time Computer Control		
ECE431	Digital Signal Processing	ECE362	
ECE362	*Digital Signal Processing*	ECE431	
ECE442	Introduction to Micro-and Nano-Fabrication Technologies		MSE457
ECE452	Computer Architecture		
ECE470	Robot Modeling and Control	AER525	
ECE516	Intelligent Image Processing		

ECE532	Digital Systems Design	
MAT363	Introduction to Differential Geometry	
MIE402	Vibrations	
MIE438	Microprocessors and Embedded Microcontrollers	ECE243, ECE352
MIE442	Machine Design	
MIE443	Mechatronics Systems: Design and Integration	
MIE444	Mechatronics Principles	
MIE464	Smart Materials and Structures	
MIE506	MEMS Design and Microfabrication	
MSE457	Micro Electro Mechanical Systems (MEMS) and Nano Electro-Opto Mechanical Systems (NEOMS)	ECE442
PHL342	Minds and Machines	

Notes
• Courses in italics are Engineering Science courses.
• Computer Science courses may have limited enrollment.
• Courses requiring special approval must be approved by the undergraduate Associate Chair of the student's home department.

PROGRAMS:

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

PROPOSAL/MOTION:

Recommendation and Motion for Faculty Council:

"THAT the Engineering Minor in Robotics and Mechatronics be approved and introduced in the 2011-2012 academic year."