



MEMORANDUM

To: Executive Committee of Faculty Council (January 23, 2017)
Faculty Council (February 28, 2017)

From: Professor Jonathan Rose
Associate Dean, Cross-Disciplinary Programs (Acting)

Date: February 10, 2017

Re: Proposed Advanced Manufacturing Minor

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

Manufacturing is the most intensive research and development economic sector in Canada, accounting for 75 per cent of all private sector research expenditures. Toronto and the Southern Ontario region are the major manufacturing hub in Canada, leaving the University of Toronto well-poised to leverage its knowledge and expertise to lead in advanced manufacturing methods and development. The Faculty recently approved a graduate emphasis in advanced manufacturing, recognizing the value of the engineering skills and multi-disciplinary knowledge that can be leveraged in a wide range of sectors, including biomedical, automotive, aviation, aerospace, energy and others.

The proposed undergraduate Advanced Manufacturing Minor will allow students to build a strong foundation in the field and provide them with the option to pursue a recognized specialization in advanced manufacturing for a career in industry or graduate degrees.

The core courses for this minor focus on the fundamental pillars of manufacturing, including: manufacturing engineering, materials in manufacturing, process engineering and introduction to electronic devices. To complete the minor, students must take two core courses, one complementary studies course (aimed at developing the non-technical skills of an engineer), and three elective courses (two of which must be from the advanced stream) that are offered by various departments, including new advanced manufacturing-focused courses, and/or a thesis design project.

STRUCTURE

Students in the Advanced Manufacturing Minor must successfully complete six courses equaling 3.0 credits, as follows. Some courses will require pre-requisites as detailed in the academic calendar.

1. Choose one of the following foundational courses:
 - MIE221H1S: Manufacturing Engineering
 - MIE364H1S: Methods of Quality Control and Improvement
 - MSE351H1S: Design and Simulation of Materials Processes
 - CHE324H1F: Process Design
2. MIE519H1F: Advanced Manufacturing Technologies
3. Choose one of the following business management/leadership courses:
 - APS343H1F/S: Engineering Leadership
 - APS446H1S: Leadership in Project Management
 - APS442H1S: Cognitive and Psychological Foundations of Effective Leadership
 - CHE488/CIV488/ECE488/MSE488/MIE488 H1F/S: Entrepreneurship and Business for Engineers
 - JRE420H1F/S: People Management and Organizational Behaviour
4. Choose three electives, two of which must from the advanced category. Thesis/design projects may count as advanced electives.

Introductory Electives

- CHE341H1F: Engineering Materials
- MIE342H1F: Circuits with Applications to Mechanical Engineering Systems
- MIE364H1S: Methods of Quality Control and Improvement
- MIE354H1F: Business Process Engineering

Advanced Electives

- AER525H1F: Robotics
- CHE562H1F: Applied Polymer Chemistry, Science and Engineering
- CHE462H1S: Food Engineering
- CHE475H1S: Mechanical Properties of Bio-Composites and Biomaterials
- CHE561H1S: Risk Based Safety Management
- ECE442H1F/S: Introduction to Micro- and Nano-Fabrication Technologies
- ECE470H1F/S: Robot Modeling and Control
- FOR424H1S: Innovation and Manufacturing of Sustainable Materials
- MIE469H1S: Reliability and Maintainability Engineering
- MIE465H1S: Analytics in Action
- MIE562H1F: Scheduling
- MIE566H1F: Decision Analysis

- MIE422H1F: Automated Manufacturing
- MIE441H1S: Design Optimization
- MIE443H1S: Mechatronic Systems: Design and Integration
- MSE419H1F: Fracture and Failure Analysis
- MSE421H1S: Solid State Processing and Surface Treatment
- MSE431H1S: Forensic Engineering
- MSE432H1S: Macromolecular Materials Engineering
- MSE438H1F: Introduction to Computational Materials Design
- MSE461H1F: Engineered Ceramics
- Thesis or Design Project courses with approval of the Director of the Minor

ENROLLMENT

Undergraduate engineering students from any program are eligible to apply for enrollment in the Advanced Manufacturing Minor. The program is designed to fit well with the third and fourth year programs in Mechanical & Industrial Engineering, Chemical Engineering & Applied Chemistry, Electrical & Computer Engineering, and Materials Science & Engineering.

PROCESS

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

PROGRAMS

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

PROPOSAL/MOTION FOR FACULTY COUNCIL

THAT the Advanced Manufacturing Minor, as described in Report 3530 Revised, be approved and introduced in the 2017-2018 academic year.