UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

**Report No. 3540**

# MEMORANDUM

**To:** Executive Committee of Faculty Council (March 21, 2017)
Faculty Council (April 10, 2017)

**From:** Professor Markus Bussmann
Chair, Engineering Graduate Education Committee

**Date:** March 17, 2017

**Re:** **EGEC Information Report**

## REPORT CLASSIFICATION

This is a routine or minor policy matter that will be considered by the Executive Committee for approving and forwarding to Faculty Council for information.

## NEW COURSE APPROVED

| | |
|---|---|
| MIE 1714 | Failure Analysis |

## MINOR MODIFICATIONS

| | |
|---|---|
| MIE 1723 | Course renamed from "Engineering Maintenance Management" to "Engineering Asset Management" |
| MHSc in Clinical Engineering | Internship requirement reduced from 1,250 hours to a minimum of 625 hours |
| Emphasis Notations on Student Transcripts | Emphasis completion be recorded on transcripts beginning September 2017 |
| Emphasis in Forensic Engineering | New emphasis created (see attached proposal) |
| Emphasis in Advanced Water Technologies & Process Design | Three Core courses reduced to two.<br>CIV1319 is now an "optional core" course. |
| Emphasis in Sustainable Aviation | Following course added as an elective - AER1322 Modern Aerospace Propulsion |
| Emphasis in Sustainable Energy | Following course added as an elective - CHE1118H Industrial Catalysis |
| Emphasis in Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) | The following courses now offered: APS1038H: Strategic Sustainability Management for Businesses and Products; APS1039H: Enterprise Risk Management; APS1040H: Quality Control for Engineering Management<br>The following course has been removed: APS1014H |

| | |
|---|---|
| Emphasis in Advanced Manufacturing | The following courses now offered: Core: MIE519H1 Advanced Manufacturing Technologies; Manufacturing Management stream elective: APS1420H Technology, Engineering and Global Development, APS1040S Quality Control for Engineering Management, MIE523H Scheduling; Manufacturing Engineering stream elective: MIE 1706H Manufacturing of Cellular and Microcellular Polymers<br><br>The following courses have been removed: Core: MIE1742H; Elective: APS520H |

**RECOMMENDATION FOR FACULTY COUNCIL**

For information.

UNIVERSITY OF TORONTO

# University of Toronto
# Minor Modification –
# Change to an Existing Graduate Program

| | |
|---|---|
| **Programs being modified:** | Biomaterials and Biomedical Engineering, MEng<br>Chemical Engineering & Applied Chemistry, MEng<br>Civil Engineering, MEng<br>Materials Science & Engineering, MEng<br>Mechanical & Industrial Engineering, MEng |
| **Graduate Units:** | As above |
| **Faculty / Academic Division:** | Applied Science & Engineering |
| **Dean's Office Contact:** | Markus Bussmann, Vice-Dean, Graduate |
| **Version Date:** | March 17, 2017 |

## 1 Summary

| | | | |
|---|---|---|---|
| | *Changing Admission Requirements* | | *Renaming Field, Concentration or Emphasis* |
| | *Changing Program Requirements or Length* | | *Renaming of Program* |
| | *Changing Timing of Program Requirements* | √ | *Creating a new Emphasis* |
| | *Adding/Removing Option (i.e. part-time, flex-time)* | | *Changes to programs affecting a MOA* |

A new Emphasis in Forensic Engineering is proposed for MEng students. As with other emphases, the Emphasis in Forensic Engineering requires considerable commitment from students to complete four (4) courses.

It is proposed that successful completion of one (1) core course and three (3) elective courses listed below would constitute the emphasis. The intention is to create a flexible Emphasis in Forensic Engineering that will allow students to develop their forensic engineering expertise around particular sub-fields of interest in forensic engineering practice. All of the numbered courses currently exist in the curriculum. These courses have been selected for their relevance to our students and to the objective of the Emphasis.

**Core Course**

MSE 1031H-Forensic Engineering

**Elective Courses**

APS 540H-Making Sense of Accidents

APS 1034H-Understanding Technological Catastrophes

APS 1039H-Enterprise Risk Management

APS 1040H-Quality Control for Engineering Management

BME 1XXXH-Human Factors in Medical Device Design

BME 1800H-Biomedical Product Development I

BME 1801H-Biomedical Product Development II

BME 1480H-Experimental Design & Multivariate Analysis

CHE 561H-Risk Based Safety Management

CHE 568H-Nuclear Engineering

CHE 1213H-Corrosion

CHE 1431H-Environmental Auditing

CHE 1432H-Technical Aspects of Environmental Regulations

CHE 1434H-Six Sigma for Chemical Processes

CIV 510H-Solid Mechanics II

CIV 518H-Behaviour and Design of Steel Structures

CIV 1163H-Mechanics of Reinforced Concrete

CIV 1171H-Principles of Earthquake Engineering and Seismic Design

CIV 1174H-Finite Element Methods in Structural Mechanics

CIV 1190H-Structures Under Blast and Impact

CIV 1201H-Concrete Technology and Non-Destructive Testing Principles

CIV 1279H-Construction Contract Documents

CIV 1282H-Case Studies in Building Science

CIV 1422H-Dynamic Response of Engineering Materials

CIV 1429H- Advanced Rock Engineering: Fractured Rock Masses

JMB 1050H- Biological & Bio-Inspired Materials

JNC 2503H-Environmental Pathways

MSE 1015H-Mechanical Properties of Solids I

MSE 1016H-Mechanical Properties of Solids II

MSE 1022H-Materials Issues & Application of Advanced Materials in Nuclear Systems

MSE 1032H-Atomistic Modelling of Materials

MIE 566H-Decision Analysis

MIE 1224H-Heating, Ventilating and Air Conditioning

MIE 1301H-Solid Mechanics

MIE 1303H-Fracture Mechanics

MIE 1411H-Design of Work Places

MIE 1414H-Human Factors in Transportation

MIE 1616H-Research Topics in Healthcare Engineering

MIE 1713H-Analysis and Design of Joints in Manufactured Products

MIE 1714H-Failure Analysis

MIE 1721H-Reliability

MIE 1723H-Engineering Maintenance Management

MIE 1727H-Statistical Methods of Quality Control

MIE 1804H-The Finite Element Method in Mechanical Engineering

## 2 Effective Date of Change

September 2017

## 3 Academic Rationale

The objective of the Emphasis in Forensic Engineering is to create a unique opportunity for interested students to gain specialized expertise and recognition for a personal and professional commitment to enhanced engineering investigation skills. Forensic engineering has traditionally been associated with the investigation of artifacts that fail or do not operate/function as intended, causing personal injury and/or monetary loss, the consequences of which are normally dealt with in a court of law. However, forensic engineering training goes well beyond the expert witness in the courtroom. Forensic engineering skills are highly valuable in other activities such as: assessment of deterioration in infrastructure, product quality and procedural practice improvement as a result of investigations, direct impact on improving engineering design practices and revision of codes/standards to improve public safety.

In 2011, Professional Engineers Ontario (PEO) embarked on developing a formal guideline to enhance the general understanding of forensic engineering, defining consistent and ethical practice, specifying scopes of work for clients and understanding of the role of expert witness testimony.

http://www.peo.on.ca/index.php/ci_id/20282/la_id/1.htm

In January 2016, the PEO Guideline for Forensic Engineering Investigations was published, a first in Canada.

http://peo.on.ca/index.php/ci_id/29496/la_id/1.htm

The Faculty of Applied Science & Engineering continues to offer the first and only degree-level course in forensic engineering (MSE 1031H) in Canada. Since forensic engineering is a part of professional engineering practice that intersects all disciplines of engineering, an Emphasis in Forensic Engineering creates the opportunity for interested students to benefit in a tangible way for making a commitment to developing investigation skills beyond the required foundation of our existing programs. As such, it can strengthen our relationships with employers as well as create an opportunity for recruitment of broad-based engineering students.

## 4 Impact on Students

The Emphasis in Forensic Engineering will offer MEng students in five graduate units the opportunity to take four courses in support of the specialization. Successful completion of the emphasis will appear on the student's academic record.

## 5 Consultation

The proposal was prepared in consultation with the five participating graduate units, the Vice-Dean, Graduate Studies, and the Dean of the Faculty.

## 6 Resources

None

## 7 Governance Approval

| | |
|---|---|
| **Unit Sign-Off** | Graduate Coordinators and Chairs of each of the five graduate units (February 2017) |
| **Dean's Office Sign-Off** | Markus Bussmann, Vice-Dean, Graduate Studies (February 2017) |
| **Faculty Council Approval (or delegated body) if applicable** | Approved by the Engineering Graduate Education Committee (EGEC) on behalf of the Council of the Faculty of Applied Science & Engineering (March 2017), and presented to the Council of the Faculty of Applied Science & Engineering (April 10, 2017) |

# Appendix A: Calendar Entry

*Please use track-changes to indicate where changes have been made.*

### Emphasis: Forensic Engineering

MEng students must successfully complete four courses (one core course and three elective courses).

### Core Course

MSE 1031H

### Elective Courses

APS 540H; APS 1034H; APS 1039H; APS 1040H;
BME 1800H; BME 1801H; BME 1480H;
CHE 561H; CHE 568H;CHE 1213H; CHE 1431H; CHE 1432H; CHE 1434H;
CIV 510H; CIV 518H; CIV 1163H; CIV 1171H; CIV 1174H; CIV 1190H; CIV 1201H; CIV 1279H; CIV 1282H; CIV 1422H; CIV 1429H;
JMB 1050H;
JNC 2503H;
MSE 1015H; MSE 1016H; MSE 1022H; MSE 1032H;
MIE 566H; MIE 1224H; MIE 1301H; MIE 1303H; MIE 1411H; MIE 1414H; MIE 1616H; MIE 1713H; MIE 1714H; MIE 1721H; MIE 1723H; MIE 1727H; MIE 1804H.