February 8, 2012

To: Members of the Faculty of Engineering Graduate Curriculum and Policy Committee

From: Medy Espiritu
Assistant Secretary & SynApps System Administrator

The next meeting of the Faculty of Engineering Graduate Curriculum and Policy Committee will be held on Thursday, February 16, 2012 at 1:00 p.m. in MUSC-318.

Listed below are the agenda items for discussion.

Please email espiritu@mcmaster.ca if you are unable to attend the meeting.

AGENDA

I. Minutes of the meeting of April 12, 2011

II. Business arising

III. Graduate curriculum recommendations

Biomedical Engineering (Dr. Michael Noseworthy/Dr. Judy West-Mays)

Ph.D. and M.A.Sc. programs – change in admission requirements

Request to cross-list courses:
ECE *6BD4 – Biomedical Instrumentation (to be cross-listed as BME *6BD4)
Mechanical Engineering *717 – Current Topics in Orthopedic Biomechanics - new course
(to be cross-listed as BME *717)

Computing and Software (Dr. Antoine Deza)

*701 – Logic and Discrete Mathematics – change in title and description
*738 – Algebraic Methods in Software Engineering and Computer Science – change in title and description
Civil Engineering  (Dr. Peijun Guo)

*6CM4 – Advanced Construction Management – new course
*6G03 – Pavement Materials & Design – change course number to *6G04
*6SD4 – Structural Dynamics and Earthquake Engineering – new course
*6V04 – Biological Aspects of Wastewater Engineering – new course
*738 – Seismic Behaviour, Analysis and Design of Masonry Structures – new course

Course cancellations:
*6C03 – Environmental Impact and Sustainability
*6D04 – Geometric Highway Design
*6H03 – Analysis of Transportation Systems
*6U03 – Unit Operations and Processes in Environmental Engineering
#791 – Municipal Solid Waste Management
#792 – Hazardous Waste Management

Engineering Physics  (Dr. Ray LaPierre)

*777 – Advanced Photovoltaics – new course
*783 – Nuclear Fuel Engineering – new course (to be cross-listed as UN 0806)
*784 – Nuclear Fuel Management – new course
UN 0902 – Fuel Management – change course number to UN 0501
UN 0806 – Nuclear Fuel Engineering (to be cross-listed as *783)

Materials Science and Engineering  (Dr. Joey Kish)

#733 – Materials Characterization by Electron Microscopy – new course
#756 – Deformation and Fracture of Crystalline and Amorphous Polymers – course cancellation
#763 – Physical Behaviour of Amorphous Solids – course cancellation

Mechanical Engineering  (Dr. Joe McDermid)

*6B03 – Topics in Product Development – new course
*717 – Current Topics in Orthopaedic Biomechanics – new course (to be cross-listed as BME *717)

School of Engineering Practice  (Dr. Samir Chidiac)

*748 – Development of Local Sustainable Communities – new course
*770 – Total Sustainability Management – new course
I. Minutes of meeting

The minutes of the meeting of December 9, 2010 were approved on a motion by Dr. Swartz, seconded by Mr. Love.

II. Business arising

There was no business arising from the minutes of the previous meeting.

III. Graduate curriculum recommendations

Biomedical Engineering

The School of Biomedical Engineering proposed the following graduate curriculum revisions.

Change in course title and description

*702 – Medical Imaging Systems II (to be cross-listed as Electrical and Computer Engineering *780 and Medical Physics *702)

Request to cross-list a course:

Medical Physics *770 – Medical Imaging Systems I (to be cross-listed as Biomedical Engineering *770)

New course:

*706 – Biomedical Engineering II (Core)

Dr. Swartz moved, and Mr. Jones seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed graduate curriculum revisions from the School of Biomedical Engineering, as described in the documents.”
Dr. West-Mays explained that the proposed course *706 – Biomedical Engineering II is a core course in addition to the existing *701 – Biomedical Engineering. Dr. West-Mays further said that course *706 is an introduction to biomedical engineering with a health science focus. After the discussion, it was suggested that it should be made clear to students with a health science background that they are expected to enrol in *701, and students with an engineering background should enrol in *706.

The motion was carried.

**Chemical Engineering**

The Department of Chemical Engineering recommended the following graduate curriculum changes.

**New courses:**
*782 – Biopharmaceuticals
*791 – Nanotechnology in Chemical Engineering

Dr. Swartz moved, and Dr. Ziada seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed new courses *782 – Biopharmaceuticals and *791 – Nanotechnology in Chemical Engineering, as described in the documents.”

The motion was carried.

**Civil Engineering**

The Department of Civil Engineering proposed the following changes.

**New course:**
*743 – Fundamentals of Soil Behaviour

**Change in course title and description:**
761 – Civil Engineering Seminars

**Request to cross-list a course:**
ES *757 – Advanced Statistical and Data Driven Methods in Hydrology (to be cross-listed as Civil Engineering *757)
Course cancellations:
#713 – Theory of Elasticity
#715 – Structural Stability
#723 – Advanced Steel Design
762 – Civil Engineering Seminar (Ph.D.)

Dr. Pietruszczak moved, and Mr. Arthurs seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed graduate curriculum changes from the Department of Civil Engineering, as described in the documents.”

The motion was carried.

Computational Engineering and Science

The School of Computational Engineering and Science proposed the following graduate curriculum changes.

Ph.D./M.A.Sc./M. Eng.: Merge two groups of courses into one group

Request to cross-list courses:

Chemistry *6PB3 – Computational Models for Electronic Structure and Chemical Bonding (to be cross-listed as CES *6PB3)
Math *749 – Mathematical and Computational Fluid Dynamics (to be cross-listed as CES *749)
Business *Q773 – Optimization I (to be cross-listed as CES *776)

Course cancellations:
#715 – Incompressible Computational Fluid Dynamics
#716 – Mathematical Introduction to Fluid Mechanics

Dr. Ziada moved, and Dr. Swartz seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed graduate curriculum changes from the School of Computational Engineering and Science, as described in the documents.”

Dr. Protas explained that the School is proposing to merge the groups of courses “Computational Techniques Modules” and “Computational Physical Sciences Courses and Modules” into one group, “Computational Techniques Modules.” Dr. Protas explained that the proposed cancellation of courses #715 and #716 is due to incorrect cross-listing of these courses with Physics #715 and #716.
The motion was **carried**.

**Computing and Software**

The Department of Computing and Software proposed the following graduate curriculum changes.

**New course:**
*733 – Mobile User Interface Design

**Course cancellation:**
*747 – Software Architecture Modeling and Reverse Engineering

Dr. Qiao moved, and Dr. Ziada seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the new course *733 – Mobile User Interface Design, and the cancellation of *747 – Software Architecture Modeling and Reverse Engineering, as described in the documents.”

The motion was **carried**.

**Electrical and Computer Engineering**

**Adding a number of courses specifically for M.Eng. and M.A.Sc. students**

The Department of Electrical and Computer Engineering proposed to create new courses (*702-*709) specifically for its M. Eng. and M.A.Sc. students to provide more course selection for these students, and make available more courses that can be credited towards the minimum degree requirements.

Dr. Kirubarajan moved, and Dr. Ziada seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposal of the Department of Electrical and Computer Engineering to add a number of courses specifically for M. Eng. and M.A.Sc. students.”

After the discussion, there was a general comment that there has been no precedent for restricting enrolment only to Master’s students in 700-level courses. Typically, 700-level courses are open to all graduate students, with certain courses requiring permission of the instructor before enrolment. It was recommended for *702-*709 to be open also to Ph.D. students but for these courses not to count towards the minimum course requirements for the Ph.D. program.

The motion was **carried**, subject to the recommendation mentioned above.
The Department proposed the following new courses.

**New courses:**
*702 – Engineering Communication and Presentation  
*703 – Advanced Computer Programming for Engineers  
*704 – Advanced Engineering Mathematics  
*705 – Probability and Stochastic Processes  
*706 – Digital Signal Processing  
*709 – High Performance Parallel Computing on Graphical Processing Units (GPU)  
*772 – Neural Networks and Learning Machines  
*777 – Advanced Topics in High Fidelity Image and Video Processing  
*785 – Computer Integrated Surgical Systems

Dr. Kirubarajan moved, and Dr. Maibaum seconded,

**“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the new courses listed above, as described in the documents.”**

It was also agreed to remove the prerequisites “Registration in M. Eng or M.A.Sc. program” for courses *702-*709.

The motion was **carried**, subject to removing the prerequisites for courses *702-*709.

The department also proposed changes in course numbers, the cross-listing of two courses, and the cancellation of courses as follows:

**Change in course number:**
*707 – Linear Systems  
*708 – Digital Communications

**Request to cross-list courses:**
Medical Physics *770 – Medical Imaging Systems I (to be cross-listed as ECE *779)  
Biomedical Engineering *702 – Medical Imaging Systems II (to be cross-listed as ECE *780)

**Course cancellations:**
*711 – Computer-Aided Design  
*715 – Simulation and Optimization  
*716 – Numerical Solution of Partial Differential Equations in Engineering

Dr. Kirubarajan moved, and Dr. Swartz seconded,

**“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the change in course numbers for *707 and *708, the cross-listing of courses *779 and *780, and the cancellation of *711, *715 and *716, as described in the documents.””**
The motion was **carried**.

**Engineering Physics**

The Department of Engineering Physics has proposed the change in title and description for course UN *805 – Introduction to Operational Health Physics.

Dr. Ziada moved, and Dr. Swartz seconded,

> “that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the change in course title and description for UN *805 – Introduction to Operational Health Physics, as described in the document.”

The motion was **carried**.

**Materials Science and Engineering**

The Department of Materials Science and Engineering proposed the following graduate curriculum revisions.

**Change to half course:**
- #764 – Solid State Polymer Analysis
- #774 – Injection Metallurgy
- #775 – Physical and Mathematical Modeling in Materials Processing

**Change to half course, title, and description:**
- #743 – Advanced Topics in Corrosion Science and Engineering

Dr. Ziada moved, and Dr. Kirubarajan seconded,

> “that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the Department of Materials Science and Engineering, as described in the documents.”

The motion was **carried**.

**Mechanical Engineering**

Cancellation of the following courses was proposed by the Department of Mechanical Engineering:

* #712 – Kinematics of Three-dimensional Mechanisms
* #744 – Advanced Mechanical Engineering Thermodynamics
* #757 – Simulation of Manufacturing Systems
Dr. Maibaum moved, and Dr. Ziada seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the cancellation of courses *712, *744, and *757, as described in the documents.”

The motion was carried.

Walter G. Booth School of Engineering Practice

Dr. Chidiac reviewed the calendar copy for the Master of Technology Entrepreneurship and Innovation.

Dr. Maibaum moved, and Dr. Swartz seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed calendar copy for the Master of Technology Entrepreneurship and Innovation, as described in the document.”

The motion was carried.

The School is also recommending the following changes:

New courses:
*711 – Regeneration of the Natural and Built Environment
*728 – Legal Issues for the Technology-Based Enterprise
*747 – Energy Efficient Buildings

Change to 600-level courses:
*720 – Entrepreneurial Processes and Skills (change to SEP *6E03)
*721 – Breakthrough Technology Venture Development (change to SEP *6EE3)

Dr. Ziada moved, and Dr. Swartz seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the new courses, *711, *728, *747, and the change of course *720 to *6E03, and *721 to *6EE3, as described in the documents.”

The motion was carried.

There was no other business and the meeting adjourned at 2:20 p.m.
**SCHOOL OF GRADUATE STUDIES**

**RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM**
- FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

**DEPARTMENT** | School of Biomedical Engineering
---|---
**NAME OF PROGRAM** | Biomedical Engineering

**PROGRAM DEGREE** | Ph.D. (x) | M.A. ( ) | M.A.Sc. (x) | M.B.A. ( ) | M. Eng. ( ) | M.Sc. ( ) | Diploma Program ( ) | Other (Specify)
---|---|---|---|---|---|---|---|---

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

**CHANGE IN ADMISSION REQUIREMENTS** | **x** | **CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE** | **CHANGE IN COURSE REQUIREMENTS**
---|---|---|---

**CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR** | **x** | **EXPLAIN:**

Provide more detail on the degrees allowed for admission into the program.

**OTHER CHANGES** | **EXPLAIN:**

Describe the existing requirement/procedure:

Current admission requirements:
http://msbe.mcmaster.ca/graduate/entrance.html

It says:
For students from engineering and physical science backgrounds:

- 4-year degree or equivalent: BSc, BEng, BASc, BHSc with B+ minimum average in their final 2 years of study

This is actually a mixture of biology and engineering based degrees. Engineers have BEng or BASc. Biologists have BSc or BHSc. Hence it is confusing.

Provide a detailed description of the recommended change (Attach additional pages if space is not sufficient.)

Propose change to entrance requirements to add more detail on the various degrees allowed for entrance as per below.

For students from engineering and physical science backgrounds:

- 4-year degree or equivalent: BSc, BEng, BASc with B+ minimum average in their final 2 years of study

For students from biological science backgrounds:

- 4-year degree or equivalent: BSc, BHSc, DDS, MD with B+ minimum average in their final 2 years of study
RATIONALE FOR THE RECOMMENDED CHANGE:
To provide more details within the calendar, allow for the interdisciplinary nature of the program, applicants come from a wide variety of backgrounds

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*
January 1, 2012

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR:
The entrance requirements will read as follows:

For students from engineering and physical science backgrounds:
- 4-year degree or equivalent: BSc, BEng, BASc with B+ minimum average in their final 2 years of study

For students from biological science backgrounds:
- 4-year degree or equivalent: BSc, BHSc, DDS, MD with B+ minimum average in their final 2 years of study

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:
Name: Natalie Illingworth   Email: illing@mcmaster.ca   Extension: 23486   Date: January 10/12

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
## School of Graduate Studies

### Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritumcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

### Department/Program

| Biomedical Engineering |

### Course Title

| Biomedical Instrumentation |

### Course Number

| 6BD4 |

### Course Credit

| FULL COURSE ( ) | HALF COURSE (X) | QUARTER (MODULE) ( ) |

### Instructor(s)

| Dr. Patricie |

### Nature of Recommendation (Please check appropriate box)

**NEW COURSE**

| DATE TO BE OFFERED: |

**Was the Proposed Course Offered on Dean’s Approval?**

If Yes, Provide the Date:

**Will the Course Be Cross-listed With Another Department?**

If Yes, Attach to this Form Any Relevant Correspondence With the Other Department(s).

**Note:** Cross-listing of courses requires written approval from EACH department and Faculty concerned.

### Change in Course Title

| PROVIDE THE NEW COURSE TITLE: |

### Change in Course Description

| 600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form |

### Change to Full Course

| CHANGE TO FULL COURSE | CHANGE TO HALF COURSE | CHANGE TO QUARTER COURSE |

### Course Cancellation

| PROVIDE THE REASON FOR COURSE CANCELLATION: |

### Other Changes

| X |

**Explain:**

Please have this course cross listed in Biomedical Engineering

### Brief Description for Calendar

- **Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.**

Principles of instrumentation; Noise and interference in electrical measurements; Generation and nature of bioelectric potentials; electrodes and other transducers; electrical safety; neuromuscular and cardiovascular instrumentation; ultrasonics for bio-measurements other than imaging; computer interfaces for data acquisition systems.

### Content/Rationale

- **Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.**

Students will be able to apply the principles of electronic circuits and devices to the use and design of instrumentation in the biomedical area. They will have gained a basic knowledge of the operating principles of electrical and other transducers, analog and digital instrumentation, applied signal acquisition and processing, electrical safety in the medical environment, electrical properties of nerve and muscle physiology; and instrumentation used in cardiopulmonary, neurological, surgical, and rehabilitation areas of medicine.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

Biomedical Instrumentation fits with the Biomedical Engineering program and we currently have students requesting this course as it fits with their areas of research.

2. **EXPECTED ENROLMENT:**

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>3 hours/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutorials:</td>
<td>1 hour per week</td>
</tr>
<tr>
<td>Labs:</td>
<td>3 hours EOW</td>
</tr>
</tbody>
</table>

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

<table>
<thead>
<tr>
<th>Labs</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm (Open books / open notes)</td>
<td>30%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam (Open books / open notes)</td>
<td>40%</td>
</tr>
</tbody>
</table>

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

If yes, please attach to this form any relevant correspondence with the other department(s).

This course is offered as ECE 6BD4, ECE 4BD4.

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

Permission from ECE was sent to SGS

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Natalie Illingworth Email: illing@mcmaster.ca Extension: 23486 Date: January 10/12

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
Hi Natalie,

Here is permission to cross-list ECE 6BD4. The professor who teaches it has also agreed.

Thanks,
Kerri

-------- Original Message --------
Subject: Re: 6BD4 Cross-List
Resent-Date: Thu, 19 Jan 2012 13:55:05 -0500
Resent-From: <hasting@univmail.cis.mcmaster.ca>
Date: Thu, 19 Jan 2012 18:55:03 +0000
From: T. Kirubarajan <kirubarajan3@gmail.com>
Reply-To: kirubarajan3@gmail.com
To: hastings@mcmaster.ca

Sure

From: Kerri Hastings <hastings@mail.ece.McMaster.CA>
Date: Thu, 19 Jan 2012 13:52:40 -0500
To: T. Kirubarajan <kiruba@mcmaster.ca>; Alexandru Patriciu <patriciu@mail.ece.McMaster.CA>
ReplyTo: hastings@mcmaster.ca
Subject: 6BD4 Cross-List
Hi,

The School of Biomed Eng has asked permission to cross-list 6BD4. Please let me know if this is acceptable.

Thanks,
Kerri

--

Kerri Hastings, CHRP
Administrator
Electrical & Computer Engineering
McMaster University
1280 Main Street West, ITB A111
Hamilton, ON, L8S 4K1
905-525-9140 ext. 24826
# Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

**SCHOOL OF GRADUATE STUDIES**

**RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES**

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**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritum@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

**DEPARTMENT/PROGRAM**

| Mechanical Engineering | School of Biomedical Engineering |

**COURSE TITLE**

Current Topics in Orthopaedic Biomechanics

**COURSE NUMBER**

| 717 |

**INSTRUCTOR(S)**

Dr. Cheryl Quenneville

**PREREQUISITE(S)**

Undergraduate degree in Mechanical Engineering or permission of instructor.

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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

- [X] NEW COURSE

**DATE TO BE OFFERED:**

September, 2013

**WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?**

- [ ] YES
  - IF YES, PROVIDE THE DATE: January, 2012

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

- [ ] YES
  - IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

**CHANGE IN COURSE TITLE**

Provide the NEW Course Title:

**CHANGE IN COURSE DESCRIPTION**

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

- [ ] CHANGE TO HALF COURSE
- [ ] CHANGE TO QUARTER COURSE

**COURSE CANCELLATION**

Provide the Reason for Course Cancellation:

**OTHER CHANGES**

- [ ] ME717 to be cross listed with the School of Biomedical Engineering 717

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**BRIEF DESCRIPTION FOR CALENDAR**

Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

Current techniques and technologies used in orthopaedic biomechanics and their applications and limitations, including joint replacement design & failure, analysis of human locomotion, numerical methods in biomechanics, computer assisted surgery, and design of assistive devices.

**CONTENT/RATIONALE**

Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The objectives of this course are: (1) to gain an understanding of techniques currently used in Orthopaedic Biomechanics, along with their applications and limitations, and (2) to develop the ability to critically review and evaluate recent literature relating to these current techniques. Major topics will be as follows:

1. Arthroplasty
2. Wear / tribology
3. Fracture fixation
4. Finite element analysis
5. Computer assisted surgery
6. Gait
7. Electromyography
8. Internal joint loading
9. Fluoroscopy
10. Assistive devices
11. Ergonomics / human factors

There is no text for this course; readings will be assigned weekly from recent (< 5 years) journal publications.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department's program?)

The objectives of this course are: (1) to gain an understanding of techniques currently used in Orthopaedic Biomechanics, along with their applications and limitations, and (2) to develop the ability to critically review and evaluate recent literature relating to these current techniques.

The course constitutes the second 700 level course in biomechanics within the department, and the only course focused on orthopaedic biomechanics. The course provides a high level of focus on design, technologies and their applications to research, and limitations of current analysis systems, which would be of interest to graduate students in a broad range of research areas.

2. **EXPECTED ENROLMENT:**

4-5 students per year. It is expected that this enrolment will increase as the department increases the number of faculty (and thereby graduate students) in biomechanical engineering.

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

Each week will consist of a journal review presentation by a student (based on the previous week’s subject), followed by a lecture (principally by the instructor) introducing a new topic. The journal review (approximately one hour) will involve a presentation of two recent research papers (distributed to the class in advance), including a critique of the strengths and limitations of the study and a class discussion. The lecture (approximately an hour and a half) will introduce a current topic or technique related to orthopaedic biomechanics. It will include the relevant anatomical and engineering background, as well as reference to current applications of the technique and areas of research.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible):** (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

Students are responsible for leading two Journal Club review seminars (where they present and critique two papers at each one). Each of these seminars is worth 10%. Students are also responsible for delivering one lecture (35%) and writing an 8-10 page review paper (35%) on one of the main topics of the course, with a focus on related current areas of research. Participation in class discussions of the papers, and asking questions during the lectures constitutes the final 10% of the grade.

In summary:
- Journal club reviews (2 x 10%) 20%
- Class participation 10%
- Lecture 35%
- Review paper 35%

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

N/A

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

N/A

### Please provide the contact information for the recommended change:

Name: Cheryl Quenneville  
Email: quennev@mcmaster.ca  
Extension: 21797  
Date: January 16, 2012

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If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
From: M. Noseworthy, PhD [mailto:nosewor@mcmaster.ca]
Sent: Wednesday, January 18, 2012 7:07 PM
To: Natalie Illingworth
Subject: Re: cross-list Biomechanics course

Sounds like a great idea!
mike

On 2012-01-18, at 4:13 PM, Natalie Illingworth wrote:
Hi
Can you please confirm that you would like to cross-list the course described below with Biomedical Engineering as BME717.
MechEng717 – Current Topics in Orthopedic Biomechanics
½ course to be provided by Dr. Cheryl Quenneville
This is a new course that is just being created now in Mechanical Engineering, it was provided in Term one under special topics in biomechanics.
Kind regards,
Natalie

Natalie Illingworth, CGA
McMaster University
Administrator, Graduate Schools
Faculty of Engineering
1280 Main Street West – ETB405
Hamilton, Ontario
L8S 4K1
(905) 525-9140 ext 23486

Dr. Michael D. Noseworthy, Ph.D., P.Eng
Director, Imaging Research Centre, St. Joseph’s Healthcare
Co-Director, McMaster School of Biomedical Engineering,
Associate Professor, Department of Electrical and Computer Engineering,
McMaster University.
Address:
Imaging Research Centre, Fontbonne Bldg, Rm F126-4
St. Joseph’s Healthcare
50 Charlton Ave. East
Hamilton, Ontario, CANADA. L8N 4A6
Phone: (905) 522-1155 x35218
FAX: (905) 540-6573
e-mail: nosewor@mcmaster.ca
http://www.ece.mcmaster.ca/~mikenose/web/HOME.html
To: Dr. Mike Noseworthy, School of Biomedical Engineering
From: Dr. Joseph McDermid, Associate Chair (Graduate Studies)
Date: February 9, 2012
Subject: CROSS LISTING of ME717 “Current Topics in Orthopedic Biomechanics”

Dear Dr. Noseworthy:

The Department of Mechanical Engineering has granted permission to the School of Biomedical Engineering to cross-list the following graduate course starting in the 2012-2013 academic year:

MECH ENG 717* / CURRENT TOPICS IN ORTHOPEDIC BIOMECHANICS

Yours truly,

[Signature]

Joseph R. McDermid, Professor, P. Eng.
Associate Chair (Graduate), Mechanical Engineering

JM/VI

Innovation in Education • Excellence in Research • Quality of Student Life
## Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritum@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Computing and Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Logic and Discrete Mathematics in Software Engineering</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>CAS701</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ), HALF COURSE ( X ), QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Staff</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in one of Computing and Software graduate programmes or permission of instructor</td>
</tr>
</tbody>
</table>

### Nature of Recommendation (Please Check Appropriate Box)

**NEW COURSE**

**DATE TO BE OFFERED:**

**WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?**

**IF YES, PROVIDE THE DATE:**

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

**NOTE:** CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

### Change in Course Title

**X**

**PROVIDE THE NEW COURSE TITLE:**

Logic and Discrete Mathematics

### Change in Course Description

**X**

600-LEVEL COURSE: **Undergraduate course for graduate credit** Please see #4 on page 2 of this form

### Change to Full Course

<table>
<thead>
<tr>
<th>CHANGE TO FULL COURSE</th>
<th>CHANGE TO HALF COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROVIDE THE REASON FOR COURSE CANCELLATION:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other Changes

**EXPLAIN:**

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

The course will cover some of the material encountered at the undergraduate courses on logic and discrete mathematics as well as advanced material on topics such as proof systems, sets, relations, and functions, recursion, type theory, and first and higher order logic systems. There will be emphasis on topics related to computer science and software engineering.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

Major topics: proof systems, sets, relations, and functions, recursion theory, and additional higher order logic systems. Principal texts: Discrete Mathematics and Its Applications, Kenneth Rosen, McGraw-Hill; Concrete Mathematics, Graham, Knuth, and Patashnik; Concrete Math, Addison Wesley; Logic: A Foundation for Computer Science, Sperschneider and Antoniou, Addison Wesley.
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

2. **EXPECTED ENROLMENT:**

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the **Extra Work** to be required of graduate students, i.e., exams, essays, etc.)

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**
   **IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**
   N.A.

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**
   N.A.

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Antoine Deza    Email: deza@mcmaster.ca    Extension: 23750    Date: January 10, 2010

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

Please read the following note before completing this form:

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

---

**DEPARTMENT/PROGRAM**
Computing and Software

**COURSE TITLE**
Relation Algebras and Kleene Algebra and their Applications

**COURSE NUMBER**
CAS738

**INSTRUCTOR(S)**
R. Khedri

**PREREQUISITE(S)**
Registration in one of Computing and Software graduate programmes or permission of instructor

---

**DATE TO BE OFFERED:**

**WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?**

**IF YES, PROVIDE THE DATE:**

---

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED:</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
</tr>
</thead>
</table>

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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

---

**CHANGE IN COURSE TITLE**

**X**

**Provide the NEW Course Title:**
Algebraic Methods in Software Engineering and Computer Science

---

**CHANGE IN COURSE DESCRIPTION**

**X**

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

---

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

---

**COURSE CANCELLATION**

**Provide the Reason for Course Cancellation:**

---

**OTHER CHANGES**

**EXPLAIN:**

---

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

The course covers a variety of software development issues, and illustrates the versatility of algebraic methods when used as conceptual tools in the software development process. The topics include algebraic approaches to software requirements, design, program verification, testing, and security. Several algebraic structures, such as relation algebra, Kleene algebra, and product family algebra, are introduced and discussed within software related issues.

---

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

Structures and theories, models, validity of a formula, constructions of algebras. Basic facts about binary relations, relation algebras and their representations, examples of relation algebras, relativised and weak representations of relation algebras, bases for atomic relation algebras, relational techniques in requirements analysis, architecture design, and testing. Product family algebra (PFA), applications of PFA in software feature modeling, an aspect-oriented language based on PFA. Kleene algebra, revisit of regular expressions from a Kleene algebra perspective, modeling of basic programming and verification constructs with Kleene algebra. Algebraic techniques for information security analysis.

Material from the following texts is used in the course:

1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

   The aim of this course is to convey to graduate students the fact that concepts of abstract algebra in general and relation, cylindric, and Kleene algebras in particular can be efficiently used in many Software Engineering and Computer Science applications. Of course before tackling applications, students need to be made familiar with the necessary model theory and universal algebra theory and with the theories of the considered algebras.

2. **EXPECTED ENROLMENT:**

   10

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

   About two-thirds of the material is presented through lectures, and the rest through a project and in-class presentations given by the students.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

   The method of evaluation involves three assignments, a project, and in-class presentations on additional material covering topics related to the course. The assignments are worth 60% of the final grade, and the project and in-class presentations are worth 40%.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

   If yes, please attach to this form any relevant correspondence with the other department(s).

   N.A.

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   N.A.

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Antoine Deza  
Email: deza@mcmaster.ca  
Extension: 23750  
Date: January 10, 2012

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
## Recommendation for Change in Graduate Curriculum - For Change(S) Involving Courses

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
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### Department/Program

Civil Engineering

### Course Title

Advanced Construction Management

### Course Number

6CM4

### Course Credit

<table>
<thead>
<tr>
<th></th>
<th>FULL COURSE</th>
<th>HALF COURSE</th>
<th>QUARTER (MODULE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(x)</td>
<td></td>
</tr>
</tbody>
</table>

### Instructor(S)

Saiedeh Razavi

### Prerequisite(S)

Civ Eng 3RR3 - Project Management and Engineering Economics

### Nature of Recommendation (PLEASE CHECK APPROPRIATE BOX)

- NEW COURSE: [X]
- Date to be Offered: Winter 2012
- Was the proposed course offered on Dean's approval? **YES**
- If yes, provide the date: 2011/2012
- Will the course be cross-listed with another department? **NO**
- If yes, attach to this form any relevant correspondence with the other department(s).
  **Note:** Cross-listing of courses requires written approval from each department and faculty concerned.

### Change in Course Title

Provide the new course title:

### Change in Course Description

600-LEVEL COURSE *(Undergraduate course for graduate credit)* Please see #4 on page 2 of this form

### Change to Full Course

<table>
<thead>
<tr>
<th></th>
<th>Change to Full Course</th>
<th>Change to Half Course</th>
<th>Change to Quarter Course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Course Cancellation

Provide the reason for course cancellation:

### Other Changes

Explain:

### Brief Description for Calendar - Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

Fundamentals of project planning and scheduling; advanced scheduling techniques; improving schedules; time-cost trade-offs, resource levelling, project acceleration; productivity management; construction materials management; Building Information Modeling, automated data acquisition technologies; decision analysis; infrastructure asset management

### Content/Rationale - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The course will cover:
- Introduction to the course and project management,
- Project planning and scheduling I (WBS, Bar Chart, CPM, PDM)
- Advanced scheduling techniques (LOB, PERT, Mont Carlo)
- Constraint-based scheduling (Time/Cost trade-offs, resource allocation and leveling)
- Productivity assessment (Work sampling, craftsman questionnaire, foreman delay survey, learning curve)
- Materials management (Processes, procurement, supply chain management)
- Infrastructure asset management
- Decision analysis and its application in construction (Decision tree, game theory, risk analysis)
- Building Information Modelling (BIM)
- Automated data acquisition technologies in construction (Sensing systems, categories, applications in construction, case studies)

The principle text to be used is a customed courseware that includes materials from a number of text books and other references.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

This course is designed to allow students to develop and add to their understanding of the construction project lifecycle and will complement the materials covered in ENG CIV 3RR3. This course and its prerequisite will enable students to understand the construction lifecycle process from the initial conception phase of a project to the completion. Advanced concepts introduced in this course (e.g. Building Information Modelling and sensing systems for construction), site visits, and guest lectures from industry and academic professionals will prepare students for the current competitive job market with hands-on experience on new technologies.

2. **EXPECTED ENROLMENT:**

> 60

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

The method for presenting the course materials include: Lectures, Guest lectures from industry and other academic professionals, construction site visit, computer lab, problem solving tutorials, group project with presentation sessions.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments, Group Project, Quizes</td>
<td>30%</td>
</tr>
<tr>
<td>4 Assignments (4%)</td>
<td></td>
</tr>
<tr>
<td>2 Quizes (6%)</td>
<td></td>
</tr>
<tr>
<td>1 Group Project and presentation (20%)</td>
<td></td>
</tr>
<tr>
<td>Midterm exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final exam</td>
<td>45%</td>
</tr>
</tbody>
</table>

For 600-level course the extra work will include individual projects as opposed to group project that requires comprehensive report and presentation.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

If yes, please attach to this form any relevant correspondence with the other department(s).

No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Saiedeh Razavi  
Email: razavi@mcmaster.ca  
Extension: 27155  
Date: Nov. 24, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
### PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

### DEPARTMENT/PROGRAM
Civil Engineering

### COURSE TITLE
Pavement Materials & Design

### COURSE NUMBER
6G03

### COURSE CREDIT
| FULL COURSE ( ) | HALF COURSE (x) | QUARTER (MODULE) ( ) |

### INSTRUCTOR(S)
Staff

### PREREQUISITE(S)

### NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

#### NEW COURSE
<table>
<thead>
<tr>
<th>DATE TO BE OFFERED:</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IF YES, PROVIDE THE DATE:</td>
</tr>
</tbody>
</table>

#### WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?
**If Yes, Attach to this Form Any Relevant Correspondence with the Other Department(s).**

**Note:** Cross-listing of courses requires written approval from **each** department and faculty concerned.

#### CHANGE IN COURSE TITLE
**Provide the NEW Course Title:**

#### CHANGE IN COURSE DESCRIPTION
600-LEVEL COURSE *(Undergraduate course for graduate credit)* Please see #4 on page 2 of this form

#### CHANGE TO FULL COURSE
**CHANGE TO HALF COURSE**
**CHANGE TO QUARTER COURSE**

#### COURSE CANCELLATION
**Provide the Reason for Course Cancellation:**

#### OTHER CHANGES
*EXPLAIN:*
Change the course code to CIV ENG 6G04. Course code would then properly correspond to the undergraduate level course CIV ENG 4G04.

### BRIEF DESCRIPTION FOR CALENDAR
- Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

### CONTENT/RATIONALE
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

2. **EXPECTED ENROLMENT:**

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: S. Pietruszczak   Email: pietrusz@mcmaster.ca   Extension: 24007   Date: November 7, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
**DEPARTMENT/PROGRAM**  
Civil Engineering

**COURSE TITLE**  
Structural Dynamics and Earthquake Engineering

**COURSE NUMBER**  
6SD4

**INSTRUCTOR(S)**  
Dimitrios Konstantinidis

**PREREQUISITE(S)**  
CE 2Q03, CE 3G03, or equivalent

### NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>YES</th>
<th>DATE TO BE OFFERED:</th>
<th>2012</th>
</tr>
</thead>
</table>

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**  
No  

**NOTE:** CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

**CHANGE IN COURSE TITLE**  
Provide the NEW Course Title:

**CHANGE IN COURSE DESCRIPTION**  
600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**  
CHANGE TO HALF COURSE  
CHANGE TO QUARTER COURSE

**COURSE CANCELLATION**  
Provide the Reason for Course Cancellation:

**OTHER CHANGES**  
Explain:

**BRIEF DESCRIPTION FOR CALENDAR**  
Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.


**CONTENT/RATIONALE**  
Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

- Dynamics of Singe-Degree-of-Freedom Systems
- Dynamics of Multi-Degree-of-Freedom Systems
- Selected Topics in Seismic Design and Earthquake Engineering

1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   The course provides an introduction to the subject of structural dynamics and earthquake engineering. Opening the course to graduate enrollment will (a) allow grad students without prior exposure to the subject to familiarize themselves with it, and (b) make it possible to cover more advanced topics in 7-series dynamics courses (CE 716, 717).

2. **EXPECTED ENROLMENT:**

   30-40 (undergrad and grad students)

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

   Lectures

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

   - homework assignments and project 30%
   - 2 midterm exams 30%
   - final exam 40%

   Graduate students will have to do a term project. A final report will be due at the end of the term.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

   No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   This course is intended primarily for students within the Department of Civil Engineering

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Dimitrios Konstantinidis    Email: konstant@mcmaster.ca    Extension: 27281    Date: Nov 25, 2011

---

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
### School of Graduate Studies

**Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses**

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: spiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Civil Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Biological Aspects of Wastewater Engineering</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>6V04</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
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<td>QUARTER (MODULE) ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>TBA</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

**Nature of Recommendation (PLEASE CHECK APPROPRIATE BOX):**

- **NEW COURSE**: X
- **DATE TO BE OFFERED**: January 2012
- **WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?** No
- **IF YES, PROVIDE THE DATE:**

**Will the course be cross-listed with another department?** No

If Yes, attach to this form any relevant correspondence with the other department(s).

**Note:** Cross-listing of courses requires written approval from each department and faculty concerned.

**Change in Course Title**

- **Provide the New Course Title:**

**Change in Course Description**

- **600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form**: X

**Change to Full Course**

- **CHANGE TO FULL COURSE**: CHANGE TO HALF COURSE
- **CHANGE TO QUARTER COURSE**

**Course Cancellation**

- **Provide the Reason for Course Cancellation:**

**Other Changes**

- **Explain:**

**Brief Description for Calendar**

- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

Process capabilities, hardware, and design equations for the biological processes used in design of wastewater treatment plants. Emphasis on processes such as bio-oxidation, clarification, sludge treatment and disinfection. Leading-edge processes are introduced and design software is used.

**Content/Rationale**

- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

Design of various biological treatment processes- text to be used will be ‘Biological Processes’ by Grady and Lim-3rd edition.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   This course offering is part of the Water Resources/Environmental component of the Department of Civil Engineering. We currently offer CIV ENG 4V04 at the undergraduate level and would now like to offer it at the graduate level as a 600 level course.

2. **EXPECTED ENROLMENT:**

   3 to 9 graduate design students, 120 undergraduate students

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

   3 lectures, 1 tutorial or laboratory each week

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

   2 exams (mid term and comprehensive final), 5 assignments, design project (done in groups for undergraduate but individually for graduate students), 4 laboratory reports, graduate students will also have to write a 4000-5000 word paper on a relevant topic agreeable to both student and instructor.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

   IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

   no

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

   Name: B. Baetz   Email: baetz@mcmaster.ca   Extension: 27214   Date: December 13, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
**DEPARTMENT/PROGRAM**
Civil Engineering

**COURSE TITLE**
Seismic Behaviour, Analysis and Design of Masonry Structures

**COURSE NUMBER**
738

**COURSE CREDIT**
- FULL COURSE (  )
- HALF COURSE ( X )
- QUARTER (MODULE) (  )

**INSTRUCTOR(S)**
Wael El-Dakhakhni

**PREREQUISITE(S)**
None.

---

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

<table>
<thead>
<tr>
<th>NEW COURSE</th>
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<td>DATE TO BE OFFERED:</td>
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<tr>
<td>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</td>
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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**
N
**N**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

**NOTE:** Cross-listing of courses requires written approval from each department and faculty concerned.

**CHANGE IN COURSE TITLE**

| PROVIDE THE NEW COURSE TITLE: |

**CHANGE IN COURSE DESCRIPTION**

| 600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form |

**CHANGE TO FULL COURSE**

| CHANGE TO HALF COURSE |

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

| PROVIDE THE REASON FOR COURSE CANCELLATION: |

**OTHER CHANGES**

| EXPLAIN: |

---

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

The course presents a comprehensive in-depth treatment to seismic design principles, procedure and philosophies with a focus on masonry structures. The course includes a good balance between practical design consideration, theoretical background, design code philosophies, component behaviour and system-level seismic performance; all applied to typical masonry structures in North America.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The main textbook of the course is:

This is in addition to 2 secondary books:
ISBN: 978-8861980006

1. STATEMENT OF PURPOSE (How does the course fit into the department’s program?)

There is a large number of graduate students with research focus on the topics to be covered by the course. There is also a major need for such course with the recently adopted seismic design provisions of the National Building Code of Canada. The latter is expected to result in attracting practicing engineers as well to the course.

2. EXPECTED ENROLMENT:

5-8

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

Lectures.

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

40% Report + 60% Final Examination

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

No.

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

No.

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Wael El-Dakhakhni Email: eldak@mcmaster.ca Extension: Date: Nov. 7th, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
**SCHOOL OF GRADUATE STUDIES**

**RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES**

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**
1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

**DEPARTMENT/PROGRAM**
- CIVIL ENGINEERING

**COURSE TITLE**
- Introduction to Mechanics of Elastic/Inelastic Solids

**COURSE NUMBER**
- 758

**COURSE CREDIT**
- **FULL COURSE ( )**
- **HALF COURSE ( x )**
- **QUARTER (MODULE) ( )**

**INSTRUCTOR(S)**
- S. Pietruszczak

**PREREQUISITE(S)**
- ---

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<thead>
<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED:</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
<th>NO</th>
<th>IF YES, PROVIDE THE DATE:</th>
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<tr>
<td>X</td>
<td>September 2012</td>
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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**
- No

If Yes, Attach to this form any relevant correspondence with the other department(s). **Note:** Cross-listing of courses requires written approval from each department and faculty concerned.

**CHANGE IN COURSE TITLE**
- PROVIDE THE NEW COURSE TITLE:

**CHANGE IN COURSE DESCRIPTION**
- 600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**
- | CHANGE TO HALF COURSE | CHANGE TO QUARTER COURSE |

**COURSE CANCELLATION**
- PROVIDE THE REASON FOR COURSE CANCELLATION:

**OTHER CHANGES**
- EXPLAIN:

**BRIEF DESCRIPTION FOR CALENDAR**
- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

Foundations of the theory of elasticity: general formulation of quasi-static problems in elasticity, discussion of elementary two-dimensional problems in rectangular and polar coordinates, introduction to energy principles. Basic concepts of plasticity: specification of yield/failure criteria for ductile/brittle materials, elastic-perfectly plastic formulations, isotropic strain-hardening concepts

**CONTENT/RATIONALE**
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.


Pietruszczak S., Fundamentals of Plasticity in Geomechanics, Taylor & Francis, 2010
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

The course covers the basic notions of elasticity/plasticity. It is suitable for both structural as well as geotechnical students enrolled in Master or Ph.D program.

This course is currently being offered as a Special Topics course; there are 10 students registered.

2. **EXPECTED ENROLMENT:**

   5-10 students

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

   Lectures

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

   Assignments (including a numerical assignment), final exam

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

   If yes, please attach to this form any relevant correspondence with the other department(s).

   No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   N/A

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

| Name: S. Pietruszczak | Email: pietrusz@mcmaster.ca | Extension: 24007 | Date: 2011/11/01 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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<th>DEPARTMENT/PROGRAM</th>
<th>Civil Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Environmental Impact and Sustainability</td>
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<td>COURSE NUMBER</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<td>INSTRUCTOR(S)</td>
<td>Staff</td>
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<tr>
<td>PREREQUISITE(S)</td>
<td></td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<th>NEW COURSE</th>
<th>DATE TO BE OFFERED</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
<th>IF YES, PROVIDE THE DATE:</th>
</tr>
</thead>
</table>

**Will the Course be Cross-listed with Another Department?**  If Yes, Attach to this Form Any Relevant Correspondence with the Other Department(s). **Note:** Cross-listing of courses requires written approval from each department and faculty concerned.

**Change in Course Title**

**Provide the New Course Title:**

**Change in Course Description**

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**Change to Full Course**

**Change to Half Course**

**Change to Quarter Course**

**Course Cancellation**

x **Provide the Reason for Course Cancellation:**

Undergraduate course is no longer being offered.

**Other Changes**

**Explain:**

**Brief Description for Calendar** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

**Content/Rationale** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
<p>| | |</p>
<table>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)</td>
</tr>
<tr>
<td>2.</td>
<td>EXPECTED ENROLMENT:</td>
</tr>
<tr>
<td>3.</td>
<td>DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):</td>
</tr>
<tr>
<td>4.</td>
<td>DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)</td>
</tr>
<tr>
<td>5.</td>
<td>TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?  IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).</td>
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<tr>
<td>6.</td>
<td>IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</td>
</tr>
</tbody>
</table>

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name:  Brian W. Baetz  Email:  baetz@mcmaster.ca  Extension: 27214  Date:  November 3, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
## Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

### Please read the following notes before completing this form:
1. This form must be completed for all course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

### Department/Program
- Civil Engineering

### Course Title
- Geometric Highway Design

### Course Number
- 6D04

### Course Credit
- FULL COURSE ( ), HALF COURSE (x ), QUARTER (MODULE) ( )

### Instructor(s)
- Staff

### Prerequisite(s)

### Nature of Recommendation (Please check appropriate box)

<table>
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<tr>
<th>New Course</th>
<th>Date to Be Offered</th>
<th>Was the Proposed Course Offered on Dean’s Approval?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>If Yes, Provide the Date:</td>
</tr>
</tbody>
</table>

Will the course be cross-listed with another department? If Yes, attach to this form any relevant correspondence with the other department(s). Note: Cross-listing of courses requires written approval from each department and faculty concerned.

### Change in Course Title
- Provide the new course title:

### Change in Course Description
- 600-Level Course (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

### Change to Full Course
- Change to Half Course
- Change to Quarter Course

### Course Cancellation
- x Provide the reason for course cancellation:
  - Undergraduate course is no longer being offered.

### Other Changes
- Explain:

### Brief Description for Calendar
- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

### Content/Rationale
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)

2. EXPECTED ENROLMENT:

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name:  S. Pietruszczak   Email: pietrusz@mcmaster.ca   Extension: 24007   Date:  November 4, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES
RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:
1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Civil Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Analysis of Transportation Systems</td>
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<td>COURSE NUMBER</td>
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<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE ( x ) QUARTER (MODULE) ( )</td>
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<td>INSTRUCTOR(S)</td>
<td>Staff</td>
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<tr>
<th>NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)</th>
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<td>NEW COURSE</td>
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<tr>
<td>Will the course be cross-listed with another department?</td>
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<td>PROVIDE THE NEW COURSE TITLE:</td>
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<th>COURSE CANCELLATION</th>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
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<tr>
<td>x</td>
<td>Undergraduate course is no longer being offered.</td>
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<th>OTHER CHANGES</th>
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<tr>
<td>EXPLAIN:</td>
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<tr>
<th>BRIEF DESCRIPTION FOR CALENDAR</th>
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</table>

<p>| CONTENT/RATIONALE | Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used. |</p>
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<tr>
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<tbody>
<tr>
<td>1.</td>
<td><strong>STATEMENT OF PURPOSE</strong>  (How does the course fit into the department’s program?)</td>
</tr>
<tr>
<td>2.</td>
<td><strong>EXPECTED ENROLMENT:</strong></td>
</tr>
<tr>
<td>3.</td>
<td><strong>DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL</strong> (i.e., lectures, seminars):</td>
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<tr>
<td>4.</td>
<td><strong>DESCRIBE IN DETAIL THE METHOD OF EVALUATION</strong> (percentage breakdown, if possible):  (For 600-level course, indicate the <strong>Extra Work</strong> to be required of graduate students, i.e., exams, essays, etc.)</td>
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<td><strong>TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?  IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).</strong></td>
</tr>
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<td>6.</td>
<td><strong>IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</strong></td>
</tr>
</tbody>
</table>

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name:  Stan Pietruszczak  Email:  pietrusz@mcmaster.ca  Extension: 24007  Date:  November 4, 2011

If you have any questions regarding this form, please contact  Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: spiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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<th>DEPARTMENT/PROGRAM</th>
<th>Civil Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Unit Operations and Processes in Environmental Engineering</td>
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<td>COURSE NUMBER</td>
<td>6U03</td>
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<tr>
<td>COURSE CREDIT</td>
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<td>PREREQUISITE(S)</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<tr>
<th>NEW COURSE</th>
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<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
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<td></td>
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<td>IF YES, PROVIDE THE DATE:</td>
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**Will the Course be Cross-listed with Another Department?**
If Yes, Attach to this Form Any Relevant Correspondence with the Other Department(s). Note: Cross-listing of courses requires written approval from each department and faculty concerned.

**Change in Course Title**
Provide the NEW Course Title:

**Change in Course Description**
600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**Change to Full Course**
**Change to Half Course**
**Change to Quarter Course**

**Course Cancellation**
Provide the Reason for Course Cancellation:
Undergraduate course is no longer being offered.

**Other Changes**
Explain:

**Brief Description for Calendar**
- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

**Content/Rationale**
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

2. **EXPECTED ENROLMENT:**

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the *Extra Work* to be required of graduate students, i.e., exams, essays, etc.)

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**  
   **IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

| Name: B. Baetz | Email: baetz@mcmaster.ca | Extension: 27214 | Date: November 4, 2011 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES
RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

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<td>COURSE TITLE</td>
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<td>COURSE NUMBER</td>
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<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<td></td>
<td>HALF COURSE ( )</td>
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<td>QUARTER (MODULE) (x)</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>B. W. Baetz</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
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NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IF YES, PROVIDE THE DATE:</td>
</tr>
</tbody>
</table>

WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?  IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

CHANGE IN COURSE TITLE

PROVIDE THE NEW COURSE TITLE:

CHANGE IN COURSE DESCRIPTION

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

CHANGE TO FULL COURSE

CHANGE TO HALF COURSE

CHANGE TO QUARTER COURSE

COURSE CANCELLATION

X PROVIDE THE REASON FOR COURSE CANCELLATION:
Course has not been taught to M.Eng/M.A.Sc./Ph.D. students within the past two years.

OTHER CHANGES

EXPLAIN:

BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

CONTENT/RATIONALE - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. STATEMENT OF PURPOSE (How does the course fit into the department’s program?)

2. EXPECTED ENROLMENT:

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

| Name: Brian W. Baetz | Email: baetz@mcmaster.ca | Extension: 27214 | Date: November 3, 2011 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
### NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED:</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>IF YES, PROVIDE THE DATE:</td>
</tr>
</tbody>
</table>

**Will the course be cross-listed with another department?**

**NOTE:** Cross-listing of courses requires written approval from each department and faculty concerned.

<table>
<thead>
<tr>
<th>CHANGE IN COURSE TITLE</th>
<th>PROVIDE THE NEW COURSE TITLE:</th>
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<table>
<thead>
<tr>
<th>CHANGE IN COURSE DESCRIPTION</th>
<th>600-LEVEL COURSE <em>(Undergraduate course for graduate credit)</em> Please see #4 on page 2 of this form</th>
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<th>CHANGE TO FULL COURSE</th>
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<th>CHANGE TO QUARTER COURSE</th>
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<table>
<thead>
<tr>
<th>COURSE CANCELLATION</th>
<th>X</th>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Course has not been taught to M.Eng/M.A.Sc./Ph.D. students within the past two years.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTHER CHANGES</th>
<th>EXPLAIN:</th>
</tr>
</thead>
</table>

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)</td>
</tr>
<tr>
<td>2.</td>
<td>EXPECTED ENROLMENT:</td>
</tr>
<tr>
<td>3.</td>
<td>DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):</td>
</tr>
<tr>
<td>4.</td>
<td>DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)</td>
</tr>
<tr>
<td>5.</td>
<td>TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).</td>
</tr>
<tr>
<td>6.</td>
<td>IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</td>
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</table>

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Brian W. Baetz    Email: baetz@mcmaster.ca    Extension: 27214    Date: November 3, 2011

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
### Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

#### Please Read the Following Notes Before Completing This Form:
1. This form must be completed for all course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Engineering Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Advanced Photovoltaics</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>777</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE (x) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>John Preston</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Nature of Recommendation (Please check appropriate box):**
- NEW COURSE: X

**Date to be Offered:** January 2013

**Was the Proposed Course Offered on Dean’s Approval?**
- Yes

**If Yes, Provide the Date:** Jan. 2012

**Will the Course Be Cross-Listed with Another Department?**
- No

**If Yes, Attach to This Form Any Relevant Correspondence With the Other Department(s).** Note: Cross-listing of courses requires written approval from each department and faculty concerned.

**Change in Course Title:**

**Provide the New Course Title:**

**Change in Course Description:**

**600-Level Course (Undergraduate Course for Graduate Credit)** Please see #4 on page 2 of this form

**Change to Full Course**

**Change to Half Course**

**Change to Quarter Course**

**Course Cancellation:**

**Provide the Reason for Course Cancellation:**

**Other Changes:**

**Explain:**

**Brief Description for Calendar** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

Advanced Photovoltaics provides students with a comprehensive overview of the fundamental processes relevant to photovoltaic operation. Specific devices are studied by both numerical simulation and analytic calculation. A connection is made between the material parameters necessary for simulating a device and their independent measurement by a range of characterization techniques. Silicon, III-V, II-VI, organic and nano-based approaches to PV device design are all explored. Students are also introduced to the challenges of integrating different approaches into a solar based electrical generation system.

**Content/Rationale** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The main text is Solar Cell Device Physics by Stephen Fonash, Elsevier, 2010. AMPS and PC1D are the two principle simulation packages that students are expected to master.

The course also makes extensive use of reading original material from patent and scientific literature.

**Topics**

- Required elements of PV device operation
  - Overview of PV technologies

- Fundamental Processes
  - Absorption of light
  - Charge separation
  - Recombination Processes
  - Charge Separation
  - Carrier Transport
  - Contacts
<table>
<thead>
<tr>
<th>Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fundamental equations</td>
</tr>
<tr>
<td>- Time dependent versus steady state approaches</td>
</tr>
<tr>
<td>- Convergence and validation of results</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Material Characterization for PV devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>- physical approaches</td>
</tr>
<tr>
<td>- optical approaches</td>
</tr>
<tr>
<td>- transport approaches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PV-based Electrical Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- existing technologies</td>
</tr>
<tr>
<td>- requirements for future systems</td>
</tr>
</tbody>
</table>
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

This course provides a capstone for graduate students interested in PV devices and solar-generated electricity. As a result, there is a heavy emphasis on self-direction, integration of knowledge from disparate sources to facilitate life-long learning in a dynamic area.

2. **EXPECTED ENROLMENT:**

>10

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

Lecture material will be provided in a modular short course format using largely standard power point delivery, augmented with real-time simulations of material and device processes. In-class workshops will be interspersed with lectures. Workshops are hands-on sessions in which students work on simulations and other assigned tasks.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

There are 3 elements of the student's work that will be evaluated. Each student is required to prepare a Learning Dossier. This dossier provides an organized written record of the student's activities and achievements to be compared against their personalized learning objectives. The dossier will have specified required elements for all of the students but it will be required that each student identify individualized elements (in conjunction with the instructor). Students will receive regular feedback on their dossier development during the course, however, the grade will be based on the finished product. The dossier is worth 30% of the assigned grade.

The course will host an end of term workshop. Interested faculty and students will join invited external participants. Each student will provide a talk and poster for the workshop. Panel committees (chaired by the instructor) will evaluate the student's presentations. The poster and talk must be on independent topics and each is worth 35%.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

**IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

There are no overlapping courses in other departments.

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

N/A

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

| Name:  | John Preston  | Email: | prestonj  | Extension: | 27294  | Date: | January 19, 2012 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
## School of Graduate Studies

### Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

#### Please Read the Following Notes Before Completing This Form:

1. This form must be completed for **All** course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th><strong>Department/Program</strong></th>
<th>Engineering Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Title</strong></td>
<td>Nuclear Fuel Engineering</td>
</tr>
<tr>
<td><strong>Course Number</strong></td>
<td>EP 783</td>
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<table>
<thead>
<tr>
<th><strong>Course Credit</strong></th>
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<tr>
<td>FULL COURSE ( )</td>
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<table>
<thead>
<tr>
<th><strong>Instructor(s)</strong></th>
<th>P. Chan</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>Prerequisite(s)</strong></th>
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### Nature of Recommendation (Please check appropriate box)

<table>
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<tr>
<th>New Course</th>
<th>Date to be Offered: 2012-13</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Was the Proposed Course Offered on Dean’s Approval?</strong> Y</td>
</tr>
<tr>
<td></td>
<td><strong>If Yes, Provide the Date:</strong> May-June 2011</td>
</tr>
</tbody>
</table>

- **If Yes, Attach to this Form Any Relevant Correspondence With the Other Department(s).** Note: Cross-listing of courses requires approval from each department and faculty concerned.

### Change in Course Title

Provide the current course title:

### Change in Course Description

600-Level Course (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

### Change to Full Course

### Change to Half Course

### Change to Quarter Course

### Course Cancellation

Provide the reason for course cancellation:

### Other

Explain:

This course will be cross-listed with UN0806 which is being submitted concurrently for approval.

### Brief Description for Calendar

- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

This course covers power reactor fuel design, performance, and safety aspects, and complements existing courses on reactor core design, thermohydraulics and reactor safety design. It includes fissile and fertile fuels; burnup effects; fuel production (as well as uranium enrichment and reprocessing of spent fuel); quality assurance and CANDU fuel technical specifications; thermal conductivity; fuel chemistry; fuel restructuring and grain growth; fission product behaviour; fuel defect detection and location; fuel performance in operation; and fuel / fuel channel behaviour in design basis and severe accidents.

### Content/Rationale

- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

#### Part 1: Introduction (4 lectures):
1. Introduction
2. Fissile/fertile material
3. Fuel Material Properties
4. Nuclear Safety
5. Fuel Burnup Effects

#### Part 2: Fuel Production (9 Lectures):
1. Fuel Cycle and UO2 Production
2. Fuel production, Procurement and QA
3. CANDU Fuel Technical Specification
4. Uranium Enrichment
5. Reprocessing of Spent Fuel

#### Part 3: Fuel Thermal Performance (4 lectures):
1. Fission rate  
2. Thermal Conductivity  
3. Temperature Profile in Fuel Rod  

Part 4: Fuel Chemistry (2 lectures):  
1. Phase Diagram  
2. Defect Structures of Oxides  
3. Oxygen Potentials of UO2  
4. Fuel vaporization  

Part 5: Fuel Restructuring/Grain Growth (2 lectures):  
1. Pore Migration  
2. Equiaxed and Columnar Grain Growth  

1. Fission Yields  
2. Solid Fission Product Behaviour  
3. Fuel Swelling  
4. Fuel Gas Release  
5. Fuel Defects Management  

Part 7: Fuel Performance (3 lectures):  
1. Monitoring Gaseous Fission Products/ Delayed Neutron  
2. Fuel Defect Mechanisms  
3. Operational Guidelines  

Part 8: Fuel and Fuel Channel Accident Analysis (3 lectures):  
1. Safety Analysis  
2. Molten Fuel Moderator Interaction  
3. Pressure Tube/Calandria Tube Contact  
4. CANDU R/D  

Part 9: Severe Core Damage (3 lectures):  
1. Source Term  
2. Fission Product Behaviour  
3. Severe Accident Management
1. **STATEMENT OF PURPOSE** *(How does the course fit into the department’s program?)*

Understanding the design and performance of nuclear fuel is essential to understanding a nuclear reactor. While both the Department of Engineering Physics and UNENE (University Network for Excellence in Nuclear Engineering) offer course-based diplomas or degrees in nuclear engineering, neither has a course in fuel. The purpose of this course is to correct that omission.

2. **EXPECTED ENROLMENT:**

   10 - 15

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** *(i.e., lectures, seminars):*

   This course would be given live and via synchronous distance education on four alternate weekends at the Durham Regional Training Centre, in Whitby, as with all other UNENE courses. The structure is outlined under "CONTENT/RATIONALE" above.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION:** *(For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)*

   The evaluation method will be a combination of assignments, projects, in-class tests and a final exam.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**
   **IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

   No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   Not applicable

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Dr. V.G. Snell  
Email: snellv@mcmaster.ca  
Extension: 20168  
Date: October 12, 2011

If you have any questions regarding this form, please contact the Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/December 2006
**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

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</tr>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Nuclear Fuel Management</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>784</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>B. Rouben</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Nuclear Reactor Analysis</td>
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</tbody>
</table>

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

<table>
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<tr>
<th>NEW COURSE</th>
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<th>DATE TO BE OFFERED:</th>
<th>2012-13</th>
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<tbody>
<tr>
<td>WOULD THE PROPOSED COURSE BE OFFERED ON DEAN’S APPROVAL?</td>
<td>No</td>
<td></td>
<td></td>
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</tbody>
</table>

| WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT? | Y |
| ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). | NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED. |

**CHANGE IN COURSE TITLE**

**CHANGE IN COURSE DESCRIPTION**

600-LEVEL COURSE *(Undergraduate course for graduate credit)* Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

**OTHER CHANGES**

<table>
<thead>
<tr>
<th>x</th>
<th>EXPLAIN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course is identical with the course UN0902 already offered by the UNENE diploma program in our department. This course form will open up the course for other students in our department.</td>
<td></td>
</tr>
</tbody>
</table>

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

This is a course on in-core fuel management in nuclear reactors. It covers all aspects of the use of nuclear fuel in CANDU reactors, with comparison to fuel management in Light-Water Reactors. A major objective of the course is to allow students to carry out various types of full-core calculations in realistic CANDU-reactor models.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

Topics covered include: Uranium mining and processing for use in nuclear reactors, uranium tails and mass of natural uranium required for enrichment to various levels, reactivity curve of fuel and its importance, the refuelling process in CANDU, design and capabilities of the fueling machine, significance of flux/power shape in reactor, how and why to flatten the flux distribution (adjuster rods, differential fuelling), time-average, snapshot, and core-follow models for CANDU reactors, PWR fuel management. Significant hands-on projects for CANDU reactors, with full-core diffusion codes and models. Carrying out actual core-follow calculations in CANDU and selection of channels for refuelling.

1. STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)

This course expands students' training in Nuclear Engineering and gives them the opportunity to understand and personally carry out the type of calculations actually done in industry.

2. EXPECTED ENROLMENT:

>10 students per term

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

Lectures, Powerpoint presentations, presentations by students of their project results

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

Minor assignments 20% + Minimum 3 projects worth 25%, 25% and 30% respectively

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

No

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

Not applicable

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

| Name: Ben Rouben | Email: benjamin.rouben@sympatico | Extension: | Date: Nov 30, 2011 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
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<th>Engineering Physics - UNENE Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Fuel Management</td>
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<tr>
<td>COURSE NUMBER</td>
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<td>COURSE CREDIT</td>
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<td>HALF COURSE ( X )</td>
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<tr>
<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Staff</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX):**

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<tr>
<td></td>
<td></td>
<td><strong>IF YES, PROVIDE THE DATE:</strong></td>
</tr>
</tbody>
</table>

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT? NO**
**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**
**NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

- **CHANGE IN COURSE TITLE**: Provide the NEW Course Title:
- **CHANGE IN COURSE DESCRIPTION**: 600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form
- **CHANGE TO FULL COURSE**
- **CHANGE TO HALF COURSE**
- **CHANGE TO QUARTER COURSE**

- **COURSE CANCELLATION**: Provide the Reason for Course Cancellation:

**OTHER CHANGES**

- **EXPLAIN**:
  - Change Course Code to UN 0501 due to course ownership changing from Queen's to UOIT (the course code indicates the location of instruction).

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
- No change

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)

2. EXPECTED ENROLMENT:
   10 - 15

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible):  (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Victor Snell  Email: vgssolutions@rogers.com  Extension: 20168  Date: January 19, 2012

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
**RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES**

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Engineering Physics - UNENE Program (University Network of Excellence in Nuclear Eng)</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Nuclear Fuel Engineering</td>
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<tr>
<td>COURSE NUMBER</td>
<td>UN0806</td>
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<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>P. Chan</td>
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<tr>
<td>PREREQUISITE(S)</td>
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</tbody>
</table>

**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

- NEW COURSE: X
- DATE TO BE OFFERED: 2012-13
- WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL? Y
  - IF YES, PROVIDE THE DATE: May-June 2011

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?** Y
- IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).
**NOTE:** CROSS-LISTING OF COURSES REQUIRES APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

**CHANGE IN COURSE TITLE**

- PROVIDE THE CURRENT COURSE TITLE:

**CHANGE IN COURSE DESCRIPTION**

- 600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

- CHANGE TO HALF COURSE
- CHANGE TO QUARTER COURSE

**COURSE CANCELLATION**

- PROVIDE THE REASON FOR COURSE CANCELLATION:

**OTHER**

- X
- EXPLAIN: This course will be cross-listed with EP 783 being submitted concurrently for approval

**BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.**

This course covers power reactor fuel design, performance, and safety aspects, and complements existing courses on reactor core design, thermohydraulics and reactor safety design. It includes fissile and fertile fuels; burnup effects; fuel production (as well as uranium enrichment and reprocessing of spent fuel), quality assurance and CANDU fuel technical specifications; thermal conductivity; fuel chemistry; fuel restructuring and grain growth; fission product behaviour; fuel defect detection and location; fuel performance in operation; and fuel / fuel channel behaviour in design basis and severe accidents. Cross-listed with EP 783.

**CONTENT/RATIONALE - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.**

Part 1: Introduction (4 lectures):
1. Introduction
2. Fissile/fertile material
3. Fuel Material Properties
4. Nuclear Safety
5. Fuel Burnup Effects

Part 2: Fuel Production (9 Lectures):
1. Fuel Cycle and UO2 Production
2. Fuel production, Procurement and QA
3. CANDU Fuel Technical Specification
4. Uranium Enrichment
5. Reprocessing of Spent Fuel

Part 3: Fuel Thermal Performance (4 lectures):
<table>
<thead>
<tr>
<th>Part 1: Fission Rate</th>
<th>1. Fission Rate</th>
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</thead>
<tbody>
<tr>
<td>Part 2: Thermal Conductivity</td>
<td>2. Thermal Conductivity</td>
</tr>
<tr>
<td>Part 3: Temperature Profile in Fuel Rod</td>
<td>3. Temperature Profile in Fuel Rod</td>
</tr>
</tbody>
</table>

**Part 4: Fuel Chemistry (2 lectures):**
1. Phase Diagram
2. Defect Structures of Oxides
3. Oxygen Potentials of UO2
4. Fuel vaporization

**Part 5: Fuel Restructuring/Grain Growth (2 lectures):**
1. Pore Migration
2. Equiaxed and Columnar Grain Growth

**Part 6: Fission Product Behaviour and Fuel Defect Detection and Location (8 lectures):**
1. Fission Yields
2. Solid Fission Product Behaviour
3. Fuel Swelling
4. Fuel Gas Release
5. Fuel Defects Management

**Part 7: Fuel Performance (3 lectures):**
1. Monitoring Gaseous Fission Products/ Delayed Neutron
2. Fuel Defect Mechanisms
3. Operational Guidelines

**Part 8: Fuel and Fuel Channel Accident Analysis (3 lectures):**
1. Safety Analysis
2. Molten Fuel Moderator Interaction
3. Pressure Tube/Calandria Tube Contact
4. CANDU R/D

**Part 9: Severe Core Damage (3 lectures):**
1. Source Term
2. Fission Product Behaviour
3. Severe Accident Management
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

Understanding the design and performance of nuclear fuel is essential to understanding a nuclear reactor. While both the Department of Engineering Physics and UNENE (University Network for Excellence in Nuclear Engineering) offer course-based diplomas or degrees in nuclear engineering, neither has a course in fuel. The purpose of this course is to correct that omission.

2. **EXPECTED ENROLMENT:**

10 - 15

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

This course would be given live and via synchronous distance education on four alternate weekends at the Durham Regional Training Centre, in Whitby, as with all other UNENE courses. The structure is outlined under "CONTENT/RATIONALE" above.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION:** (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

The evaluation method would be similar to other UNENE courses; a combination of assignments, projects, in-class tests and a final exam.

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

Not applicable

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Dr. V.G. Snell  
Email: snellv@mcmaster.ca  
Extension: 20168  
Date: October 12, 2011

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If you have any questions regarding this form, please contact the Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/December 2006
## Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

### Please read the following notes before completing this form:

1. This form must be completed for **All** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

### Department/Program
Materials Science and Engineering

### Course Title
Materials Characterization by Electron Microscopy

### Course Number
733

### Course Credit
| Full Course ( ) | Half Course ( ) | Quarter (Module) (x) |

### Instructor(s)
G. de Silveira

### Prerequisite(s)
None

### Nature of Recommendation (Please check appropriate box)

**New Course**

<table>
<thead>
<tr>
<th>Date to be Offered:</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 2012</td>
</tr>
</tbody>
</table>

**Was the proposed course offered on Dean’s Approval?**

If Yes, provide the date:

**Will the course be cross-listed with another department?**

If Yes, attach to this form any relevant correspondence with the other department(s). **Note:** Cross-listing of courses requires written approval from **Each** department and faculty concerned.

### Change in Course Title

Provide the **New Course Title**:

### Change in Course Description

600-level course (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

### Change to Full Course

| Change to Half Course | Change to Quarter Course |

### Course Cancellation

Provide the reason for course cancellation:

### Other Changes

**Explain:**

### Brief Description for Calendar - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

Materials Characterization by Electron Microscopy (791X) is intended as an introduction to the theory, physical and operating principals of scanning electron microscopy, focused ion beam microscopy and spectroscopy techniques. It provides students with competence in the characterisation of a wide variety of conductive and non-conductive nano-scale materials, which is further developed with hands-on assistance during the graduate research project.

### Content/Rationale - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The need for this course arises from the fact that most graduate students lack knowledge about the physics and operating principals behind electron microscopy (EM); knowledge that enables the analysis of nano-structural features through high-resolution imaging and the acquisition of elemental information from any specimen using EM techniques. The course provides students with the underlying principles of scanning electron microscopy and X-ray spectroscopy and their application to a variety of material, as well as, an understanding of the power and limitations of these techniques for analysis at the nano-metre scale; thus, enabling students to assign a logical sequence of techniques to solve particular problems in the characterisation of nano-materials.

**Course Materials:**

1. Hand-outs
2. Text books (recommended):
   - Scanning Electron Microscopy by L. Reimer, 2nd Edition
   - Introduction to Focused Ion Beams, Ed: L. Giannuzzi and F. Stevie
   - Electron Backscatter Diffraction in Materials Science Ed: A. Schwartz, M. Kumar and B. Adams
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)
   It enables students to choose appropriate techniques to characterise the materials that are an integral part of their research project.

2. **EXPECTED ENROLMENT:**
   Over the last 3 years, in which the course has been given, 9 to 21 students were enroled.

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):
   Lectures which include experimental details of ‘real world’ materials and hands-on demonstrations on the instruments in the Canadian Centre for Electron Microscopy.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)
   - Mid-term exam 40%
   - Final exam 60%

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**
   If yes, please attach to this form any relevant correspondence with the other department(s).
   No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**
   Intended for graduate students in Materials (majority), other Engineering departments, Chemistry and Physics

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

| Name: Nanci Cole | Email: colenj | Extension: 24295 | Date: January 20, 2012 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
# Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

## Please Read the Following Notes Before Completing This Form:

1. This form must be completed for **ALL** course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espirtu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

## Department/Program

Materials Science and Engineering

## Course Title

Deformation and Fracture of Crystalline and Amorphous Polymers

## Course Number

#756

### Course Credit

- Full Course ( )
- Half Course ( )
- Quarter (Module) (x)

## Instructor(s)

G.P. Johari

## Prerequisite(s)


## Nature of Recommendation (Please Check Appropriate Box)

- **New Course**
- **Date to be Offered:**
- **Was the Proposed Course Offered on Dean's Approval?**
  - If Yes, provide the date:
- **Will the Course Be Cross-listed with Another Department?**
  - If Yes, attach to this form any relevant correspondence with the other department(s). Note: Cross-listing of courses requires written approval from each department and faculty concerned.

## Change in Course Title

Provide the new course title:

## Change in Course Description

600-Level Course (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

## Change to Full Course

### Change to Half Course

### Change to Quarter Course

## Course Cancellation

- Provide the reason for course cancellation:
  - No longer being offered

## Other Changes

Explain:

## Brief Description for Calendar - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

## Content/Rationale - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. STATEMENT OF PURPOSE (How does the course fit into the department’s program?)

2. EXPECTED ENROLMENT:

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

| Name: Nanci Cole | Email: colenj | Extension: 24295 | Date: January 20, 2012 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:
1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: spiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT/PROGRAM: Materials Science and Engineering

COURSE TITLE: Physical Behaviour of Amorphous Solids (formerly part of Mat Sci 702)

COURSE NUMBER: #763

INSTRUCTOR(S): G.P. Johari

PREREQUISITE(S):

NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IF YES, PROVIDE THE DATE:</td>
</tr>
</tbody>
</table>

Will the course be cross-listed with another department? If yes, attach to this form any relevant correspondence with the other department(s). Note: Cross-listing of courses requires written approval from each department and faculty concerned.

CHANGE IN COURSE TITLE:

CHANGE IN COURSE DESCRIPTION:

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

CHANGE TO FULL COURSE

CHANGE TO HALF COURSE

CHANGE TO QUARTER COURSE

COURSE CANCELLATION: x

Provide the reason for course cancellation:

Course no longer being offered

OTHER CHANGES:

EXPLAIN:

BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

CONTENT/RATIONALE - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

2. **EXPECTED ENROLMENT:**

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

| Name: Nanci Cole | Email: colenj | Extension: 24295 | Date: January 20, 2012 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
SCHOOL OF GRADUATE STUDIES
RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Mechanical Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Topics in Product Development</td>
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<tr>
<td>COURSE NUMBER</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )  HALF COURSE (X)  QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Allan Spence</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>enrolment in any Engineering Graduate Program</td>
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**NATURE OF RECOMMENDATION** (PLEASE CHECK APPROPRIATE BOX)

<table>
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<tr>
<th>NEW COURSE</th>
<th>DATE TO BE OFFERED: September 2012</th>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL? No</th>
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<tbody>
<tr>
<td>WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?</td>
<td>If Yes, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). <strong>NOTE:</strong> CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.</td>
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<table>
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<tr>
<th>CHANGE IN COURSE TITLE</th>
<th>PROVIDE THE NEW COURSE TITLE:</th>
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<tbody>
<tr>
<td>CHANGE IN COURSE DESCRIPTION</td>
<td>600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form</td>
</tr>
<tr>
<td>CHANGE TO FULL COURSE</td>
<td>CHANGE TO HALF COURSE</td>
</tr>
<tr>
<td>COURSE CANCELLATION</td>
<td>PROVIDE THE REASON FOR COURSE CANCELLATION:</td>
</tr>
<tr>
<td>OTHER CHANGES</td>
<td>EXPLAIN:</td>
</tr>
</tbody>
</table>

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
Case studies using modern product development methods, value engineering, product specification, rapid product development, lean design and continuous improvement. Product liability and robust design

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
The principal textbook is Ulrich, K.T. and Eppinger, S.D., Product Design and Development.

Principle topics:
1. Introduce the student to the design process of open-ended design problems by offering an approach through a practical case study.
2. Introduce the student to a multi-discipline team-work environment, team-work meetings, problem solving discussions, and practice deadline fulfillment policies.
3. Involve the student in a completely functional engineering project, from concept to prototype implementation, to final presentation.
4. Learn to present a completed design project in a trade fairlike style.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

Design is a core subject requirement in Mechanical Engineering, and the 4B03 undergraduate version of the course has operated successfully for 5 years now. Substantial investment has been made in the solar tracker project kits, and extending the offering to Graduate students will provide a useful alternative to Mech Eng 6Z03. The solar energy project topic promotes sustainability studies - a faculty initiative.

2. **EXPECTED ENROLMENT:**

Up to 64 undergraduate students are accepted in Mech Eng 4B03. It is expected that 4-6 Mech Eng 6B03 students will enroll. There is some possibility that School of Engineering Practice students, and Software Engineering students will choose the course.

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

There are 1-2 50 minute lectures per week (in common with Mech Eng 4B03), and 1-2 50 minute laboratory times to work on the project. The lectures covers the textbook material and necessary details for the project. See the attached outline and conference paper.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

The evaluation will be the same as Mech Eng 4B03 (typically a 50% tests/final exam and 50% project) but pro-rated to 80%. The 600 level students will be expected to complete extra project work (value 20%) on a topic such as full scale solar tracker structural FEA analysis (Mech Eng), compass/tilt sensor electronic/software integration (Software Eng), integration with a novel load (SEP).

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**
   **IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

Please provide the contact information for the recommended change:

| Name: Dr A. Spence | Email: adspence@mcmaster.ca | Extension: 27130 | Date: January 16, 2012 |

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
### School of Graduate Studies
#### Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Mechanical Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
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<td>COURSE NUMBER</td>
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<td>HALF COURSE (X)</td>
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<tr>
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<td>QUARTER (MODULE) ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Cheryl Quenneville</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Undergraduate degree in Mechanical Engineering or permission of instructor.</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX):**

<table>
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</tr>
<tr>
<td>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</td>
<td>YES</td>
</tr>
<tr>
<td>IF YES, PROVIDE THE DATE:</td>
<td>January, 2012</td>
</tr>
</tbody>
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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

**NOTE:** Cross-listing of courses requires written approval from each department and faculty concerned.

**CHANGE IN COURSE TITLE**

Provide the NEW Course Title:

**CHANGE IN COURSE DESCRIPTION**

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**OTHER CHANGES**

**EXPLAIN:** ME717 to be cross listed with the School of Biomedical Engineering 717

**BRIEF DESCRIPTION FOR CALENDAR**

Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.

Current techniques and technologies used in orthopaedic biomechanics and their applications and limitations, including joint replacement design & failure, analysis of human locomotion, numerical methods in biomechanics, computer assisted surgery, and design of assistive devices.

**CONTENT/RATIONALE**

Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

The objectives of this course are: (1) to gain an understanding of techniques currently used in Orthopaedic Biomechanics, along with their applications and limitations, and (2) to develop the ability to critically review and evaluate recent literature relating to these current techniques. Major topics will be as follows:

1. Arthroplasty
2. Wear / tribology
3. Fracture fixation
4. Finite element analysis
5. Computer assisted surgery
6. Gait
7. Electromyography
8. Internal joint loading
9. Fluoroscopy
10. Assistive devices
11. Ergonomics / human factors

There is no text for this course; readings will be assigned weekly from recent (< 5 years) journal publications.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

The objectives of this course are: (1) to gain an understanding of techniques currently used in Orthopaedic Biomechanics, along with their applications and limitations, and (2) to develop the ability to critically review and evaluate recent literature relating to these current techniques.

The course constitutes the second 700 level course in biomechanics within the department, and the only course focused on orthopaedic biomechanics. The course provides a high level of focus on design, technologies and their applications to research, and limitations of current analysis systems, which would be of interest to graduate students in a broad range of research areas.

2. **EXPECTED ENROLMENT:**

4-5 students per year. It is expected that this enrolment will increase as the department increases the number of faculty (and thereby graduate students) in biomechanical engineering.

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

Each week will consist of a journal review presentation by a student (based on the previous week’s subject), followed by a lecture (principally by the instructor) introducing a new topic. The journal review (approximately one hour) will involve a presentation of two recent research papers (distributed to the class in advance), including a critique of the strengths and limitations of the study and a class discussion. The lecture (approximately an hour and a half) will introduce a current topic or technique related to orthopaedic biomechanics. It will include the relevant anatomical and engineering background, as well as reference to current applications of the technique and areas of research.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

Students are responsible for leading two Journal Club review seminars (where they present and critique two papers at each one). Each of these seminars is worth 10%. Students are also responsible for delivering one lecture (35%) and writing an 8-10 page review paper (35%) on one of the main topics of the course, with a focus on related current areas of research. Participation in class discussions of the papers, and asking questions during the lectures constitutes the final 10% of the grade.

In summary:
- Journal club reviews (2 x 10%)  20%
- Class participation  10%
- Lecture  35%
- Review paper  35%

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

N/A

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

N/A

**PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Cheryl Quenneville  
Email: quennev@mcmaster.ca  
Extension: 21797  
Date: January 16, 2012

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
To: Dr. Mike Noseworthy, School of Biomedical Engineering

From: Dr. Joseph McDermid, Associate Chair (Graduate Studies)

Date: February 9, 2012

Subject: CROSS LISTING of ME717 "Current Topics in Orthopedic Biomechanics"

Dear Dr. Noseworthy:

The Department of Mechanical Engineering has granted permission to the School of Biomedical Engineering to cross-list the following graduate course starting in the 2012-2013 academic year:

MECH ENG 717* / CURRENT TOPICS IN ORTHOPEDIC BIOMECHANICS

Yours truly,

Joseph R. McDermid, Professor, P. Eng.
Associate Chair (Graduate), Mechanical Engineering

JM/VI
SCHOOL OF GRADUATE STUDIES  
RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for ALL course changes. All sections of this form must be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Walter G. Booth School of Engineering Practice; Master of Engineering Design</th>
</tr>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Development of local sustainable communities</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>SEP 748</td>
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<tr>
<td>COURSE CREDIT</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Staff</td>
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<td>PREREQUISITE(S)</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<th>NEW COURSE</th>
<th>Date to be Offered: September 2012</th>
<th>Was the Proposed Course Offered on Dean’s Approval?</th>
<th>No</th>
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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).**

**NOTE:** CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

**CHANGE IN COURSE TITLE**

**PROVIDE THE NEW COURSE TITLE:**

**CHANGE IN COURSE DESCRIPTION**

600-LEVEL COURSE *(Undergraduate course for graduate credit)*

Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

**PROVIDE THE REASON FOR COURSE CANCELLATION:**

**OTHER CHANGES**

**EXPLAIN:**

**BRIEF DESCRIPTION FOR CALENDAR**

Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

Local economy as a basis for sustainable communities. Deciding on the role of the community (thinkers, makers, traders) and development of economic competitive advantage and the associated business clusters. Community corporations. Pro-community local governance. Regeneration of livable cities. Case studies on Ontario regional economies.

**CONTENT/RATIONALE**

Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

- Principles for sustainable societies.
- Key attributes of the globalization model.
- Deciding on the role of the community (thinkers, makers, traders)
- Business clusters
- Alternative ways of meeting the needs
- Energy systems, Transportation systems, Manufacturing systems, Agriculture and food production systems,
- From Global to Local
- Import substitution: local production vs. imports
- Community corporations
- Community-development financial institutions
- Pro-community local governance
- Regeneration of Livable cities
- Case studies on Ontario regional economies.
- Term project

References:
M.H. Shuman, "Going Local"
C. Heying, "Brew to Bikes. Portland's Artisan Economy"
M. H. Shuman, "The Small-Mart Revolution. How Local Business are Beating the Global Competition"
R. Hopkins, "The Transition Handbook: From Oil Dependency to Local Resilience (Transition Guides)"
L. Estil, "Small is Possible: Life in a Local Economy"

1. STATEMENT OF PURPOSE (How does the course fit into the department's program?)

The concepts for creating sustainable, livable communities, supported by the flourishing local economies will be explored from the perspectives of design, entrepreneurship and public policy and illuminated, central to the purpose of engineering for a sustainable future.

2. EXPECTED ENROLMENT:

15 to 30 students

3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):

Lectures; term project., INTERACTIVE EXERCISES Seminars presented by the guest speakers.

4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

Homework assignments: 15%;
midi-term project: 20%;
final project: 65%

5. TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT? IF YES, PLEASE ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S).

no

6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?

The course is primarily for the students in Master of Engineering & Public Policy, Master of Eng. Design, and Master of Engineering Entrepreneurship and Innovation

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: V. Mahalec Email: mahalec@mcmaster.ca Extension: 26386 Date: Jan 15, 2012

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011
**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**

1. This form must be completed for **ALL** course changes. All sections of this form **must** be completed.
2. An electronic version of this form must be emailed to the Assistant Secretary and SynApps System Administrator (Email: espiritu@mcmaster.ca).
3. A representative from the department is required to attend the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

**DEPARTMENT/PROGRAM**

SCHOOL OF ENGINEERING PRACTICE

**COURSE TITLE**

TOTAL SUSTAINABILITY MANAGEMENT

<table>
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<th>COURSE NUMBER</th>
<th>COURSE CREDIT</th>
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<tr>
<td>770</td>
<td>FULL COURSE (x)</td>
<td>DR. LOTFI BELKHIR</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

**NEW COURSE**

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<th>DATE TO BE OFFERED:</th>
<th>SEPT 2012</th>
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<td>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</td>
<td>IF YES, PROVIDE THE DATE:</td>
<td></td>
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**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?**

**IF YES, ATTACH TO THIS FORM ANY RELEVANT CORRESPONDENCE WITH THE OTHER DEPARTMENT(S). NOTE: CROSS-LISTING OF COURSES REQUIRES WRITTEN APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

**CHANGE IN COURSE TITLE**

**CHANGE IN COURSE DESCRIPTION**

600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

| PROVIDE THE REASON FOR COURSE CANCELLATION: |

**OTHER CHANGES**

| EXPLAIN: |

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

This course introduces sustainability within a unified framework of Total Sustainability Management that will teach the student how to deeply embed sustainability into the enterprise through the use of Design principles, Bill-of-Rights of the Planet and through public policy. This approach will apply to not only a company products but also to its business strategy and business model. Furthermore, the course will teach the student a problem-solving approach that combines innovation, design and policy to emphasize the synergetic interplay between them. The student will learn how to think of sustainability as a “Way of Thinking”. The course will make liberal use of appropriate case studies, and call on several internal and external speakers who are recognized subject-matter experts.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.

1. Sustainability concepts background and key concepts and terminology
2. Holistic approach to Sustainability within a Unified Framework that combines innovation, design and public policy and apply to both the public and private sectors
3. Achieving the Triple-Bottom Line: How social and environmental benefits can go hand-in-hand with economic benefits - Doing business the "Natural Way"
4. Turning Sustainability into a “Sustainable Competitive Advantage”
5. Use of Sustainable Design Principles in the design of the Product / Service at the Inception stage.
6. Embedding Sustainability into the Business Model
7. Use of “sustainability criteria” in Business Strategy
8. Embedding Sustainability into the Team
8. Sustainability and Public Policy

REQUIRED & RECOMMENDED TEXTS

1. "Cradle to Cradle", by William Donough and Michael Braungart
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   The ability to deeply understand sustainability from a public policy and entrepreneurship perspective is a central purpose of the School of Engineering Practice.

2. **EXPECTED ENROLMENT:**

   20

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):

   lectures, guest seminars, classroom exercises, background readings and preparatory assignments.

4. **DESCRIBE IN DETAIL THE METHOD OF EVALUATION** (percentage breakdown, if possible): (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)

   Assignments: 60%; major project paper 40%

5. **TO PREVENT OVERLAP, IS A COURSE IN THE SAME OR A RELATED AREA OFFERED IN ANOTHER DEPARTMENT?**

   If yes, please attach to this form any relevant correspondence with the other department(s).

   No

6. **IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?**

   **PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

   Name: S. Chidiac   Email: chidiac   Extension: 26558   Date: January 19, 2012

If you have any questions regarding this form, please contact Medy Espiritu, Assistant Secretary and SynApps System Administrator, School of Graduate Studies, extension 24204.

SGS/Medy/2011