April 4, 2011

To: 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 **Tuesday, April 12, 2011, at 1:00 p.m. in MUSC-311/313.**

Listed below are the agenda items for discussion.

Please email espiritum@mcmaster.ca or call extension 24204, if you are unable to attend the meeting.

**AGENDA**

I. Minutes of the meeting of April 21, 2010.

II. Business arising

III. Graduate Curriculum Recommendations

**Biomedical Engineering** (Dr. Michael Noseworthy)

**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)*
Chemical Engineering (Dr. Chris Swartz)

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

Civil Engineering (Dr. Stan Pietruszczak)

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.)

Computational Engineering and Science (Dr. Bartosz Protas)

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

Computing and Software (Dr. Sanzheng Qiao)

New course:
*733 – Mobile User Interface Design
Course cancellation:
*747 – Software Architecture Modeling and Reverse Engineering

**Electrical and Computer Engineering** (Dr. Thia Kirubarajan)

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

**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

**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

**Engineering Physics** (Dr. Andy Knights)

**Change in course title and description:**
UN *0805 – Introduction to Operational Health Physics

**Materials Science and Engineering** (Dr. Jeffery Hoyt)

**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

**Mechanical Engineering** (Dr. Samir Ziada)

Course cancellations:
*712 – Kinematics of Three-dimensional Mechanisms
*744 – Advanced Mechanical Engineering Thermodynamics
*757 – Simulation of Manufacturing Systems

**Walter G. Booth School of Engineering Practice** (Dr. Samir Chidiac)

Calendar copy for the Master of Technology Entrepreneurship and Innovation

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)*
I. Minutes of Meeting

The minutes of the meeting of April 21, 2010 were approved on a motion by Dr. Swartz, seconded by Dr. Davidson, with one correction. On page 3, the phrase, “due to the broad range of the established norms for course requirements in the disciplines that lie within the scope of the School” was added to the last sentence of paragraph 9.

II. Business Arising

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

III. Graduate Curriculum Revisions

Biomedical Engineering

Dr. de Bruin presented the proposed curriculum changes from the Biomedical Engineering program.

Ph.D. program – change in comprehensive examination procedure

Request to cross-list:
Mechanical Engineering *715 – Biomechanics of Injury and Prevention as Biomedical *715

Request to add CAS *757 – Modern Software Technology for eHealth to Biomedical course listing

Dr. McDermid moved, and Dr. Swartz seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the Biomedical Engineering program, as listed above, and described in the documents.”
Dr. de Bruin explained that the Biomedical Engineering program has proposed revising its Ph.D. comprehensive examination procedure by adjusting the examination time from 6-18 months to 6-15 months after the student’s initial registration in the Ph.D. program.

The motion was **carried**.

**Chemical Engineering**

Dr. Swartz briefly discussed the curriculum recommendations from the Chemical Engineering Department.

**New courses:**

- #702 – Special Topics in Chemical Engineering
- 755 – Dynamic Optimization

Request to cross-list

Mechanical Engineering *752 – Advanced MEMS Fabrication and Microfluidics as Chemical Engineering *750

Request to cross-list the following courses subject to SBME Operating Committee approval:

Biomedical Engineering *701 – Biomedical Engineering as Chemical Engineering *781

Biomedical Engineering *704 – Gene Therapy for Bioengineers as Chemical Engineering *784

Dr. Cassidy moved, and Mr. Jones seconded,

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

The motion was **carried**.

**Civil Engineering**

Dr. Wilson presented the proposed curriculum changes for the Civil Engineering Department.

**M. Eng. program – addition of course-based option**

**New course:**

*726 – Advanced Analysis of Reinforced Concrete Structures

**Course cancellations:**

#725 – Advanced Design and Analysis of Masonry

#733 – Investigation and Retrofit of Existing Masonry Buildings

#773 – Physico-chemical Processes in Environmental Systems
Dr. Wilson explained that the department is proposing to add a course-based option to its M. Eng. degree. The department believes the proposal would attract more students into the program.

Ms. Peshko moved, and Mr. Volante seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the curriculum recommendations from the Civil Engineering Department listed above, and described in the documents.”

In response to a question, Dr. Wilson explained that students who choose the course-based option is required to complete 8 half courses, of which at least 4 courses should be from within the department. He further explained that students in the program will also be required to attend the course, *761 – Graduate Seminar.

The motion was carried.

Computational Engineering and Science

Dr. Davidson presented the curriculum revisions from the School of Computational Engineering and Science.

New course:
*744 – Algorithms for Combinatorial Optimization

Request to cross-list courses:
Mathematics *6B03 – Calculus on Manifolds as CES *6B03
Mechanical Engineering *751 – Advanced Mechanical Engineering Control Systems as CES *751
Electrical & Computer Engineering *775 – Cognitive Dynamic Systems as CES *775

Dr. McDermid moved, and Mr. Jones seconded,

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

The motion was carried.

Computing and Software

Dr. Deza briefly discussed the proposed changes from the Computing & Software Department.

Request to change prefix for 700-level courses
New course
*762 – Cryptography

Change in course title:
*730 – Machine Learning and Data Mining

Request to cross-list the following CAS courses with the eHealth program
*6CD3 – Distributed Computer Systems (cross-listed as eHealth *6CD3)
*6D03 – The Human Computer Interface (cross-listed as eHealth *6D03)
*6M03 – Databases (cross-listed as eHealth *6M03)
*6WW3 – Web Systems and Web Computing (cross-listed as eHealth *6WW3)
*730 – Machine Learning and Related A1 Topics (cross-listed as eHealth *730)
*747 – Software Architecture Modeling and Reverse Engineering (cross-listed as eHealth *747)
*750 – Model-Based Image Reconstruction (cross-listed as eHealth *750)
*757 – Modern Software Technology for eHealth (cross-listed as eHealth *757)

Course cancellation:
*759 – Medical Image Registration

Dr. Deza explained that the change of prefix for the 700-level courses from COM SFWR to CAS will help students find the courses easily on SOLAR (Student On-Line Academic Registration).

Dr. McDermid moved, and Ms. Peshko seconded,

“That the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the Computing & Software Department, as described in the documents.”

The motion was carried.

Electrical and Computer Engineering

Dr. Davidson presented the proposal from the Electrical and Computer Engineering Department.

New courses:
*6BD4 – Biomedical Instrumentation
*721 – Digital Communications
*733 – Nonlinear Optimization for Engineers

Change in course description:
*775 – Cognitive Dynamic Systems

Course cancellations:
Ms. Peshko moved, and Dr. Cassidy seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum revisions from the Electrical and Computer Engineering listed above, and described in the documents.”

The motion was **carried**.

**Walter G. Booth School of Engineering Practice**

Drs. Potter and Mahalec presented the curriculum changes for the Walter G. Booth School of Engineering Practice.

**New course (Master of Engineering Entrepreneurship and Innovation):**
*727 – Technology Entrepreneurship for Engineers and Scientists*

**New courses (Master of Engineering Design):**
*745 – Design of Sustainable Community Infrastructure I*
*746 – Design of Sustainable Community Infrastructure II*
*763 – Special Topics in Engineering Design*
*764 – Visual Thinking*
*765 – Design Development*

**Change in course title and description (Master of Engineering Design):**
*760 – Design Thinking*
*761 – Design Innovation*

Dr. McDermid moved, and Mr. Jones seconded,
“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the Walter G. Booth School of Engineering Practice listed above, and described in the documents.”

Upon reviewing the documents, there was a comment that the course contents for *764 – Visual Thinking and *765 – Design Development are similar. The presenters will clarify the issue with the instructors.

The motion was carried (subject to clarification of courses *764 and *765 mentioned above).

**Engineering Physics**

Dr. Cassidy briefly discussed the curriculum submissions from the Engineering Physics Department.

New courses:
*6MD3 – Advanced Materials and Next-Generation Devices
*727 – Advanced Reactor Physics and Analysis

Request to cross-list Mechanical Engineering *752 – Advanced MEMS Fabrication and Microfluidics as Engineering Physics *752

Request to cross-list Engineering Physics *719 – MEMS Devices: Design, Fabrication and Applications as Mechanical Engineering *719

Dr. McDermid moved, and Mr. Jones seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposals from the Engineering Physics Department listed above, and described in the documents.”

The motion was carried.

**Mechanical Engineering**

Dr. McDermid presented the curriculum submissions from the Mechanical Engineering Department.

New course:
*715 – Biomechanics of Injury and Prevention (cross-listed as Biomedical Engineering *715)

Change in course title and description:
*6K03 – Robotics
*6U03 – Compressible Flow and Turbomachinery
Request to cross-list Engineering Physics *719 – MEMS Device: Design, Fabrication, and Applications as Mechanical Engineering *719

Request to cross-list Mechanical Engineering *752 – Advanced MEMS Fabrication and Microfluidics as Chemical Engineering *750 and Engineering Physics *752

ADMI new courses:
DM0828 – Lean Manufacturing – Principles, Applications and Implementation
DM0827 – Renewable Energy Systems

Dr. Thompson moved, and Mr. Jones seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the Mechanical Engineering Department listed above, and described in the documents.”

The motion was carried.

Materials Science and Engineering

In the absence of a representative from the Materials Science and Engineering Department, Dr. Sheardown presented the proposed new course, #714 – Phase Field Methods in Microstructure Modeling.

Dr. McDermid moved, and Mr. Jones seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the new course, #714 – Phase Field Methods in Microstructure Modeling, from the Materials Science and Engineering Department as described in the document.”

The motion was carried.

Interdisciplinary Program

M.Sc. eHealth

Dr. Archer briefly discussed the proposed curriculum changes for the M.Sc. eHealth program.

M.Sc. eHealth

- Change to admission requirements
- Change to program completion time
Request to cross-list the following courses with Computing and Software:
*6CD3 – Distributed Computer Systems (cross-listed as eHealth *6CD3)
*6D03 – The Human Computer Interface (cross-listed as eHealth *6D03)
*6M03 – Databases (cross-listed as eHealth *6M03)
*6WW3 – Web Systems and Web Computing (cross-listed as eHealth *6WW3)
*730 – Machine Learning and Data Mining (cross-listed as eHealth *730)
*747 – Software Architecture Modeling and Reverse Engineering (cross-listed as eHealth *747)
*750 – Model-Based Image Reconstruction (cross-listed as eHealth *750)
*757 – Modern Software Technology for eHealth (cross-listed as eHealth *757)

Dr. McDermid moved, and Mr. Love seconded,

“that the Faculty of Engineering Graduate Curriculum and Policy Committee approve the proposed curriculum changes from the M.Sc. in eHealth program listed above, and described in the documents.”

Change to admission requirements
Dr. Archer explained that students who are interested in the M.Sc. eHealth program are required to have a background in computer science. To address this issue, it was proposed to add the following in the admission requirements of the program: “….Students will not be admitted to the program unless they can present evidence that they have taken a minimum of two computer science – related courses at the undergraduate level. At least one of these courses must have involved computer programming….. All students admitted to the program must pass a background test in information technology (IT) before taking the required course eHealth 757. Students preparing for this test will be provided with study materials and, where possible and appropriate, tutorial assistance.”

In response to a query, Dr. Archer explained that students without any computer science background may be considered and admitted conditionally to the program. The educational background of students in this category will be checked in detail and they may be required to take additional undergraduate courses in order to fulfil the requirements of the program.

Program Completion
Dr. Archer explained that students in the thesis option will now be expected to complete the program within 24 months. Dr. Archer said the current 20-month completion time is not sufficient for students to complete the 8-month internship, the research and submit a thesis.

The motion was **carried**.

Other Business

Dr. Sheardown reminded the committee of the deadline to submit nominations for the International Excellence Award. She added that the Faculty of Engineering was allotted seven awards. She then asked the members if they are willing to volunteer to be part of the ranking
committee for this award. Two student representatives, Kurt Stoll and Joshua Samuel, volunteered to assist with the ranking.

There was no other business, and the meeting adjourned at 3:10 p.m.
# Recommendation for Change in Graduate Curriculum - For Changes 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**

Biomedical Engineering, School of Biomedical Engineering

**COURSE TITLE**

Medical Imaging Systems II

**COURSE NUMBER**

702

**COURSE CREDIT**

<table>
<thead>
<tr>
<th>Full Course</th>
<th>Half Course</th>
<th>Quarter (Module)</th>
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</table>

**INSTRUCTOR(S)**

Dr. MD Noseworthy, Dr. N Bock

**PREREQUISITE(S)**

Permission of the Instructor(s)

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

- [ ] NEW COURSE
- [X] CHANGE IN COURSE TITLE
- [X] CHANGE IN COURSE DESCRIPTION
- [X] CHANGE TO FULL COURSE
- [X] CHANGE TO HALF COURSE
- [ ] CHANGE TO QUARTER COURSE

**NEW COURSE**

**DATE TO BE OFFERED:**

Winter Semesters

**WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL? IF YES, PROVIDE THE DATE:**

**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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

**CHANGE IN COURSE TITLE**

[ ] PROVIDE THE CURRENT COURSE TITLE:

Foundations of Magnetic Resonance

**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**

**EXPLAIN:**

The previous instructor (Dr. G. Moran) is no longer at McMaster University. Furthermore in collaboration with Medical Physics we have come up with Medical Imaging Systems I and II thereby removing redundancy in our programs. To be cross listed with Electrical & Computer Engineering as ECE *780 and as Medical Physics *702.

**BRIEF DESCRIPTION FOR CALENDAR**

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

This course will compliment Medical Imaging Systems I. In this course imaging methods that rely on non-ionizing radiation will be discussed. The course content focuses on magnetic resonance imaging (MRI), in vivo nuclear magnetic resonance (NMR), ultrasound (US), and optical imaging methods. Advanced concepts such as multi-modality imaging approaches, image fusion, and functional medical image processing will be discussed.

**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 revolve around principles of magnetic resonance imaging (MRI), ultrasound (US) and optical imaging. A plethora of textbooks and current review papers will be used as course materials.
1. STATEMENT OF PURPOSE (How does the course fit into the department’s program?)

One of the foci of biomedical engineering in the McMaster Engineering faculty is medical imaging. As this is also an important facet of medical physics it is cross listed there too.

2. EXPECTED ENROLMENT:

15-20

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

Lectures, imaging demonstrations (Imaging Research Centre, St. Joseph’s Healthcare), student seminars.

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.)

50% Student Seminar
50% Assignments (2 each 25%). These will involve programming and advanced manipulation of imaging data.

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: Dr. Michael D. Noseworthy  Email: nosewor@mcmaster.ca  Extension: 35218  Date: February 14, 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/medy
Medical Imaging Systems II: BME-702

Course Outline

Instructor
Michael D. Noseworthy, Ph.D., P.Eng.
Email: nosewor@mcmaster.ca
Web: http://www.ece.mcmaster.ca/~mikenose/web/HOME.html
Campus Office: ETB-406  Phone: ext.23727
Hospital Office/Lab:
Imaging Research Centre, St. Joseph’s Healthcare,
Fontbonne Bldg, room F-127, Phone: ext.35218

Course Schedule and Location
One lecture every week; next offered in winter 2011.
Lecture times: Tuesdays, 9:30am - 12:20pm
Location: IRC Conference room, Imaging Research Centre, St. Joseph’s Healthcare,
Fontbonne Bldg, room F-129

Course Objectives
This course is designed to have students develop a solid understanding of imaging modalities that work on non-ionizing radiation. The course will focus on magnetic resonance imaging (MRI) and associated techniques (e.g. in vivo NMR), ultrasound, and optical imaging. Students will become familiar with these technologies, from a physics and engineering perspective. Practical aspects will be investigated throughout the course.

Prerequisite
At least one course in medical imaging physics or engineering, and the instructor’s permission.

Textbook and Recommended Readings
A number of key review papers that fully complement the course material will be suggested to students throughout the term. Required texts are:
1) Bernstein MA. Handbook of MRI Pulse Sequences.
5) Drexler W, and Fujimoto JG. Optical Coherence Tomography: Technology and Applications
Grading
There are 12 three hour lectures this term. Students will be required to do 2 in-class presentations (each 45 minutes long).

Presentations (2 x30% each) 60%
Class Participation 10%
Final EXAM (date TBA) 30%

Please note that announcements concerning any type of graded material may be in any format (e.g. announcements may be made only in class). Students are responsible for completing the graded material regardless of whether they received the announcement or not.

Course Content (approximately by week)
1. Basics of nuclear magnetic resonance signal (NMR)- Quantum and Newtonian approaches
2. Going from NMR to magnetic resonance imaging (MRI): Basics of pulse sequences
3. Sampling and Reconstruction: Hermitian symmetry, spiral, rectilinear, keyhole, tricks
4. RF pulses: Basic, spectral-spatial and Adiabatic pulses
5. Gradients: Imaging, motion sensitizing, correction gradients
6. Parallel Imaging: SENSE vs. SMASH, parallel transmit
7. Advanced MRI pulse sequences 1: SE, GRE, FSE, angiography, fat/water,
8. Advanced MRI pulse sequences 2: diffusion- DWI, DTI, HARDI, q-space
9. In vivo MR Spectroscopy
10. Ultrasound Imaging: Part I (A-mode, B-mode, M-mode)
11. Ultrasound Imaging: Part II (Doppler, 3 and 4D modes, co-registration)
12. Optical Imaging: Part I- basic techniques, NIRS, Raman
13. Optical Imaging: Part II- Tomography
### Recommended 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**
Medical Physics and Applied Radiation Sciences

**COURSE TITLE**
Medical Imaging Systems I

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>COURSE CREDIT</th>
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<tbody>
<tr>
<td>MedPhys *770</td>
<td>FULL COURSE (X)</td>
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**INSTRUCTOR(S)**
Dr. Hao Peng, Dr. Troy Farncombe

**PREREQUISITE(S)**
Permission of the instructors

**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>
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<tbody>
<tr>
<td>Fall semesters</td>
<td>If Yes, Provide the Date:</td>
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</table>

**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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

**CHANGE IN COURSE TITLE**

<table>
<thead>
<tr>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
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<tr>
<td>Imaging in Medical Physics</td>
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**CHANGE IN COURSE DESCRIPTION**

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<tr>
<td>Imaging in Medical Physics</td>
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**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

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<tr>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
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<tr>
<td>To be cross-listed with Biomedical Engineering as *770. Note that this course is also cross-listed with Electrical and Computer Engineering.</td>
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**OTHER**

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<th>EXPLAIN:</th>
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**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description *(maximum 6 lines)* to be included in the Graduate Calendar.

Medical imaging is important for both clinical medicine, and medical research. This course will provide an introduction to several of the major imaging modalities, focusing on the aspects of imaging physics, signal processing and system design. The topics to be covered include projection-imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT). Ultrasound, optical imaging and MRI will be covered in the second part of this course Medical Imaging System II.

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

In summary, the course is designed to introduce several general concepts and address some critical questions in medical imaging system: 1) How do the major medical imaging modalities work (physics, image formation, image quality)? What are the main sources of noise, distortion, artifact, and contrast recovery? 2) What is the role of system theory in the performance analysis of medical imaging systems? What is the transfer function of the system? On what design parameters and imaging protocol that the signal-to-noise ratio (SNR) of medical imaging systems depend? 3) How is a medical imaging technology used in clinical practice? What are the trends and emerging areas of future study? 4) General imaging concepts and multi-mode imaging system design such as PET/CT, PET/MRI and SPECT/MRI?

Text: Bushberg, Seibert, Leidholdt & Boone, The Essential Physics of Medical Imaging, Lippincott Williams & Wilkins
1. **STATEMENT OF PURPOSE (How does the course fit into the department’s program?)**

One of the foci of medical physics is medical imaging. Complementary to the introductory medical imaging course MedPhys 4T3, this graduate course will teach students several advanced topics in medical imaging.

2. **EXPECTED ENROLMENT:**

15-20

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

Lectures, imaging demonstrations (HHS and preclinical imaging facility), student presentations.

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.)**

Three assignments: 20% for each; Final Project: 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?**

N/A

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

Name: Dr. Hao Peng Email: penghao@mcmaster.ca Extension: 27126 Date: Feb 17, 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/medy
To:  
Dr. Michael J. Farquharson, Prof, PhD, MSc, BSc, PGCE  
Chair, Medical Physics and Applied Radiation Sciences  
Tandem Accelerator Building Room 207  
McMaster University, Hamilton, Ontario, Canada.  
Phone: (905) 525-9140 Ext 23021  
Email: farquhm@mcmaster.ca  
http://www.science.mcmaster.ca/medphys/faculty/36-michael-faquharson.html

From:  
Dr. Michael D. Noseworthy, Ph.D., P.Eng.  
Co-Director, McMaster School of Biomedical Engineering,  
Associate Professor, Department of Electrical and Computer Engineering,  
McMaster University. Hamilton, Ontario, Canada.  
Phone: (905) 522-1155 x23727  
email: nosewor@mcmaster.ca  
http://www.ece.mcmaster.ca/~mikenose/web/HOME.html

Re: Cross listing of Graduate Courses “Medical Imaging Systems I and II”

February 17, 2011

Dear Mic,

I am delighted to see collaboration between Medical Physics and The School of Biomedical Engineering to cross list the 700 level graduate courses “Medical Imaging Systems (I and II)” between us. I agree that Medical Imaging Systems I will be offered through Medical Physics, while being cross listed in Biomedical Engineering. Medical Imaging Systems II will be offered through the School of Biomedical Engineering and Cross listed within your department, Medical Physics. I am positive this will be well received by faculty and students alike. Further, I believe this will lead to superior instruction for all our graduate students who have interest in advanced understanding of medical imaging technology.

Sincerely,

Michael D. Noseworthy, Ph.D., P.Eng.
Dr. Mike Noseworthy  
Director Bio Medical Engineering  
McMaster University  

Dear Mike  

I fully agree with the proposal for the two Medical Imaging Systems (MIS-1) graduate courses to be cross listed between BME and Medical Physics. MIS-1 should be crossed listed in Biomedical Engineering in the Graduate Calendar. In a similar manner MIS-2 will be crossed listed in Medical Physics in the Graduate Calendar.  

Kind Regards  

M.J.Farquharson
### School of Biomedical Engineering

#### Biomedical Engineering II (Core)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Course Number</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Engineering II (Core)</td>
<td>706</td>
<td>Dr. Sheardown, Dr. Hoare, Dr. Noseworthy, Dr. Margetts, Dr. Hortelano, Dr. West-Mays</td>
<td>none</td>
</tr>
</tbody>
</table>

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

- **NEW COURSE**
- **Date to be Offered:** Winter 2012
- **Was the Proposed Course Offered on Dean’s Approval?**
  - **If Yes, Provide the Date:**

**Will the Course be Cross-listed with Another Department?**
- **No**

**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**

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

**Other**
- **Explain:**

**Brief Description for Calendar**
- An introduction to biomedical engineering with a health science focus. The biological and chemical concepts involved in the design and operation of medical devices and biological processes will be discussed. The following research themes will be emphasized: cell biological responses to biomaterials, toxicity / pharmacokinetics, tissue and genetic engineering, gene therapy, biotechnology physiological response to biomaterials.

**Content/Rationale**
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
  - The topics to be discussed are listed above in the calendar description and will be delivered by different faculty members. All topics will have a bioengineering emphasis.
1. STATEMENT OF PURPOSE (How does the course fit into the department’s program?)

This is an added core course (will be in addition to BME *701 - Biomedical Engineering - Engineering themes;) to that offered in the fall. Students can enroll in this core course either before or after *701. The rationale for adding this core course along with 701 is to fulfill the need for the students to be exposed to additional course material in Health Science. Currently, there are few courses for the BME students to enroll in from Health Sciences.

2. EXPECTED ENROLMENT:

25

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

Lectures from multiple faculty members from Engineering and Health Science.

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 will be identical to that of BME *701: 6 quizzes (closed book - 30 minutes) 50%
   (one quiz per segment, to be given at the start of class of the next segment)
   Project 50%
   Oral Powerpoint presentation (12 min) followed by Q and A session (8min)

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).

Not that we are aware of.

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: Judith West-Mays Email: westmayj@mcmaster.ca Extension: 26237 Date: February 16, 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/medy
## 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

Chemical Engineering

### Course Title

Biopharmaceuticals

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>782</td>
<td>Dr. Raja Ghosh</td>
<td>Undergraduate degree in chemical/biochemical engineering or in chemistry, biochemistry, pharmacology, life sciences</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>New Course</th>
<th>Date to Be Offered: 2012-13</th>
<th>Was the Proposed Course Offered on Dean’s Approval? No</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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<td></td>
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</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 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:

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

The term biopharmaceuticals usually refers to peptide, protein and nucleic acid based therapeutic products such as insulin, monoclonal antibodies and interferon. The product and process development, manufacturing, formulation and analytical technologies involved with such products are significantly different from those for low molecular weight pharmaceuticals. This course aims to introduce students to some of the technological aspects related to biopharmaceuticals.

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

Introduction to biopharmaceuticals; product development and characterization; production technologies; analytical techniques; survey of biopharmaceutical products: cytokines, hormones and growth factors, blood products, monoclonal antibodies, nucleic acid therapeutics, and chemically modified therapeutics such as PEGylated proteins.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   A graduate course on biopharmaceuticals will be most useful for chemical engineers looking for career opportunities in the pharmaceutical industry.

2. **EXPECTED ENROLMENT:**

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

   Lectures, term paper and seminar

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.)

   Term paper (20%), seminar (5%), assignments (15%) and 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).**

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: Raja Ghosh | Email: rghosh@mcmaster.ca | Extension: 27415 | Date: 6 January 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/medy
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: Chemical Engineering

COURSE TITLE: Nanotechnology in Chemical Engineering

COURSE NUMBER: 791

INSTRUCTOR(S): Dr. T.R. Hoare

PREREQUISITE(S): None

Nature of Recommendation (Please check appropriate box):

New Course: Y

Date to be offered: 2011-12

Was the proposed course offered on Dean’s approval? No

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 approval from each department and faculty concerned.

Provide the current course title:

Provide the current course description:

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

Provide the reason for course cancellation:

Other

Explain:

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

Fundamentals of the design, preparation, and properties of nanomaterials are discussed from a chemical engineering perspective. Emphasis will be placed on how physical properties of materials change on the nanoscale, top-down (chemical patterning/lithography techniques) versus bottom-up (self-assembly) approaches to nanostructure preparation, nanoparticle design, characterization of nanoscale structures, nanofluidics and nanomachines (including microelectromechanical systems), and nanobiomaterials (drug and gene delivery, biosensors, and bioseparations)

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:
1) Nanotechnology basics - effect of length scale; unique properties of nanomaterials (quantum effects)
2) Fabrication of Nanostructures - biological inspiration; top-down vs. bottom up assembly
3) Self Assembly as a Route to Nanostructures - fundamental forces directing self-assembly; applications for nanostructure assembly
4) Nanoparticle Design and Assembly - isotropic nanoparticles (micelles, liposomes, polymerosomes, coacervates, solid nanoparticles, nanogels); anisotropic nanoparticles (core-shell particles, Janus particles, patchy particles, nanoshells, nanowires, nanotubes, prisms) - preparation methods and applications
5) Top-Down Patterning - lithography (electron beam, photolithography, soft lithography, dip pen); surface wrinkling; applications
6) Nanofluidics and Microelectromechanical Systems - fundamental principles; lab-on-a-chip designs; fabrication techniques
7) Nanobiomaterials - interactions of nanomaterials with cells; drug and gene delivery; biosensors; nanobioseparations
8) Nanomaterial Safety - biological and environmental effects of nanomaterials; nanotoxicology


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

Our department has three major research themes: polymer science and engineering, bioengineering, and process control. Increasingly, faculty members with specializations in polymers, biomaterials, and bioseparations have gravitated toward research projects involving the design of nanomaterials to solve technological challenges. As such, there is a need in our department for a graduate course that addresses the chemical engineering fundamentals of nanomaterial design and preparation to prepare students for research in this field and make them aware of the techniques, materials, and properties accessible through nanoscale engineering.

2. EXPECTED ENROLMENT:

10 per year

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

Mixture of lectures (2 hours/week) and literature/patent discussion workshops (1 hour/week)

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.)

- Leading literature/patent discussions – 15%
- Participating in literature/patent discussions – 10%
- Final Presentation (review of a selected topic in nanotechnology) – 35%
- Final Report (literature review + mini-grant proposal on an approved topic) – 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 - while Materials Engineering offers a course in Nanomaterials Characterization, this course will be significantly distinct in that the chemical engineering principles of nanotechnology will be emphasized.

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

N/A - we expect enrollment from Chemistry/Chemical Biology and selected groups in other engineering disciplines (Materials, Mechanical), but the course is designed primarily for chemical engineering students

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Todd Hoare   Email: hoaretr   Extension: 24701   Date: February 4, 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/medy
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**
Fundamentals of Soil Behaviour

**COURSE NUMBER**
743

**COURSE CREDIT**

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

**INSTRUCTOR(S)**
Peijun Guo

**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>Y</td>
<td>Sept. 2011</td>
<td>No</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 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**

**EXPLAIN:**
The course has been offered as a special topic for 4 years for graduate students in both geotechnical engineering and structural engineering

**BRIEF DESCRIPTION FOR CALENDAR**
Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
An understanding of soil behaviour is a fundamental requisite to a wide variety of geotechnical engineering applications, such as foundation design, soil-structure interaction and geotechnical earthquake engineering. Appropriate numerical modelling also highly depends on a better understanding of soil behaviour. This course, which focuses on the behaviour of soils under various conditions, their theoretical descriptions and laboratory testing, will provide students the knowledge and understanding of fundamental soil behaviour and of the underlying scientific principles.

**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 the following topics: Physical properties of soils; fabric and internal structure; the principle of effective stress and its implications; soil strength; volume change characteristics of soil; critical state soil mechanics; advanced theory of consolidation; thermal-mechanical coupled processes; introduction to unsaturated soil behaviour.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   This is fundamental geotechnical engineering course for graduate students in the area of Computational Mechanics (Structural/Geotechnical)

2. **EXPECTED ENROLMENT:**

   Approximately 5

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

   Regular lectures: PowerPoint Presentation
   Lecture notes are emailed to student before lecture
   Reading material is provided to students
   Project topics will be provided

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 performance of students will be evaluated based on both term work (including four assignments and one course project) and the final exam, which are weighted as 20% for assignments, 40% for the term project and 40% for the final exam.

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

   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: Peijun Guo | Email: guop@mcmaster.ca | Extension: 27903 | Date: Jan 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/medy
### 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 approval from each department and faculty concerned.

### CHANGE IN COURSE TITLE
- Provide the current course title:
  - Civil Engineering Seminars (Master's)

### 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:

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

This is a seminar series presented by graduate students and guest speakers invited by the department. All full time students are required to take this course in both fall and winter terms. Course grades are either 'pass' or 'fail'. In order to pass the course the student must attend a minimum of 70% of the seminars. Full time Master's students are required to present one seminar in the second year of their program, while the full time Ph.D. students must present two seminars during the period between the second year and the submission of Ph.D. thesis. The seminar topic will be in the area related to student's current research.

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

The changes being made to the calendar are to reflect the change in attendance and presentation requirements within the course for students.
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):

   There is no course material being presented. Both Master and PhD students are required to do seminar presentations. The seminar topic will be in the area related to student's current research.

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.)

   This is a 'pass' or 'fail' course. In order to pass the course the student must attend a minimum of 70% of the seminars. Full time Master's students are required to present one seminar in the second year of their program, while the full time Ph.D. students must present two seminars during the period between the second year and the submission of Ph.D. thesis.

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: February 8, 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/medy
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: CIVIL ENGINEERING

COURSE TITLE: ADVANCED STATISTICAL & DATA DRIVEN METHODS IN HYDROLOGY

COURSE NUMBER: 757

COURSE CREDIT

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

INSTRUCTOR(S): DR PAULIN COULIBALY

PREREQUISITE(S): NA

NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

NEW COURSE

DATE TO BE OFFERED: FALL 2011

WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL? IF YES, PROVIDE THE DATE:

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

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:

Request to cross-list School of Geography & Earth Sciences course, ES *757, as Civil Engineering *757

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

The objective of this course is to provide a survey of advanced statistical and data-driven methods in hydrology and water resources engineering, and to apply selected methods to hydrologic modeling and water resources problems solving.

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

This course covers (1) the fundamentals of advanced statistical methods (distributions, Markov chain, ARMA family) used for hydro-climatic time series analysis and modelling; (2) a survey of data driven-methods such as artificial neural networks (ANN), fuzzy logic, and genetic programming (GP) used in water resources and environmental systems modelling. This includes the application of ANN and GP methods in hydrologic modelling; the estimation of water quality parameters using ANN; and the downscaling of climate predictors with dynamic ANN models. A specific term project is assigned to each student according to his research topic. In addition to the term project work and the assigned reading, the student has to complete two assignments and a review paper. Emphasis in this course will be placed on:

(a) Understanding the fundamentals and limitations of statistical and data-driven methods in hydrologic and environmental time series analysis and modelling.
(b) The application of selected methods in the analyses and modelling of hydrologic/environmental data.
(c) Uncertainty and reliability of analysis results.

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

This course is already offered in the School of Geography and Earth Sciences (SGES) as EARTH SC 757 and has been offered in the Department of Civil Engineering as Special Topic Course (CE-704) over the last 3 years. The course has been taken by graduate students from the Civil Eng. Dept. and from the SGES. The course is essential for students dealing with physical system modelling and environmental data analysis. There is actually no such offering in the Department of Civil Engineering. The course will fill that gap.

2. EXPECTED ENROLMENT:

7-12

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

Lecture: PowerPoint presentation
Lecture notes are emailed to students before lecture
Reading material is provided in a custom courseware

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.)

Assignments: (25%)
Evaluation of review paper: (25%)
Student term project and presentation: (50%)

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 IN THE SGES AS EARTH SC 757 AND WAS ALSO OFFERED IN CIVIL ENG. AS SPECIAL TOPIC COURSE (CE-704). THE REQUEST IS TO OFFER THE COURSE AS REGULAR GRADUATE COURSE AND CROSS-LIST THE COURSE IN CIVIL ENG. AND THE SGES. (See attachment)

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: Paulin Coulibaly  Email: couliba@mcmaster.ca  Extension: 23354  Date: February 8, 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/medy
Dear Medy:
I am in agreement that the course listed below, taught by Dr. Paulin Coulibaly, be cross-listed with the Civil Engineering graduate program. If you have any question, please contact me.
Thanks,
Pavlos

*Earth Sci 757 / Advanced Statistical & Data Driven Methods in Hydrology/ P. Coulibaly
The objective of this course is to provide a survey of advanced statistical and data-driven methods in hydrology and water resources engineering, and to apply selected methods to hydrologic modeling and water resources problems solving.

Pavlos S. Kanaroglou, Director
School of Geography and Earth Sciences
Canada Research Chair in Spatial Analysis
Director, McMaster Institute for Transportation and Logistics
McMaster University
Hamilton, Ontario, Canada, L8S-4K1
Tel: 905 5259140 Ext: 23525
Fax: 905 5460463

It would be fine with me. Thanks. Altaf
<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Civil Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Theory of Elasticity</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>CE 713</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
</tr>
<tr>
<td></td>
<td>HALF COURSE ( )</td>
</tr>
<tr>
<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Staff</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

**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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

**CHANGE IN COURSE TITLE**

<table>
<thead>
<tr>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
</tr>
</thead>
</table>

**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>CHANGE TO HALF COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
</tr>
</thead>
</table>

**COURSE CANCELLATION**

<table>
<thead>
<tr>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course has not been offered in the last 4 - 5 years and material has been incorporated into other courses.</td>
</tr>
</tbody>
</table>

**OTHER**

<table>
<thead>
<tr>
<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.
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:  (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:  February 8, 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
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>Civil Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Structural Stability</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>CE 715</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>K. S. Sivakumaran</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
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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?**
**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**

**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: |
| Course has not been offered in the last 4 - 5 years and material has been incorporated into other courses. |

**OTHER**

| 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:**  (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: February 8, 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:

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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Advanced Steel Design</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Staff</td>
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</table>

**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? 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 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:

- Course has not been offered in the last 4 - 5 years and material has been incorporated into other courses.

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**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>
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<tbody>
<tr>
<td><strong>1. STATEMENT OF PURPOSE</strong> (How does the course fit into the department’s program?)</td>
<td></td>
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<tr>
<td><strong>2. EXPECTED ENROLMENT:</strong></td>
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<tr>
<td><strong>3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL</strong> (i.e., lectures, seminars):</td>
<td></td>
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<tr>
<td><strong>4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION:</strong> (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)</td>
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<td><strong>6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</strong></td>
<td></td>
</tr>
</tbody>
</table>

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

| Name: | S. Pietruszczak | Email: | pietrusz@mcmaster.ca | Extension: | 24007 | Date: | February 8, 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: 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**
- Civil Engineering

**COURSE TITLE**
- Civil Engineering Seminar (Ph.D.)

**COURSE NUMBER**
- CE 762

**COURSE CREDIT**

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

**INSTRUCTOR(S)**
- Staff

**PREREQUISITE(S)**

**COURSE CREDIT**

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

<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 approval from each department and faculty concerned.

**CHANGE IN COURSE TITLE**

<table>
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**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>
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<th>CHANGE TO QUARTER COURSE</th>
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</table>

**COURSE CANCELLATION**

<table>
<thead>
<tr>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
<th>To only have one Graduate Seminar Series Course for the entire department.</th>
</tr>
</thead>
</table>

**OTHER**

| 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: (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: February 8, 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
## 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: 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.

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>School of Computational Engineering and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME OF PROGRAM</td>
<td>Computational Engineering and Science</td>
</tr>
<tr>
<td>PROGRAM DEGREE</td>
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<tr>
<td>Ph.D. (x)</td>
<td>M.A. ( )</td>
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<tr>
<td>M.A.Sc. (x)</td>
<td>M.B.A. ( )</td>
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<tr>
<td>M. Eng. (x)</td>
<td>M.Sc. (x)</td>
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<tr>
<td>Diploma Program ( )</td>
<td>Other (Specify)</td>
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### Nature of Recommendation (Please check appropriate box)

<table>
<thead>
<tr>
<th>Change in Admission Requirements</th>
<th>Change in Comprehensive Examination Procedure</th>
<th>Change in Course Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLOIT:</td>
<td></td>
<td></td>
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</table>

| Other                             | EXPLOIT:                                      | Merge two groups of courses into one group |

### Describe the existing requirement/procedure:

Courses and modules offered by the School of Computational Engineering and Science are divided into four groups:

(i) Core Courses,
(ii) Parallel Programming Modules,
(iii) Computational Techniques Modules,
(iv) Computational Physical Sciences Courses and Modules

Depending on the specific degree option, Master's students are required to take a prescribed number of courses and modules from groups (i), (ii) and (iii) to satisfy their coursework requirements.

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

It is proposed that the groups of courses "(iii) Computational Techniques Modules" and "(iv) Computational Physical Sciences Courses and Modules" be merged into one group named "Computational Techniques Modules".
RATIONALE FOR THE RECOMMENDED CHANGE:

The group "Computational Physical Sciences Courses and Modules" currently consists of two modules, namely "Introduction to Particle Methods" (CES #712) and "Foundations of Computational Finite Element Methods" (CES #717). In order to appeal to students with diverse backgrounds, these modules are taught in a way emphasizing general computational aspects relevant to different disciplines. Therefore, the modules CES #712 and CES #717 can be more appropriately classified as "Computational Techniques". The group "Computational Physical Sciences Courses and Modules" is not part of any specific coursework requirements and will be eliminated.

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

September 2011

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

N / A

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR:

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Dr. Bartosz Protas Email: bprotas@mcmaster.ca Extension: x24116 Date: February 9, 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/medy
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 Computational Engineering and Science

### COURSE TITLE
Computational Models for Electronic Structure and Chemical Bonding

### COURSE NUMBER
chem6PB3

### COURSE CREDIT
<table>
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<tr>
<th>FULL COURSE</th>
<th>HALF COURSE</th>
<th>QUARTER (MODULE)</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### INSTRUCTOR(S)
Dr. Paul Ayers

### PREREQUISITE(S)
Registration in a graduate program

### 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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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>If Yes, Provide the Date:</td>
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</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 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:
The course is currently offered in the Department of Chemistry and Chemical Biology. It is proposed to cross-list this course in the School of Computational Engineering and Science (see below for justification)

### BRIEF DESCRIPTION FOR CALENDAR
- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
The Existing Graduate Calendar Description for the Course CHEM6PB3: Modern computational methods for studying atoms, molecules, and materials.

### 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 offers an introduction to applications of quantum many-body problems in computational chemistry.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

The course will be useful for students interested in computational chemistry and physics.

2. **EXPECTED ENROLMENT:**

2 (in CES)

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

Weekly lectures (3 hours per week)

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 course evaluation is based on mid-term exams, a final exam, and projects. The largest portion of the grade is a major project (50% or more of the mark) that stretches over the majority of the term. Graduate student assessment is the same as undergraduates, but the project is more intense (target: research-level computations), the final report is longer (target: publication-quality), and the grading standards are more stringent.

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 is a proposal for cross-listing a course

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

   Yes, see correspondence attached

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

Name: Dr. Bartosz Protas Email: bprotas@mcmaster.ca Extension: x24116 Date: February 8, 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/medy
From: Brian McCarry <mccarry@mcmaster.ca>
Subject: Re: Cross-listing the Course CHEM 6PB3 in CES
Date: Mon, 14 Feb 2011 07:56:54 -0500
To: Bartosz Protas <bprotas@mcmaster.ca>
Cc: Alex Adronov <adronov@mcmaster.ca>, "Vargas-Baca, Ignacio (vargasi)"
    <vargasi@mcmaster.ca>

Dear Bartosz:

I had circulated your request to my Associate Chairs of Undergraduate and Graduate Studies. We agree that there is no problem cross-listing this course. However, the course is only offered every other year so students should be aware that it will not always be available every year.

Brian

---

On 13/02/11 10:49 PM, "Bartosz Protas" <bprotas@mcmaster.ca> wrote:

Dear Professor McCarry,

I beg your pardon for bothering you with this matter again. I was wondering if it would be perhaps possible to obtain your opinion about the possibility of cross-listing the course CHEM 6PB3 in the School of Computational Engineering & Science. The reason I am following up on this is because the deadline for submitting this information to the
School of Graduate Studies is at the end of this week. Thank you very much indeed!

Sincerely,

Bartek Protas

On Tue, 08 Feb 2011 12:11:03 -0500
"Bartosz Protas" <bprotas@mcmaster.ca> wrote:
> Dear Dr. McCary,
> 
> I am contacting you as regards the graduate course "Computational Models for
Electronic Structure and Chemical Bonding" (CHEM 6PB3) offered by Dr. Ayers. We
would like to have this course cross-listed in the School of Computational Engineering
and Science (http://computational.mcmaster.ca) which would allow our students to take
this course for credit (I expect that approx. 1-2 students from our program might be
interested in taking this course in any given year). As required by the School of Graduate
Studies, I am writing to inquire if you would be agreeable to having the course CHEM
6PB3 cross-listed in CES. If I could provide any additional information, please do not
hesitate to let me know. Thank you very much.
> 
> With my best regards,
> 
> Bartek Protas
> 
> Director, School of Computational Engineering and Science
> 
> Bartosz Protas
> 
> Department of Mathematics & Statistics
> 
> McMaster University
> 
> Hamilton, Ontario, CANADA L8S 4K1
> 
> Phone: +1 (905) 525 9140 ext. 24116
> 
> Fax: +1 (905) 522 0935
> 
> Email: bprotas@mcmaster.ca
> 
> URL: www.math.mcmaster.ca/bprotas
**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>School of Computational Engineering and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Mathematical and computational fluid dynamics</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>MATH 749</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
</tr>
<tr>
<td></td>
<td>HALF COURSE ( X )</td>
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<tr>
<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>To be assigned</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in Graduate Program</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

<table>
<thead>
<tr>
<th>NEW COURSE</th>
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<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
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</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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.**

**CHANGE IN COURSE TITLE**

**PROVIDE THE CURRENT COURSE TITLE:**

<table>
<thead>
<tr>
<th>CHANGE IN COURSE DESCRIPTION</th>
<th>600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form</th>
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**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

**EXPAND:**

<table>
<thead>
<tr>
<th>OTHER</th>
<th>EXPLAIN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>The is a new course proposed by the Department of Mathematics &amp; Statistics. It is proposed to cross-list this course in the School of Computational Engineering and Science as CES <em>749</em> (see below for justification)</td>
</tr>
</tbody>
</table>

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

Mathematical properties of the Euler and Navier-Stokes equations for fluid flow, boundary layers, non-Newtonian fluids and turbulence. Numerical methods for the solution of the equations of fluid dynamics, focusing on finite volume methods, finite difference methods and spectral methods. Advanced topics include non-uniform grids, multigrid methods and adaptive methods.

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

This course provides an introduction to both the mathematical analysis of the equations of fluid flow, as well as an introduction to advanced computational methods for solving these equations.

Proposed texts: Wesseling "Principles of Fluid Dynamics", Chorin and Marsden "A Mathematical Introduction to Fluid Mechanics".
1. STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)

Fluid dynamics is a major research area in the School of Computational Engineering and Science. This course would provide a foundation for the mathematical theory and computational aspects of research in fluid dynamics. The subject matter of this new course has been taught successfully as a topics course for several years attracting significant interest among students in the CES Program.

2. EXPECTED ENROLMENT:

2-3 in CES

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

Lectures.

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.)

Assignments, exams. The assignments will include a computational component.

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 is a proposal for cross-listing a course

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

Yes, see correspondence attached.

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Bartosz Protas     Email: bprotas@mcmaster.ca     Extension: 24116     Date: 2011-02-14

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
From: "Hans U. Boden" <boden@math.mcmaster.ca>
Subject: Re: Cross-listing MATH 749 in CES
Date: Mon, 14 Feb 2011 12:10:17 -0500
To: Bartosz Protas <bprotas@mcmaster.ca>

Bartek,
Yes, I support the crosslisting of Math 749
Hans

On 2011-02-14, at 10:30 AM, Bartosz Protas wrote:

> Hi Hans,
> > I am writing as regards the proposal to cross-list the course MATH 749
> "Mathematical and Computational Fluid Dynamics" in the School of Computational
> Engineering and Science. I wonder if you approve this request (we must have the
> departmental support to be able to submit the request to SGS). Thanks a lot!
> > Bartek
> >
> Bartosz Protas
> Department of Mathematics & Statistics
> McMaster University
> Hamilton, Ontario, CANADA L8S 4K1
> Phone: +1 (905) 525 9140 ext. 24116
> Fax: +1 (905) 522 0935
> Email: bprotas@mcmaster.ca
> URL: www.math.mcmaster.ca/bprotas
> >
> >

============================================================================
| Hans U. Boden, Chair | Hamilton Hall 218E |
| Mathematics & Statistics | 905.525.9140 ext.23417 |
| McMaster University | fax 905.522.0935 |
| Hamilton, Ontario | boden@mcmaster.ca |
| L8S 4K1 Canada | www.math.mcmaster.ca/boden |
============================================================================
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: 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 | School of Computational Engineering and Science
--- | ---
COURSE TITLE | Optimization I

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>Q773</th>
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<tbody>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<table>
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<tr>
<th>INSTRUCTOR(S)</th>
<th>Dr. Elkafi Hassini</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PREREQUISITE(S)</th>
<th>Registration in a graduate program</th>
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NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

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<thead>
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<th>NEW COURSE</th>
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<td>IF YES, PROVIDE THE DATE:</td>
<td></td>
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<th>CHANGE TO QUARTER COURSE</th>
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<tr>
<th>COURSE CANCELLATION</th>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
</tr>
</thead>
</table>

| OTHER | X |

EXPLAIN: The course is currently offered in the DeGroote School of Business as *Q773. It is proposed to cross-list this course in the School of Computational Engineering and Science as CES *776 (see below for justification).

BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
The Existing Graduate Calendar Description for the Course Q773

The course will cover topics in linear, integer and nonlinear programming. Concepts to be covered include convexity, duality, Karush-Kuhn-Tucker conditions, complexity and different algorithmic and heuristic approaches to solving optimization problems. A selection of application and theory papers will also be discussed. Software implementation issues will be highlighted via the use of a popular package called the General Algebraic Modeling System (GAMS).

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 offers an introduction to optimization methods applicable to solution of business decision problems.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   While the School already offers courses on optimization, this course will be useful for students interested in Operations Research.

2. **EXPECTED ENROLMENT:**

   3 (in CES)

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

   Weekly lectures (3 hours per week)

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 students are required to: (1) work on four assignments that include both theoretical and computational problems; (2) write a term paper that involves preparing and peer-reviewing drafts, final report and presentation; (3) prepare a 20 minute presentation on a theoretical topic as part of a lecture; (4) a final exam that includes an in-class exam, an a take-home problem and a research paper critique.

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 is a proposal for cross-listing a course.

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

   Yes, see correspondence attached

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

Name: Dr. Bartosz Protas  Email: bprotas@mcmaster.ca  Extension: x24116  Date: February 8, 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/medy
Dear Prof. Protas:

One or two extra students in the class should be manageable in Q773. It is acceptable to cross-list the course.

Best regards.

Prakash Abad
Chair, Operations Management area
Professor of Management Science
DeGroote School of Business
McMaster University
Tel 905-525-9140 ext. 23945
Fax 905-521-8995

-----Original Message-----
From: Bartosz Protas [mailto:bprotas@mcmaster.ca]
Sent: Tuesday, February 08, 2011 12:05 PM
To: abad@mcmaster.ca
Cc: Elkafi Hassini
Subject: Cross-listing the Course Q773 in CES

Dear Dr. Abad,

I am contacting you as regards the graduate course "Optimization I" (Q773) offered by Dr. Hassini. We would like to have this course cross-listed in the School of Computational Engineering and Science (http://computational.mcmaster.ca) which would allow our students to take this course for credit (I expect that approx. 1-2 students from our program might be interested in taking this course in any given year). As required by the School of Graduate Studies, I am writing to inquire if you would be agreeable to having the course Q773 cross-listed in CES. If I could provide any additional information, please do not hesitate to let me know. Thank you very much.

With my best regards,

Bartek Protas
Director, School of Computational Engineering and Science

Bartosz Protas
Department of Mathematics & Statistics
McMaster University
Hamilton, Ontario, CANADA L8S 4K1
Phone: +1 (905) 525 9140 ext. 24116
# 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

School of Computational Engineering and Science

## Course Title

Incompressible Computational Fluid Dynamics

## Course Number

CES #715

## Course Credit

<table>
<thead>
<tr>
<th></th>
<th>Full Course</th>
<th>Half Course</th>
<th>Quarter (Module)</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td>( )</td>
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</tr>
</tbody>
</table>

## Instructor(s)

Dr. Nicholas Kevlahan

## Prerequisite(s)

Registration in Graduate Program

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

- **New Course**
- **Date to be Offered:**
- **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 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

**Provide the Reason for Course Cancellation:**

This module has been incorrectly cross-listed as PHYS #715, while in fact it has been offered by the Department of Mathematics and Statistics. It will be replaced by MATH 749 "Mathematical and Computational Fluid Dynamics" (see accompanying documentation).

**Other**

**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:**  (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:  | Bartosz Protas | Email:  | bprotas@mcmaster.ca | Extension:  | 24116 | Date:  | 2011-02-14 |

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

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<tr>
<td>COURSE TITLE</td>
<td>Mathematical Introduction to Fluid Mechanics</td>
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<tr>
<td>COURSE NUMBER</td>
<td>CES #716</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Nicholas Kevlahan</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in Graduate Program</td>
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**NATURE OF RECOMMENDATION** *(PLEASE CHECK APPROPRIATE BOX)*

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<th>NO IF YES, PROVIDE THE DATE:</th>
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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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

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**COURSE CANCELLATION**

- PROVIDE THE REASON FOR COURSE CANCELLATION: This module has been incorrectly cross-listed as PHYS #716, while in fact it has been offered by the Department of Mathematics and Statistics. It will be replaced by MATH 749 "Mathematical and Computational Fluid Dynamics" (see accompanying documentation).

**OTHER**

- 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:** (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: Bartosz Protas | Email: bprotas@mcmaster.ca | Extension: 24116 | Date: 2011-02-14 |

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:**

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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
Mobile User Interface Design

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Credit</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>733</td>
<td>FULL COURSE ( )</td>
<td>Christopher Anand</td>
</tr>
</tbody>
</table>

### Prerequisite(s)
Human-computer interaction, program applications on a mobile device

### Nature of Recommendation

#### New Course

**DATE TO BE OFFERED:**
2011/2012

**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 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:**

**Brief Description for Calendar**

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

An advanced look at User Interface issues associated with mobile devices, e.g. smart phones. This course is for graduate students who have already taken a course in human-computer interaction and already know how to program non-trivial applications on at least one mobile device. Through literature review, and experimentation, students will learn how the advent of mobile devices is changing our approach to human-computer interactions, and will practice a quantitative approach to evaluating the effectiveness of user interface concepts.

### Content/Rationale

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

In this course you will learn (1) the state of the art in mobile interface design and analysis, and (2) quantitative methods of evaluating a user interface or change to an existing user interface.

Journal and conference papers will be assigned based on the interests of the students. A good overview of expected general UI knowledge and specific Mobile UI content is Schneifman's "Designing the User Interface".

This course was designed in consultation with recent graduates at RIM and other companies and current grad students, because we don’t have courses in this area.

Recommendation of student: “It's the best project-based course I've ever taken. It's still very geared towards graduate students in that the aim is to find experimental results and design experiments around a UI.”
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   This course exposes graduate students to two aspects of computer science: Mobile UI design at a time of rapid innovation in both industry and academia, and application of the scientific method to design, in this case the deliberate planning of UI elements, in which human interactions can be predicted by models, but not in an exact way, so experiments are needed.

2. **EXPECTED ENROLMENT:**

   10

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

   Seminars and group discussions.

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.)

   Literature Review. 15% Each student will review at least 3 journal and conference papers which are either directly relevant to the question, or contain methods of evaluation which are likely to be applicable to the question. Each student will give a 15 minute presentation, and hand in a short written report (with references). Marks for how well the reports identify (1) related work in the literature, and (2) possible methods of quantifying effective user interfaces.

   Experiment Design. 15% 5 minute presentation and written report.

   Software Design. 10% A report will be made available for peer review. Marks will be awarded for review of peer designs.

   Implementation. 20% will be awarded based on meeting design requirements, and being "usable" for our purposes.

   Interpretation. 30% percent, 15 minute presentation (with discussion) and a written report. It will be evaluated on:
   - answering the question
   - connection of this problem with the literature
   - significance of conclusions
   - recommendation

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: Christopher Anand (research leave) Email: anandc@mcmaster.ca Extension: 24895 Date: 10 Dec 2010

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
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: 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>Software Architecture Modeling and Reverse Engineering</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>747</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE (x) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>K. Sartipi</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

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? IF YES, PROVIDE THE DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

CHANGE IN COURSE TITLE

<table>
<thead>
<tr>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
</tr>
</thead>
</table>

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:
The instructor Dr. K. Sartipi has left the department.

OTHER

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:** (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:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Extension</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanzheng Qiao</td>
<td><a href="mailto:qiao@mcmaster.ca">qiao@mcmaster.ca</a></td>
<td>27234</td>
<td>30 Dec 2010</td>
</tr>
</tbody>
</table>

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** 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
Electrical and Computer Engineering

### NAME OF PROGRAM
Electrical and Computer Engineering

### PROGRAM DEGREE

<table>
<thead>
<tr>
<th>Degree</th>
<th>Ph.D.</th>
<th>M.A.</th>
<th>M.A.Sc.</th>
<th>M.B.A.</th>
<th>M. Eng.</th>
<th>M.Sc.</th>
<th>Diploma Program</th>
<th>Other (Specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( )</td>
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</table>

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

<table>
<thead>
<tr>
<th>Requirement/Procedure</th>
<th>Change in Admission Requirements</th>
<th>Change in Comprehensive Examination Procedure</th>
<th>Change in Course Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLAIN:</td>
<td>Adding a section for Master's level courses only</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### OTHER
EXPLAIN:

### DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:
Currently there is only one course listed (*701) under the section "Required Course for M. Eng. with Project"

### PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE (Attach additional pages if space is not sufficient.)

The department would like to add a number of master's level courses specifically for M.Eng students, as well as M.A. Sc students, which could be taken for credit towards minimum degree requirements.
**RATIONALE FOR THE RECOMMENDED CHANGE:**
To provide more of a course selection for masters level students

**PROVIDE IMPLEMENTATION DATE:** *(Implementation date should be at the beginning of the academic year)*
September 2011

**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:**
To be inserted after course *701*

Master’s Level Courses

The following courses can be taken for credit towards minimum degree requirements by MEng and MASc students only.

*702  
*703  
....  
*708  
*709

**CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:**

Name: Kerri Hastings  
Email: hastings@mcmaster.ca  
Extension: 24826  
Date: February 22, 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/medy
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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<th>DEPARTMENT/PROGRAM</th>
<th>Electrical and Computer Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Engineering Communication and Presentation</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>*702</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE ( X ) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Thia Kirubarajan</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in M.Eng or MASc program</td>
</tr>
</tbody>
</table>

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>X</td>
<td>January 2012</td>
<td>No</td>
</tr>
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</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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

CHANGE IN COURSE TITLE

<table>
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</thead>
</table>

CHANGE TO FULL COURSE

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<tr>
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<th>CHANGE TO QUARTER COURSE</th>
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COURSE CANCELLATION

<table>
<thead>
<tr>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
</tr>
</thead>
</table>

OTHER

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

BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
This course is on presentation and communication, both written and oral, for engineers. Students are expected to write a project proposal, conduct research/development, prepare a report and make an oral presentation. Lectures on technical writing and presentation will be conducted.

CONTENT/RATIONALE - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
Please see attached.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)
   
   To provide a course on communication and presentation for students to prepare them for industry.

2. **EXPECTED ENROLMENT:**
   
   20

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):
   
   One 3-hour lecture per week.

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.)
   
   Project proposal 25%  
   Weekly assignments 25%  
   Project report and presentation 50%

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:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Extension</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerri Hastings</td>
<td><a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
<td>24826</td>
<td>February 21, 2011</td>
</tr>
</tbody>
</table>

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
**Electrical and Computer Engineering 702**

**Engineering Communication and Presentation**

Instructor: Staff  
Office: ITB A112A, ext. 24819  
Email: kiruba@mcmaster.ca

Prerequisites: MEng or MASc only

This course is on presentation and communication, both written and oral, for engineers. Students are expected to write a project proposal, conduct research/development, prepare a report and make an oral presentation. Lectures on technical writing and presentation will be conducted.

Recommended textbooks:

Grading based on the Project:

- Project proposal: 25%
- Weekly assignments: 25%
- Project report and presentation: 50%
### 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**

| Electrical and Computer Engineering |

**COURSE TITLE**

| Advanced Computer Programming for Engineers |

**COURSE NUMBER**

| *703 |

**COURSE CREDIT**

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

**INSTRUCTOR(S)**

| Dr. Thia Kirubarajan |

**PREREQUISITE(S)**

| Registration in M.Eng or MASc program |

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

- **NEW COURSE**
  - Date to be Offered: September 2011
  - 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 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: |

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

This course is on the use of computer programming to solve graduate-level engineering problems using C/C++/Java and MATLAB. Advanced algorithms, data structures, parallel computing and numerical methods will be addressed. A major project is required.

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

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

To provide an advanced course on programming.

2. **EXPECTED ENROLMENT:**

20

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

One 3-hour lecture per week.

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.)*

Take-home midterm 25%
Weekly assignments 25%
Project presentation 50%

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: Kerri Hastings   Email: hastings@mcmaster.ca   Extension: 24826   Date: February 21, 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
Electrical and Computer Engineering 703

Advanced Computer Programming for Engineers

Instructor: Staff
Office: ITB A112A, ext. 24819
Email: kiruba@mcmaster.ca

Prerequisites: MEng or MASc only

This course is on the use of computer programming to solve graduate-level engineering problems using C/C++/Java and MATLAB. Advanced algorithms, data structures, parallel computing and numerical methods will be addressed. A major project is required.

Recommended textbooks:

Grading based on the Project:

. Take-home mid-term: 25%
. Weekly assignments: 25%
. Project and presentation: 50%
**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>DEPARTMENT/PROGRAM</th>
<th>Electrical and Computer Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Advanced Engineering Mathematics</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>*704</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Thia Kirubarajan</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in M.Eng or MASc program</td>
</tr>
</tbody>
</table>

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

- NEW COURSE [X]

**DATE TO BE OFFERED:** September 2011

**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

**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:

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

This course is on the survey of a number of mathematical methods of importance in engineering modeling and analysis. The course covers orthogonal function expansions, Fourier series, discrete and continuous Fourier transforms, generalized functions and sampling theory, complex variables, functions and complex integration, Laplace, Z, and Hilbert transforms. Also includes computational Fourier analysis, applications to linear systems, waves, and signal processing and differential or partial differential equations.

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

Please see attached.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)
   
   To provide an advanced course in mathematics.

2. **EXPECTED ENROLMENT:**
   
   20

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):
   
   One 3-hour lecture per week.

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.)
   
   Midterm test 25%
Weekly assignments 25%
Final 50%

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: Kerri Hastings  
Email: hastings@mcmaster.ca  
Extension: 24826  
Date: February 21, 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
Electrical and Computer Engineering 704

Advanced Engineering Mathematics

Instructor: Staff
Office: ITB A112A, ext. 24819
Email: kiruba@mcmaster.ca

Prerequisites: MEng or MASc only

This course is on the survey of a number of mathematical methods of importance in engineering modeling and analysis. The course covers orthogonal function expansions, Fourier series, discrete and continuous Fourier transforms, generalized functions and sampling theory, complex variables, functions and complex integration, Laplace, Z, and Hilbert transforms. Also includes computational Fourier analysis, applications to linear systems, waves, and signal processing and differential or partial differential equations.

Recommended textbooks:

Grading based on the Project:

- Mid-term test: 25%
- Weekly assignments: 25%
- Final: 50%
RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING COURSES

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<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Probability and Stochastic Processes</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>705</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE (X) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Dongmei Zhao</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in M.Eng or MASc program</td>
</tr>
</tbody>
</table>

NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

<table>
<thead>
<tr>
<th>NEW COURSE</th>
<th>X</th>
<th>DATE TO BE OFFERED: September 2011</th>
</tr>
</thead>
</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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

<table>
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<tr>
<th>CHANGE IN COURSE TITLE</th>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
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<th>CHANGE TO HALF COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
</tr>
</thead>
</table>

COURSE CANCELLATION | PROVIDE THE REASON FOR COURSE CANCELLATION: |

| OTHER | X | EXPLAIN: Needs permanent course number. Previously offered as ECE *738. |

BRIEF DESCRIPTION FOR CALENDAR - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
Topics in this course cover Markov chain, Poisson processes, Continuous-time Markov chain, Stationary processes, Convergence concepts; as well as a review of probability and conditional probability, random variables, and probability density function.

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

   To provide an permanent course in probability and stochastic processes.

2. **EXPECTED ENROLMENT:**

   20

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

   One 3-hour lecture per week.

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.)

   - Midterm test 30%
   - Final 70%

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:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Extension</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerri Hastings</td>
<td><a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
<td>24826</td>
<td>February 21, 2011</td>
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</tbody>
</table>

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
Electrical and Computer Engineering 738
Special Topics: M.Eng. Stochastic Processes

Instructor: Dr. Dongmei Zhao
Office: ITB-A323, ext. 26127
Email: dzhao@mail.ece.mcmaster.ca
Web: http://ece.mcmaster.ca/fac_mems/zhao.htm

Prerequisites: EE3TQ4 "Probability and Random Process", or permission of the instructor

Course Outline: (subject to change)
- Review: probability and conditional probability, random variables, probability density function, probability mass function, cumulative distribution function, mean and variance, moment generating functions.
- Markov chain: Chapman-Kolmogorov equations, time reversibility, Markovian decision process.
- Poisson processes: exponential distribution, Poisson process, generalization of the Poisson process.
- Continuous-time Markov chain: birth and death process, transition probability function, time reversibility.
- Stationary processes: Brownian motion, white noise, Gaussian process, stationary process.
- Convergence concepts: convergence in mean square, convergence in probability, convergence in distribution.


Grading:
- Midterm test 30%
- Final exam 70%

Term: II
**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>Electrical and Computer Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Digital Signal Processing</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>*706</td>
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<tr>
<td>COURSE CREDIT</td>
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<td>HALF COURSE ( X )</td>
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<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Tim Davidson</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in M.Eng or MASc program</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 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:

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

This course is a graduate-level introduction to digital signal processing covering such topics as discrete time-signals and systems, the z-Transform, sampling of continuous-time signals, and transform analysis of linear time-invariant systems.

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

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

To provide an graduate-level introduction to digital signal processing.

### 2. EXPECTED ENROLMENT:

20

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

One 3-hour lecture per week.

### 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.)

- Midterm test 25%
- Weekly Assignments 25%
- Final 25%
- Project 25%

### 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: Kerri Hastings  
Email: hastings@mcmaster.ca  
Extension: 24826  
Date: February 21, 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
Electrical and Computer Engineering 706

Digital Signal Processing

Instructor: Dr. Tim Davidson
Office: ITB A310, ext. 27352
Email: davidson@mcmaster.ca

Prerequisites: MEng or MASc only

This course is a graduate-level introduction to digital signal processing. The course will cover

1. Discrete Time-Signals and Systems
2. The z-Transform
3. Sampling of Continuous-Time Signals
4. Transform Analysis of Linear Time-Invariant Systems
5. Structures for Discrete-Time Systems
6. Filter Design Techniques
7. The Discrete Fourier Transform
8. Computation of the Discrete Fourier Transform
9. Fourier Analysis of Signals Using the Discrete Fourier Transform
10. Parametric Signal Modeling
11. Discrete Hilbert Transforms
12. Cepstrum Analysis and Homomorphic Deconvolution

Recommended textbooks:

Grading based on the Project:

- Mid-term: 25%
- Weekly assignments: 25%
- Final exam: 25%
- Project: 25%
# Recommendation for Change in Graduate Curriculum - For Change(s) Involving Courses

## School of Graduate Studies

### 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

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<th>DEPARTMENT/PROGRAM</th>
<th>Electrical and Computer Engineering</th>
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## Course Title

<table>
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<tr>
<th>COURSE TITLE</th>
<th>High Performance Parallel Computing on Graphical Processing Units (GPU)</th>
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## Course Number

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## Course Credit

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<th>QUARTER (MODULE) ( )</th>
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## Instructor(s)

<table>
<thead>
<tr>
<th>INSTRUCTOR(S)</th>
<th>Dr. Alexandru Patriciu</th>
</tr>
</thead>
</table>

## Prerequisite(s)

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</table>

## Nature of Recommendation (Please check appropriate box)

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<tr>
<th>NEW COURSE</th>
<th>X</th>
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**Date to be Offered:** January 2012

**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 approval from each department and faculty concerned.

## Change in Course Title

<table>
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<th>PROVIDE THE CURRENT COURSE TITLE:</th>
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## 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>
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<th>CHANGE TO HALF COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
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## Course Cancellation

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<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
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</thead>
</table>

## Other

<table>
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<tr>
<th>EXPLAIN:</th>
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</table>

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

The course is an introduction in parallel algorithm design and programming techniques for massive arrays of processing units available on modern GPU. The course will introduce the students to GPU computing architectures provided by NVIDIA and ATI. This is a hands-on course; each student will complete a short project involving the design, implementation, testing, and performance evaluation of an algorithm on a GPU.

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

Please see attached.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. <strong>STATEMENT OF PURPOSE</strong> (How does the course fit into the department’s program?)</td>
<td>To provide a course on Graphical Processing Units.</td>
</tr>
<tr>
<td>2. <strong>EXPECTED ENROLMENT:</strong></td>
<td>20</td>
</tr>
<tr>
<td>3. <strong>DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL</strong> (i.e., lectures, seminars):</td>
<td>One 3-hour lecture per week.</td>
</tr>
<tr>
<td>4. <strong>DESCRIBE IN DETAIL THE METHOD OF EVALUATION:</strong> (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)</td>
<td>Project 100%</td>
</tr>
<tr>
<td>5. <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>
<td>N/A</td>
</tr>
<tr>
<td>6. <strong>IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</strong></td>
<td>N/A</td>
</tr>
</tbody>
</table>

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

- **Name:** Kerri Hastings
- **Email:** hastings@mcmaster.ca
- **Extension:** 24826
- **Date:** February 21, 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
Electrical and Computer Engineering 718

Special Topics: High Performance Parallel Computing on Graphical Processing Units (GPU)

Instructor: Dr. Alexandru Patriciu
Office: ITB-A308, ext. 20395
Email: patriciu@mcmaster.ca
Web: http://ece.mcmaster.ca/~patriciu

Prerequisites: For M.Eng students

Course Objective: The course is an introduction in parallel algorithm design and programming techniques for massive arrays of processing units available on modern GPU. The course will introduce the students to GPU computing architectures provided by NVIDIA and ATI. This is a hands-on course, each student will complete a short project involving the design, implementation, testing, and performance evaluation of an algorithm on a GPU.

Course Outline:

1. NVIDIA CUDA architecture.
2. ATI Stream architecture.
3. GPU programming languages and techniques
   1. C extensions for CUDA
4. CUDA optimization issues.
5. Parallel algorithm design topics:
   1. Data decomposition
   2. Algorithm decomposition
   3. Parallel Reductions
6. Applications
   1. GPU accelerated linear systems of equations solvers.
   2. Fast nonlinear deformable tissue modeling using mesh-less methods.

Textbook/Reading:

1. NVIDIA CUDA Programming Guide; NVidia Inc.
2. NVIDIA CUDA Reference Guide; NVidia Inc.
3. ATI Stream Computing with OpenCL; ATI Inc.

Grading: Each student will have to complete a project involving the design, implementation, testing, and evaluation of an algorithm on a GPU.

Term: I
# 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>Electrical and Computer Engineering</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Neural Networks and Learning Machines</td>
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<tr>
<td>COURSE NUMBER</td>
<td>772</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>Dr. Simon Haykin</td>
</tr>
</tbody>
</table>

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

- NEW COURSE [X]
- 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 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** [X]

**EXPLAIN:** Needs permanent course number. Previously offered as ECE *739.*

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

Statistical learning theory, including VC, regularization, and Bayesian theories. Algorithms for multilayer perceptrons, kernel-based learning machines, self-organizing maps, principal components analysis, and blind source separation. Sequential state estimation algorithms, including extended Kalman filter, unscented Kalman filter, and particle filters; applications to learning machines.

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

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

   This course is basic to neural computation and finds applications in signal processing, communication systems, control systems, and biomedical engineering.

2. **EXPECTED ENROLMENT:**

   10-20

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

   1 3-hour lecture.

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.)

   Computer Experiment Project- 25% understanding of the problem, 50% reliability of the experimental results, 25% insight into the problem developed from the computer experiment

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: Kerri Hastings  
Email: hastings@mcmaster.ca  
Extension: 24826  
Date: January 20, 2010

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:

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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

- Electrical and Computer Engineering

### Course Title

- Advanced Topics in High Fidelity Image and Video Processing

### Course Number

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>777</th>
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</table>

### Course Credit

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

### Instructor(s)

- Dr. Xiaolin Wu

### Prerequisite(s)

- Digital image processing or permission from the instructor

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

- NEW COURSE [X]

### Date to Be Offered

- Jan 2011

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

- If Yes, Provide the Date:

### Will the Course Be Cross-listed with Another Department?

- No

### 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

<table>
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<tr>
<th>CHANGE TO FULL COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
</tr>
</thead>
</table>

### Course Cancellation

- Provide the Reason for Course Cancellation:

### Other

- Needs new permanent course number. Previously offered as ECE *768

### Brief Description for Calendar - Provide a Brief Description (Maximum 6 Lines) to be Included in the Graduate Calendar.

This course introduces students to the exciting problems of high fidelity image and video processing, and brings them to the frontier and challenges of this research area. The lectures will cover the theoretical fundamentals (the limits of sampling and reconstruction, mathematical modeling of multi-dimensional signals, etc.), algorithmic techniques, applications, and open problems. The course will prepare the students for future research endeavours and industrial jobs in the areas of image/video processing, multimedia, medical imaging, etc.

### Content/Rationale - Provide a Brief Description, I.e., Outline the Topics or Major Sub-Topics, and Indicate the Principal Texts to Be Used.

See attached outline of topics.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)
   
   To bolster the image processing offerings of the department

2. **EXPECTED ENROLMENT:**
   
   10

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL** (i.e., lectures, seminars):
   
   One three-hour lecture per week.

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.)
   
   In-class presentation 15%, Final Exam 25%, Design Project 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?**

   N/A

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

Name: Kerri Hastings  Email: hastings@mcmaster.ca  Extension: 24826  Date: July 14, 2010

---

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
Electrical and Computer Engineering 768
Special Topics: Advanced Topics in High Fidelity Image and Video Processing

Instructor: Dr. Xiaolin Wu
Office: ITB-A315, ext. 24190
Email: xwu@mail.ece.mcmaster.ca
Web: http://ece.mcmaster.ca/fac_mems/xwu.htm

Prerequisites: Digital image processing or permission from the instructor

Background: Through years of intensive research and heavy investment in imaging technologies, spatial, spectral and temporal fidelities of digital images are steadily improving and now can match and even exceed those of traditional film. However, no matter how much sensor technologies advance, new, more exciting and exotic applications will always present themselves that demand ever higher image precision. Researchers in medicine, space, engineering and sciences all have insatiable desire for imaging ever more miniscule and subtle details. Users cannot solely count on raw sensor capability to satisfy their needs. There exist hard physical limits on native fidelity of imaging devices. In pursuing ever increasing spatial resolution one has to sacrifice SNR due to diminishing pixel size and increased sensor crosstalk. Also, in some cases the imaging process itself incurs a penalty to the imaged object, capping the safe sample density. For example, for certain medical imaging modalities high resolution is associated with high dosage of radiation that is harmful to the patient. Therefore, signal processing techniques to algorithmically improve native sensor precision are and will be playing an important role in the fields of image processing and computer vision.

The purpose of the proposed advanced topic course is to introduce the students to the exciting problems of high fidelity image and video processing, and bring them to the frontier and challenges of this research area. The lectures will cover the theoretical fundamentals (the limits of sampling and reconstruction, mathematical modeling of multidimensional signals, etc.), algorithmic techniques, applications, and open problems. The course will prepare the students for future research endeavors and industrial jobs in the areas of image/video processing, multimedia, medical imaging, etc.

Course Outline:

- Image acquisition technologies and their limits
  o CCD, CMOS, X-ray, MR, etc.
  o Point spread functions
  o Sensor noises and noise models
  o Mosaic sensor arrays for multispectral sampling
• Review of sampling theorem
• Image resolution upconversion
  o Adaptive interpolation filters
  o Model-based interpolators
  o 2D applications
  o 3D applications
• High-fidelity multispectral imaging
  o CF A camera architecture
  o Modeling and removal of channel crosstalk
  o Spatio-spectral demosaicking
  o Upsampling aided by spatio-spectral correlations
• Video superresolution
  o Frequency domain methods
  o Spatial domain methods
  o Learning-based methods
  o Motion estimation and registration
• Video frame rate upconversion
  o Telecine
  o Deinterleaving
  o Motion-adaptive and motion-compensated temporal upsampling
• High-fidelity image/video coding
  o Mathematically lossless coding
  o Perceptually lossless coding
  o Coding for random access
• New trends and applications
  o Compressive sensing
  o High dynamic range image processing
  o Multiview video
  o 3D TV
  o Large format displays
  o High throughput image/video systems

Experiment Environment:

The course has a significant experimental component. Students will get to use state of the art image acquisition and display equipment. The instructor has acquired and will continue to acquire, through his NSERC industrial research chair program and CFI, a host of sophisticated, top-of-the-line devices, including 15Mpixel camera, 4K digital cinema camera, digital cinema projector, 65' 4K LCD panel, 4K video server, LED high dynamic display.

Textbook/Reading: No textbook dedicated to the subject area is available as of now. The instructor will primarily use research papers and his own lecture notes.

Grading: In-class Presentation 15%, Final Exam 25%, Design Project 60%

Term: II
**SCHOOL OF GRADUATE STUDIES**

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

**PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:**
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Computer Integrated Surgical Systems</td>
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<tr>
<td>COURSE NUMBER</td>
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<td>COURSE CREDIT</td>
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<td>QUARTER (MODULE) ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Alexandru Patriciu</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Linear algebra, matrix computations, engineering optimizations</td>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<th>NEW COURSE</th>
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<td></td>
<td></td>
<td></td>
<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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

**CHANGE IN COURSE TITLE**

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**CHANGE IN COURSE DESCRIPTION**

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</thead>
</table>

**CHANGE TO FULL COURSE**

**CHANGE TO HALF COURSE**

**CHANGE TO QUARTER COURSE**

**COURSE CANCELLATION**

**PROVIDE THE REASON FOR COURSE CANCELLATION:**

<table>
<thead>
<tr>
<th>OTHER</th>
<th>X</th>
<th>EXPLAIN: Needs permanent course number. Previously offered as ECE *799.</th>
</tr>
</thead>
</table>

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

This course will present computer-based techniques and systems that use the information from medical images to support clinicians during surgical interventions. Applications of computer-based techniques for diagnostic, preoperative planning, treatment optimization, execution, and follow up will be presented. The emphasis of the course will be on image-guided interventions.

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

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

   To add to department's offering of biomedical courses.

2. **EXPECTED ENROLMENT:**

   20

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

   One three-hour lecture per week

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.)

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
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</tr>
<tr>
<td>Paper Presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Project</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</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).

   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: Kerri Hastings  
   Email: hastings@mcmaster.ca  
   Extension: 24826  
   Date: June 7, 2010

---

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
Electrical and Computer Engineering 799
Computer Integrated Surgical Systems

Instructor:  Dr. Alexandru Patriciu  
Office:  ITB-A308, ext. 20395  
Email:  patriciu@mail.ece.mcmaster.ca

Prerequisites:  Linear algebra, matrix computations, engineering optimizations

Course Objective:  This course will present computer-based techniques and systems that use the information from medical images to support clinicians during surgical interventions. Applications of computer-based techniques for diagnostic, preoperative planning, treatment optimization, execution, and follow up will be presented. The emphasis of the course will be on image-guided interventions.

Since the audience of the class is expected to be composed of electrical engineers students some topics related to the kinematic of rigid bodies will be covered in the introductory part of the course. However, it is assumed that the students are familiar with general topics on linear algebra, matrix computations, and engineering optimizations.

Students will study research papers and will present one paper in class. Students will have to complete a project related to the topic of the course.

Course Outline:
1. Introduction - computer assisted diagnostic/computer assisted modeling paradigm,
2. Theoretical background
   2.1. Linear vector spaces, Euclidean space, Special orthogonal matrix group (rotation matrices)
   2.2. Coordinate transformations, parameterization of coordinate transformations including parameterization of rotations
   2.3. Derivatives of SO(3) matrices, Skew symmetric matrices
   2.4. Numerical optimization on SO(3)
3. Applications
   3.1. Integration of image guidance with therapy delivery devices
   3.2. Registration algorithms for surgical navigation, surgical navigation systems,
   3.3. X-Ray – robot registration algorithms
   3.4. Computed-tomography/MRI - robot registration algorithms
   3.5. Ultrasound calibration algorithms and ultrasound guided interventions
   3.6. Robotic assisted needle based procedure challenges
   3.7. Respiratory motion compensation
   3.8. Robotic assisted soft tissue manipulation
Textbook/Reading: Relevant papers for each topic will be provided.
Recommended reading: Computer Integrated Surgery, R. Taylor, S.

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
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<tr>
<td>Paper Presentation</td>
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<tr>
<td>Project</td>
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<tr>
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<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
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</tr>
</tbody>
</table>

Term: II
# 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
Electrical and Computer Engineering

### COURSE TITLE
Linear Systems

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>COURSE CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>707</em></td>
<td><strong>FULL COURSE</strong> ( ) <strong>HALF COURSE</strong> ( X ) <strong>QUARTER (MODULE)</strong> ( )</td>
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<table>
<thead>
<tr>
<th>INSTRUCTOR(S)</th>
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</thead>
<tbody>
<tr>
<td>Dr. Thia Kirubarajan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREREQUISITE(S)</th>
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<tbody>
<tr>
<td>Registration in M.Eng or MASc program; and engineering mathematics and basic linear algebra</td>
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### NEW COURSE

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<th>DATE TO BE OFFERED:</th>
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<tr>
<td>September 2011</td>
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<table>
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<tr>
<th>WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO</strong></td>
</tr>
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</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 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:**

Needs different course number. Currently listed in the 2010-2011 calendar as *730*

---

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

This course is intended as a first semester graduate course on linear systems theory, design and implementation with application to signal processing, communications, estimation, and control. The objective is to present a comprehensive coverage of the basic tools needed by an electrical engineering graduate student specializing in the above areas.

---

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

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

To provide comprehensive coverage of the basic tools needed by an electrical engineering student in the noted areas.

2. **EXPECTED ENROLMENT:**

20

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

One 3-hour lecture per week.

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.)

Assignments and Projects 30%
Midterm 30%
Final Exam 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: Kerri Hastings  Email: hastings@mcmaster.ca  Extension: 24826  Date: February 21, 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
Electrical and Computer Engineering 730
Linear Systems

Instructor: Dr. T. Kirubarajan
Office: ITB-A112/A, ext. 24819
Email: kiruba@mcmaster.ca
Web: http://www.ece.mcmaster.ca/~kiruba/

Prerequisites: Engineering mathematics and basic linear algebra

Course Summary: This course is intended as a first semester graduate course on linear systems theory, design and implementation with application to signal processing, communications, estimation and control. The objective is to present a comprehensive coverage of the basic tools needed by an electrical engineering graduate student specializing in the above areas.

Course Outline:
1. Linear spaces and linear operators
2. Mathematical descriptions of systems
3. State-space models, solutions and realizations
4. Controllability and observability of linear systems
5. Minimal realizations and coprime fractions
6. State feedback, state estimators and observers
7. Stability of linear and non-linear systems
8. Applications


Grading:

Assignments and projects 30%
Mid-term 30%
Final exam 40%

Term: I
**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>
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<th>DEPARTMENT/PROGRAM</th>
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<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Digital Communications</td>
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<tr>
<td>COURSE NUMBER</td>
<td>*708</td>
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<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. Jian Kang Zhang</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Registration in M.Eng or MASc program</td>
</tr>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

**NEW COURSE**

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

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

**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: | Change in course number. Currently listed in the 2010-11 calendar as ECE *721 |

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

The course provides an in-depth coverage of modern communication theory and technologies. The material is fundamental to the understanding, design and analysis of digital communication systems. The course is intended for students either wishing to major in digital communicaition, wireless communication or interested to learn the basic principles and technologies used in today's digital communication systems.

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

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

   To provide a course on digital communications.

2. **EXPECTED ENROLMENT:**

   20

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

   One 3-hour lecture per week.

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.)

   Two projects: each 20%
   Reading and Presentation 20%
   Final Exam 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: Kerri Hastings  
Email: hastings@mcmaster.ca  
Extension: 24826  
Date: February 21, 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
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: Medical Physics and Applied Radiation Sciences
COURSE TITLE: Medical Imaging Systems I

COURSE NUMBER: MedPhys *770
COURSE CREDIT: FULL COURSE ( X )  HALF COURSE ( )  QUARTER (MODULE) ( )
INSTRUCTOR(S): Dr. Hao Peng, Dr. Troy Farncombe
PREREQUISITE(S): Permission of the instructors

NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

NEW COURSE
DATE TO BE OFFERED: Fall semesters
WAS THE PROPOSED COURSE OFFERED ON DEAN’S APPROVAL? IF YES, PROVIDE THE DATE:

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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

CHANGE IN COURSE TITLE: X 
PROVIDE THE CURRENT COURSE TITLE: Imaging in Medical Physics

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: X 
PROVIDE THE REASON FOR COURSE CANCELLATION: To be cross-listed with Electrical & Computer Engineering as ECE*779. Note that this course is also cross-listed with Biomedical Engineering.

OTHER
EXPLAIN:

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

Medical imaging is important for both clinical medicine, and medical research. This course will provide an introduction to several of the major imaging modalities, focusing on the aspects of imaging physics, signal processing and system design. The topics to be covered include projection-imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT). Ultrasound, optical imaging and MRI will be covered in the second part of this course Medical Imaging System II.

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

In summary, the course is designed to introduce several general concepts and address some critical questions in medical imaging system: 1) How do the major medical imaging modalities work (physics, image formation, image quality)? What are the main sources of noise, distortion, artifact, and contrast recovery? 2) What is the role of system theory in the performance analysis of medical imaging systems? What is the transfer function of the system? On what design parameters and imaging protocol that the signal-to-noise ratio (SNR) of medical imaging systems depend? 3) How is a medical imaging technology used in clinical practice? What are the trends and emerging areas of future study? 4) General imaging concepts and multi-mode imaging system design such as PET/CT, PET/MRI and SPECT/MRI?

Text: Bushberg, Seibert, Leidholdt & Boone, The Essential Physics of Medical Imaging, Lippincott Williams & Wilkins
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

   One of the foci of medical physics is medical imaging. Complementary to the introductory medical imaging course MedPhys 4T3, this graduate course will teach students several advanced topics in medical imaging.

2. **EXPECTED ENROLMENT:**

   15-20

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

   Lectures, imaging demonstrations (HHS and preclinical imaging facility), student presentations.

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.)

   Three assignments: 20% for each; Final Project: 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?**

   N/A

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

Name: Dr. Hao Peng   Email: penghao@mcmaster.ca   Extension: 27126   Date: Feb 17, 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/medy
**School of Graduate Studies**

**Recommendation for Change in Graduate Curriculum - For Changes 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**

Biomedical Engineering, School of Biomedical Engineering

**Course Title**

Medical Imaging Systems II

**Course Number**

702

**Course Credit**

| Full Course ( ) | Half Course ( ) | Quarter (Module) ( ) |

**Instructor(s)**

Dr. MD Noseworthy, Dr. N Bock

**Prerequisite(s)**

Permission of the Instructor(s)

**Nature of Recommendation**

*Please check appropriate box*

- **New Course**
- **Date to be Offered:** Winter Semesters
- **Was the proposed course offered on Dean’s approval?** If yes, provide the date:

**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 approval from each department and faculty concerned.

**Change in course title**

- **Provide the current course title:** Foundations of Magnetic Resonance

**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:**
  
  The previous instructor (Dr. G. Moran) is no longer at McMaster University. Furthermore in collaboration with Medical Physics we have come up with Medical Imaging Systems I and II thereby removing redundancy in our programs. To be cross listed with Electrical & Computer Engineering as ECE *780 and as Medical Physics *702.

**Brief Description for Calendar**

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

This course will compliment Medical Imaging Systems I. In this course imaging methods that rely on non-ionizing radiation will be discussed. The course content focuses on magnetic resonance imaging (MRI), in vivo nuclear magnetic resonance (NMR), ultrasound (US), and optical imaging methods. Advanced concepts such as multi-modality imaging approaches, image fusion, and functional medical image processing will be discussed.

**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 revolve around principles of magnetic resonance imaging (MRI), ultrasound (US) and optical imaging. A plethora of textbooks and current review papers will be used as course materials.
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

One of the foci of biomedical engineering in the McMaster Engineering faculty is medical imaging. As this is also an important facet of medical physics it is cross listed there too.

2. **EXPECTED ENROLMENT:**

   15-20

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

   Lectures, imaging demonstrations (Imaging Research Centre, St. Joseph's Healthcare), student seminars.

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.)

   50% Student Seminar
   50% Assignments (2 each 25%). These will involve programming and advanced manipulation of imaging data.

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: Dr. Michael D. Noseworthy  Email: nosewor@mcmaster.ca  Extension: 35218  Date: February 14, 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/medy
To:  
Kerri Hastings,  
Electrical and Computer Engineering

From:  
Dr. Michael D. Noseworthy, Ph.D., P.Eng.  
Co-Director, McMaster School of Biomedical Engineering,  
Associate Professor, Department of Electrical and Computer Engineering,  
McMaster University.  
Hamilton, Ontario, Canada.  
email: nosewor@mcmaster.ca  
http://www.ece.mcmaster.ca/~mikenose/web/HOME.html

Re: Cross listing of Graduate Courses “Medical Imaging Systems I and II”

March 30th, 2011

Dear Kerri,

I am delighted to see a cross listing of our 700 level graduate courses “Medical Imaging Systems (I and II)” between The School of Biomedical Engineering, and Electrical and Computer Engineering. Medical Imaging Systems I will be offered through Medical Physics, while being cross listed in Biomedical Engineering. Medical Imaging Systems II will be offered through the School of Biomedical Engineering and Cross listed within your department and also Medical Physics. I am positive this will be well received by faculty and students alike. Further, I believe this will lead to superior instruction for all our graduate students who have interest in advanced understanding of medical imaging technology.

Sincerely,

Michael D. Noseworthy, Ph.D., P.Eng.
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.

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<tr>
<td>COURSE TITLE</td>
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<tr>
<td>COURSE NUMBER</td>
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<td>COURSE CREDIT</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. John Bandler</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
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NEW COURSE

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<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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

CHANGE IN COURSE TITLE

<table>
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<th>PROVIDE THE CURRENT COURSE TITLE:</th>
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CHANGE IN COURSE DESCRIPTION

<table>
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<tr>
<td>Please see #4 on page 2 of this form</td>
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CHANGE TO FULL COURSE

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<tr>
<th>CHANGE TO FULL COURSE</th>
<th>CHANGE TO HALF COURSE</th>
<th>CHANGE TO QUARTER COURSE</th>
</tr>
</thead>
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</table>

COURSE CANCELLATION

<table>
<thead>
<tr>
<th>X</th>
<th>PROVIDE THE REASON FOR COURSE CANCELLATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emeritus Professor no longer teaching course.</td>
</tr>
</tbody>
</table>

OTHER

<table>
<thead>
<tr>
<th>EXPLAIN:</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</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>
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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>
</tr>
<tr>
<td>4.</td>
<td><strong>DESCRIBE IN DETAIL THE METHOD OF EVALUATION:</strong> (For 600-level course, indicate the <strong>Extra Work</strong> to be required of graduate students, i.e., exams, essays, etc.)</td>
</tr>
<tr>
<td>5.</td>
<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>
<tr>
<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: Kerri Hastings  Email: hastings@mcmaster.ca  Extension: 24826  Date: January 14, 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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<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Electrical and Computer Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Simulation and Optimization</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>*715</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( 3 ) HALF COURSE ( X ) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Dr. John Bandler</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

**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? NO</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 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**

X

**PROVIDE THE REASON FOR COURSE CANCELLATION:**

Emeritus Professor no longer teaching course.

**OTHER**

**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:**  (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:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Extension</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerri Hastings</td>
<td><a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
<td>24826</td>
<td>January 14, 2011</td>
</tr>
</tbody>
</table>

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.
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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>Electrical and Computer Engineering</th>
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</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Numerical Solution of Partial Differential Equations in Engineering</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>*716</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></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?** NO 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 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:** Has not been offered in over 5 years

**OTHER**
- **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:** (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:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Extension</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerri Hastings</td>
<td><a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
<td>24826</td>
<td>January 11, 2011</td>
</tr>
</tbody>
</table>

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: 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
- Engineering Physics, UNENE Program

#### Course Title
- Introduction to Operational Health Physics

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Credit</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN0805</td>
<td>Half Course</td>
<td>D. Tucker</td>
</tr>
</tbody>
</table>

#### Course Number and Credit
- **UN0805**
- **Half Course** (X)

#### 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?**
- **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** (X)
- Provide the current course title: Radiation Health Risks and Benefits

**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** (X)
- **Change to Quarter Course**

**Course Cancellation**
- Provide the reason for course cancellation:

**Other** (X)
- **Explain:**
  - Add Instructor Name

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

An introduction to a number of topics that will be encountered in the practice of health physics. The following topics will be discussed: Dose limitation; dosimetric quantities for individuals and populations; ionizing radiation risks and hazards; ICRP-60; internal doses and the compartment model; derived air concentrations and annual limit on intake; metabolic models for respiratory system and GI tract; radiation safety at nuclear reactors, particle accelerators, irradiators, X-Ray installations and laboratories; pathway analysis; derived release limits; environmental monitoring, sample collection and preparation, and sources of radiation; atmospheric transport; cost-benefit analysis; derivation of limits for surface contamination. This course is equivalent to Med Phys 776.

#### Content/Rationale
- Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
- **No Change**
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)
   
   No Change

2. **EXPECTED ENROLMENT:**
   
   N/A

3. **DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):**
   
   No Change

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.)
   
   No Change

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 Change - course equivalent to Medical Physics 776

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: Victor Snell UNENE Program Director   Email: vgssolutions@rogers.com   Extension: 20168   Date: Feb 14/11

---

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

SGS/medy
**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**
- Materials Science and Engineering

**COURSE TITLE**
- Solid State Polymer Analysis

**COURSE NUMBER**
- 764

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

**INSTRUCTOR(S)**
- Gu Xu

**PREREQUISITE(S)**
- none

**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 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**
- X

**CHANGE TO QUARTER COURSE**

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

**OTHER**
- EXPLAIN:

**BRIEF DESCRIPTION FOR CALENDAR** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
- Solid state analytical method are employed to determine the influence of polymer structure on the physical and chemical properties.

**CONTENT/RATIONALE** - Provide a brief description, i.e., outline the topics or major sub-topics, and indicate the principal texts to be used.
- The principles and applications of 1, structural analyses by microscopes and XRD; 2, thermal analysis; 3, Dielectric Relaxation Measurements; 4, optical measurements.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

   The course has been designed in response to the need of structure-property investigation of polymers and polymer based materials, which is an indispensable part of the materials research as well as in the graduate education.

2. **EXPECTED ENROLMENT:**

   about 10

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

   the course has been given in multi-mode, involving lectures by the instructor and presentations by the graduate students, class room discussions and term projects.

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 grade was mainly based on three components: the quality of project presentations, capability of answering questions, and ability of challenging the others.

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: Gu Xu    Email: xugu@    Extension: 27341    Date: Jan 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/medy
**SCHOOL OF GRADUATE STUDIES**

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

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

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</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Injection Metallurgy</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>774</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )  HALF COURSE ( )  QUARTER (MODULE) ( X )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>G. A. Irons</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>N/A</td>
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</tbody>
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**NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)**

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<th>NEW COURSE</th>
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<tbody>
<tr>
<td></td>
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<td>IF YES, PROVIDE THE DATE:</td>
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</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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

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<table>
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<tr>
<th>CHANGE IN COURSE DESCRIPTION</th>
<th>600-LEVEL COURSE (Undergraduate course for graduate credit) Please see #4 on page 2 of this form</th>
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<td>CHANGE TO HALF COURSE X CHANGE TO QUARTER COURSE</td>
</tr>
</tbody>
</table>

**COURSE CANCELLATION**

**PROVIDE THE REASON FOR COURSE CANCELLATION:**

<table>
<thead>
<tr>
<th>OTHER</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.

The transport phenomena associated with the injection of gas or gas and particles into liquid metals are examined. Specific topics include: pneumatic conveying, particle injection, flow regimes, mixing, plume modeling and refining reactions.

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

Topics listed above will be explored via the archival literature. There is no text on the subject.
1. **STATEMENT OF PURPOSE**  (How does the course fit into the department’s program?)

   This course supports the Materials Processing research in the Department.

2. **EXPECTED ENROLMENT:**

   10

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

   Lectures and seminars

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.)

   Students will present a seminar on the course material and will also prepare an essay on a particular topic of their interest.

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?**

   Primarily this department

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

   Name: G.A. Irons  Email: ironsga  Extension: 24974  Date: Feb. 8/2011

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

SGS/medy
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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</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Physical and Mathematical Modeling in Materials Processing</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>775</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<td>HALF COURSE ( )</td>
</tr>
<tr>
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<td>QUARTER (MODULE) ( X )</td>
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<td>G. A. Irons</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>N/A</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 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 x Change to quarter course

Course cancellation: Provide the reason for course cancellation:

Other: Explain:

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

Criteria for similarity; analysis of tracer mixing; mathematical models of combined fluid flow, heat transfer and mass transfer. Critical review of case studies in the literature.

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

Topics listed above will be explored via the archival literature. Some material from texts will be assembled as Custom courseware.
<p>| | |</p>
<table>
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<tr>
<th></th>
<th></th>
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<tbody>
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</tr>
<tr>
<td><strong>2. EXPECTED ENROLMENT:</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>3. DESCRIBE IN DETAIL THE METHOD OF PRESENTATION OF COURSE MATERIAL (i.e., lectures, seminars):</strong></td>
<td>Lectures and seminars</td>
</tr>
<tr>
<td><strong>4. DESCRIBE IN DETAIL THE METHOD OF EVALUATION:</strong> (For 600-level course, indicate the Extra Work to be required of graduate students, i.e., exams, essays, etc.)</td>
<td>Students will present a seminar on the course material and will also prepare an essay on a particular topic of their interest.</td>
</tr>
<tr>
<td><strong>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).</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>6. IF THE COURSE IS INTENDED PRIMARILY FOR STUDENTS OUTSIDE YOUR DEPARTMENT, DO YOU HAVE THE SUPPORT OF THE DEPARTMENT/PROGRAM CONCERNED?</strong></td>
<td>Primarily this department</td>
</tr>
</tbody>
</table>

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

Name:  G.A. Irons  
Email:  ironsga  
Extension:  24974  
Date:  Feb. 8/2011

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

SGS/medy
### 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.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>Materials Science &amp; Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Advanced Topics in Corrosion Science &amp; Engineering</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>MATLS 743</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
</tr>
<tr>
<td></td>
<td>HALF COURSE ( )</td>
</tr>
<tr>
<td></td>
<td>QUARTER (MODULE) ( X )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Joseph R Kish</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></td>
</tr>
</tbody>
</table>

#### 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? If yes, provide the date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></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 approval from each department and faculty concerned.

**Change in course title**

Provide the current course title: 

Selected Topics in Oxidation & Corrosion

**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**

**X**

**Change to half course**

**Change to quarter course**

<table>
<thead>
<tr>
<th>COURSE CANCELLATION</th>
<th>Provide the reason for course cancellation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other**

Explain:

**Brief description for calendar** - Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar. A fundamental discussion on the structure of electrified interfaces, dynamic electrochemistry, mixed potential theory, mass transport, passivity, and corrosion measurement techniques. A selection of problems (with worked solutions) and research topics will be provided to clarify the electrochemical theoreies of corrosion and methods for corrosion control and protection.

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

The Department of Materials Science and Engineering provides opportunities for research in a broad range of fundamental and applied topics including materials processing and recycling, nanotechnology and nanoscale materials science, electronic materials and structural materials. The course supports the Department research effort in experimental techniques (advanced corrosion measurement techniques), nanotechnology (formation and stability of passive films), and performance of structural materials (corrosion reactivity and prevention and control measures).

2. **EXPECTED ENROLMENT:**

5-10 Graduate Students

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

The method of presentation will involve a set of lectures delivered by the Instructor, a set of discussions periods involving critical reviews of journal publications, and a set of seminars delivered by the students.

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.)

Course evaluation will include assignments and a research project, which involves both an individual seminar and written report on a suitable topic critically evaluating either an electrochemical theory of corrosion, electrochemical measurement technique or method for corrosion control or prevention.

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: Joey Kish Email: kishjr@mcmaster.ca Extension: 21492 Date: February 9, 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/medy
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>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Kinematics of Three-dimensional Mechanisms</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>ME 712</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<td></td>
<td>HALF COURSE (x)</td>
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<tr>
<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>W. Newcombe</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></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 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:
X Due to change in research priorities this course has not been offered for the last 12 years

OTHER | 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:** (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: Dr. Ziad
Email: ziad@mcmaster.ca
Extension: 27530
Date: January 11, 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/medy
**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: espitu@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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</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Advanced Mechanical Engineering Thermodynamics</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>ME 744</td>
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<td>COURSE CREDIT</td>
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<td></td>
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<tr>
<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>B. Latto</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td></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 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**

- X

**Provide the reason for course cancellation:**

Instructor no longer teaching at McMaster University

**OTHER**

**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: (For 500-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: Dr. Ziada Email: ziadas@mcmaster.ca Extension: 27530 Date: January 11, 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/medy
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: espitu@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>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Simulation of Manufacturing Systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>COURSE CREDIT</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>FULL COURSE</th>
<th>HALF COURSE</th>
<th>QUARTER (MODULE)</th>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INSTRUCTOR(S)</th>
<th>PREREQUISITE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Timothy Nye</td>
<td>Undergraduate degree in Mechanical Engineering or permission of instructor</td>
</tr>
</tbody>
</table>

NATURE OF RECOMMENDATION (PLEASE CHECK APPROPRIATE BOX)

NEW COURSE

DATE TO BE OFFERED: WERE THE PROPOSED COURSE OFFERED ON DEAN'S APPROVAL? YES 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 APPROVAL FROM EACH DEPARTMENT AND FACULTY CONCERNED.

<table>
<thead>
<tr>
<th>CHANGE IN COURSE TITLE</th>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CHANGE IN COURSE DESCRIPTION</th>
<th>600-LEVEL COURSE (Undergraduate course for graduate credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Please see #4 on page 2 of this form</td>
</tr>
</tbody>
</table>

<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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE CANCELLATION X

PROVIDE THE REASON FOR COURSE CANCELLATION:
Replaced by Mechanical Engineering ME729 effective September 1, 2006 to support the M. Eng. Degree.

OTHER

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: (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:

[Signature]

Name: Samir Ziada   Email: zidas@mcmaster.ca   Extension: 27530   Date: January 11, 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
Admission
Candidates will normally have completed an undergraduate degree in engineering or applied sciences. However, applicants to the Master of Technology Entrepreneurship and Innovation program may have an undergraduate honours degree (or equivalent) from any discipline. Applicants should have an undergraduate degree, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12). Each applicant will also be interviewed as part of the admission process. Professional work experience will be highly desirable.

Bachelor of Technology students are also required to take the Graduate Record Exam.
- Verbal >550
- Quantitative >550
- Verbal and Quantitative >1200
- Analytical Writing >3.5

Candidates may be enrolled on a full- or part-time basis. Students are admitted for September or January, except for the Master of Engineering Entrepreneurship and Innovation, the Master of Technology Entrepreneurship and Innovation, and Master of Engineering Design programs which only admit in September.

The delivery of the programs relies heavily on the synergy created between members of student teams, and successful operation of the program requires that each cohort have an appropriate blend of skills and experience. Therefore each applicant will be interviewed. A strong performance in the interview is a critical requirement for admission. Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the appropriate program director. If the experience is deemed sufficient, the director may then recommend an interview. Evidence of ability to do graduate work will still be required. (See Sections 2.1.1 Admission Requirements for Master’s Degree and 2.1.3 Admission of Students with Related Work Experience or Course Work Beyond the Bachelor’s Degree in the Graduate Calendar.)

TECHNOLOGY ENTREPRENEURSHIP AND INNOVATION
The Master of Technology Entrepreneurship and Innovation program is a fast paced program aimed at highly motivated students. The program will accept full- or part-time students. The full program is expected to take up to 18 months full-time study or three years part-time. A compressed program of 12 months may be possible.

While students in the Technology Entrepreneurship and Innovation program are not expected to have any engineering or scientific background, they are expected to embrace creativity and innovation. Some basic familiarity with technology is expected, but the required technological depth will depend on the project itself and will be evaluated on a case-by-case basis. Considerable emphasis will be placed on team-based experiential learning in which all members of the team will learn from each other as they complete the project.

A candidate is required to complete successfully two one-term advanced graduate courses and the five compulsory Entrepreneurship and Innovation module courses. A faculty advisor will assist the student in selecting relevant graduate courses. Students will normally be required to complete two graduate level (700 –level) graduate courses in fulfillment of the requirements for Advanced Studies. Advanced studies are an integral component of the program and are offered by various departments in the Faculty of Engineering and beyond. The objective is to acquire leading-edge skills and apply them to the enterprise project.

Innovation and Entrepreneurial Skills Development
Five compulsory enterprise modules will focus on providing the Master’s degree candidate basic skills to select an idea with good potential, manage the innovation process, then create and manage the business outcome. The skills will broadly cover all the business cycle from start, growth and sustainability. The modules will develop an understanding of both the innovation and the entrepreneurial processes through lectures, workshops and hands-on work, and will enable the student to fully exploit the potential of the engineering enterprise project. Each module is considered the equivalent of a half-course as defined by the School of Graduate Studies, but will contain elements of lecture, group work, presentation and other activities as defined in the course outline. The module courses will be delivered in an intensive format; and it is expected that students will take the module courses in sequenced numerical order. The module courses are:

*720 / Entrepreneurial Processes and Skills (Module 1) / R. Loutfy
*721 / Breakthrough Technology Venture Development (Module 2) / D. Potter
*722 / Positioning and Shaping an Enterprise (Module 3) / Staff
*723 / New Venture Business Strategy (Module 4) / Staff
*724 / Taking a New Venture to Market (Module 5) / S. Treiber
Enterprise Project
The Enterprise Project will run throughout the entire study period and will result in both a business and a technical plan for an engineering prototype product (ideally with an actual prototype device or software produced) with an identified customer base and a plan outlining the way to commercialization. The project will bring together complementary streams of activities to bring an idea to the proof of concept phase. The core Entrepreneurial course stream, will guide the technological work performed in the research laboratory so that the concept becomes, by the end of the degree, the nucleus of a business proposition. The Enterprise project development will be supported by two additional graduate level courses.

The Enterprise Project will have three phases, which will end with project gate assessments to determine the project's readiness to proceed to the next phase:

**Phase 1 - Project Preparation:** Market research to arrive at a proposed product or service with clear value proposition; define the market for the intended product or service revealing competitive threat, opportunities, and margins and volumes projections; draw up development plans for the product or service indicating the required resources and estimated investment cost; seek the resources within the university and without; build a team of support that might include a partner.

**Phase 2 - Technical Research and the Development of the Prototype:** Develop a research plan, identifying key issues and opportunities (with the assistance of academic technical and business supervisors); conduct technical research and development; implement the engineering research plan within the research group in the host-engineering department; build a development network within the engineering research community; ready the technology for transfer to market; conduct initial market engagement to get customer feedback and reactions.

**Phase 3 - Technology Transfer to Market:** Apply for IP protection; develop a path-to-market strategy; develop a business case; present to funding institutions and explore business arrangements; plan for business start-up. Each phase has two equally important components, one technical and the other business:
- **Phase I:** Concept initiation proposal; Technology development plan presentation and documentation
- **Phase II:** Technical Proof-of-concept; Draft financial plan presentation and documentation
- **Phase III:** Business Strategy and Go-to-market plan or a Venture feasibility presentation and documentation

The Phase III evaluation will be a defence of your project in an oral examination to your board (technical supervisor, enterprise advisor, business advisor and your business mentor). Candidates are required to complete and pass each phase in order to graduate.

Peer Evaluation and the Enterprise Project
The ability to effectively work in a team environment is an important learning outcome of team-based project work on the Enterprise project. Candidates will be mentored on their progress in this aspect by their enterprise advisor based on input from their peers in the project team and from the observations of the enterprise advisor. Team member evaluations will be collected in confidence from team members by the enterprise advisor, or their designate, on a six-month basis. Every six months the Enterprise Advisor will review the performance of the individual candidate in the team with the candidate. The enterprise advisor will generate an assessment of performance. To successfully complete the program, the candidate must maintain an average rating of “Good” over the span of the enterprise project.

Enterprise Development Lab
The MTEI program is constructed in such a way as to allow students from different disciplines to work in a common learning environment – the Enterprise Development Lab. The Lab is equipped with state-of-the-art communications equipment designed to facilitate both internal and external collaboration with faculty, colleagues, mentors, technical supervisors and private sector representatives, if applicable.
**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: 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>Walter G. Booth School of Engineering Practice/ Master of Eng. and Public Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Regeneration of the natural and built environment</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>711</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE (x ) QUARTER (MODULE) ( )</td>
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<tr>
<td>INSTRUCTOR(S)</td>
<td>Gail Krantzberg and Faculty</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>none</td>
</tr>
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</table>

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

- NEW COURSE [x]

**DATE TO BE OFFERED:** September 2011

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

If yes, provide the date:

**WILL THE COURSE BE CROSS-LISTED WITH ANOTHER DEPARTMENT?** [x] 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:

---

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

Regenerate. Revitalize. Restore. Renew. All of these terms are used in the evolving field of restorative development. Restorative development involves renewing or reusing the health, beauty, quantity, and functionality of natural, built and socio-economic assets, to enhance their value without depleting or destroying other assets of long-lasting or irreplaceable quality. It is central to sustaining a revitalized Great Lakes basin ecosystem. It is the process by which built and natural environments are either brought back to life, or under-performing ones are revitalized for improved eco-system service performance and a better quality of life. All such initiatives, including the construction of new places, must have eventual restorability embedded in them.

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

Curriculum includes green economy, community revitalization, habitat regeneration in an urban context, sustainability and urban design protocols. Specific training in Adaptive Re-Use, Great Lakes watershed analysis and restoration, brownfield remediation and redevelopment, bioengineering for riparian zone restoration, and engineered solutions for built/natural environment including enhancements such as methods for improved infiltration of water, ground water recharge, natural heritage strategies, and planning for walkable communities. Materials will be based on current training manuals, no single specific text.
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

Recognizing the significant need for sustainable solutions to complex social, political and environmental issues, EPP is involved in challenging projects related to water, energy, transportation, and other contemporary societal challenges which often have environmental and economic impacts subject to regulation and legislation. Our students gain an understanding of how to improve, integrate and protect natural assets within human built environments.

2. **EXPECTED ENROLMENT:**

25

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

Lectures, Seminars and Workshops, with at least one Field Trip to Seneca's King Campus for hands on training

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.)

Brownfields redesign charette report: 20%
Building repurposing project report: 20%
Workshop attendance and participation: 20%
Bioengineering analysis and design: 20%
Urban fabric project: 20%

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: Samir Chidiac  
Email: chidiac  
Extension: 26558  
Date: February 18, 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/medy
### Course Information

**DEPARTMENT/PROGRAM**: WGB-SEP/Master of Engineering Entrepreneurship and Innovation

**COURSE TITLE**: Legal Issues for the Technology-Based Enterprise

**COURSE NUMBER**: SEP 728

**INSTRUCTOR(S)**: To be determined

**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>X</td>
<td>Term I, 2011-12</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

X: 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

Provide the reason for course cancellation:

#### OTHER

EXPLAIN:

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

This course provides students with an understanding of all of the relevant legal issues. In the case of IP, students will be provided with the basic tools that will allow them to identify intellectual property, protect that property by applying the necessary types of legal protection such as patents, trademarks and copyright registrations and to then transfer or permit the use of the IP by others. For enterprise formation, the course will provide practical legal tools for enterprise formation, incorporation, contracting and rules that affect its day-to-day business.

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

There are a number of legal issues that a technology-based enterprise must deal with. These include traditional legal issues such as incorporation and contracting as well as emerging issues such as intellectual property (IP) management. This course provides students with an understanding of all of the relevant legal issues. In the case of IP, students will be provided with the basic tools that will allow them to identify intellectual property, protect that property by applying the necessary types of legal protection such as patents, trademarks and copyright registrations and to then transfer or permit the use of the IP by others. For enterprise formation, the course will provide practical legal tools for enterprise formation, incorporation, contracting and rules that affect its day-to-day business. The course is taught primarily through lecture material and interactions (on-line and in-class) with the instructor and the instructional material. The materials used in the course encompass a wide range of industries, businesses and issues in order to provide the greatest depth and breadth of experience.
1. STATEMENT OF PURPOSE  (How does the course fit into the department’s program?)

In-depth knowledge of any given technical field is not what the assignments are testing for. Rather the purpose of these is to ensure that students have learned the concepts of the course. Upon completion of this course, students will be able to complete the following key tasks:

- Understand the importance of IP in the operation of an enterprise
- Categorize different types of IP into different legal regimes
- Understand the rules of patents, copyrights and trade-marks and how to search registrations of these
- Plan the commercialization for new IP identified in an enterprise
- Understand and implement commercialization strategies for intellectual property in a new enterprise
- Understand the legal rules of enterprise formation, organization and operation

Students are expected to have the requisite technical knowledge relating to their own enterprise project. Examples in the course will require an advanced level of lay-understanding of technologies being discussed.

2. EXPECTED ENROLMENT:

15

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

The principal method of instruction will be in-class and on-line lectures and additional reading material. Lectures and reading material will be reinforced with in-class and on-line discussions including regularly presented problems and case studies. Students are, accordingly, expected to participate in all classes. Unavoidable absences should be discussed, in advance, with the instructor.

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.)

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>25%</td>
</tr>
<tr>
<td>Assignment #1</td>
<td>25%</td>
</tr>
<tr>
<td>Assignment #2</td>
<td>25%</td>
</tr>
<tr>
<td>Examination</td>
<td>25%</td>
</tr>
</tbody>
</table>

Individual Work: For the purposes of the Assignments, students are expected to work individually. If students are working jointly on an enterprise project and wish to submit assignments for this course as joint assignments, they must receive the prior approval of the instructor.

Assignment Proposal (Proposal document due tbc)

Students will use their XCEEi enterprise projects for the purposes of the assignments in the course. In order to ensure that this project is suitable for these purposes, students will be required to prepare a brief (no more than two pages) description of their enterprise project for the 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).

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:  S. Chidiac   Email:  chidiac   Extension:  26558   Date:  August 31, 2010

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
### 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: 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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**Department/Program**

Walter G. Booth School of Engineering Practice/Master of Engineering Design

**Course Title**

Energy Efficient Buildings

**Course Number**

SEP 747

**Course Credit**

<table>
<thead>
<tr>
<th>Full Course</th>
<th>Half Course</th>
<th>Quarter (Module)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>(x)</td>
<td>( )</td>
</tr>
</tbody>
</table>

**Instructor(s)**

Course will be delivered by Samir Chidiac, Mike Luburn of Canmet Energy, and other leading

**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>x</td>
<td>2011-12</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 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:

---

**Brief Description for Calendar**

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

The objective of the course is to provide students with a good understanding of 1) buildings energy sources, 2) energy efficient technologies for commercial and industrial type buildings, and 3) energy efficient buildings. Topics covered: Building major energy sources and areas of end use including building envelope, HVAC, distribution system, lighting system, internal loads, etc.; building energy balance, energy audit of buildings, energy conservation measures, building simulation tools, design of integrated systems.

---

**Content/Rationale**

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

The objective of the course is to provide students with a good understanding of 1) buildings energy sources, 2) energy efficient technologies for commercial and industrial type buildings, and 3) energy efficient buildings.

The course will cover the following topics:

1) Building major energy sources and areas of end use including building envelope, HVAC, distribution system, lighting system, internal loads, etc.
2) Building energy balance
3) Energy audit of buildings
4) Energy conservation measures
5) Building simulation tools
6) Design of integrated systems
1. **STATEMENT OF PURPOSE** (How does the course fit into the department’s program?)

The Master of Engineering Design program is developing a set of offerings in the area of Sustainable Infrastructure. Students are expected to have basic knowledge of heat transfer and building components.

2. **EXPECTED ENROLMENT:**

10 to 15 students

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

3 hour graduate lecture

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.)

Assignments (20%), test (40%), and project (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: Dr. Samir Chidiac  Email: chidiac  Extension: 26558  Date: February 18, 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/medy
**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>School of Engineering Practice / Masters of Engineering Entrepreneurship and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Entrepreneurial Processes and Skills</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>720</td>
</tr>
<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( ) HALF COURSE ( x ) QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>Rafik Loutfy</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>Enrolment in MEEI program</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 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:
  - Request change to 600 level course designation, SEP *6E03, to accommodate participation by undergraduates from the Engineering and Management program

**BRIEF DESCRIPTION FOR CALENDAR**

- Provide a brief description (maximum 6 lines) to be included in the Graduate Calendar.
  - Same as course description in undergraduate calendar (see attachment)

**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?)

   This is the introductory module to the MEEI program

2. **EXPECTED ENROLMENT:**

   40

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

   Course material is introduced through lectures and seminars by external speakers.

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.)

   One individual written assignment, one group assignment which includes a presentation and report, one concept initiation proposal which includes a presentation and report.

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 intended for students within the Engineering Entrepreneurship and Innovation program. This change is being proposed to accommodate undergraduates in the Engineering & Management program.

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

   Name: Samir Chidiac       Email: chidiac       Extension: 26558       Date: Oct. 25, 2010

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

SGS/medy
Engineering and Management {185}

Web Address: http://www.eng.mcmaster.ca/engandmg/t/

John Hodgins Engineering Building, Room A214-C
Ext. 27009

The Engineering and Management Programs are described in the Faculty of Engineering section in this Calendar. These programs are administered jointly by the DeGroote School of Business and the Faculty of Engineering and lead to the B.Eng.Mgt. degree.

Program Director
David K. Potter/B.Sc., Ph.D. (Waterloo)

Note
Engineering and Management students planning to later enter an accelerated M.B.A. program are advised to take COMMERCE 4KH3 as one of their Commerce electives.

Courses If no prerequisite is listed, the course is open.

ENGN MGT 2AA2 COMMUNICATION SKILLS
Writing skills including formal reports; speaking, listening and presentation skills, speeches, technical presentations and electronic communication technology.
One lecture (two hours); one term
Prerequisite(s):
Registration in any Engineering and Management program

ENGN MGT 4A03 INNOVATION DRIVEN PROJECT DEVELOPMENT AND MANAGEMENT
What is innovation and how is it managed? Team-based creativity skills will be developed with a focus on delivering innovation. Participants develop teamwork skills while using project management tools to develop a project.
Three hours; first term
Prerequisite(s):
CHEM ENG 2G03 or ENGN MGT 2AA2; and registration in any Engineering and Management program
Antirequisite(s):
ENGN MGT 3AA1, 4A01

ENGN MGT 5B03 ENGINEERING AND MANAGEMENT PROJECTS
Capstone course: Students work in multidisciplinary teams to solve an integrated engineering and business problem in an organization. Team, project and client management skills are developed.
No lectures, individual meetings with course instructor (two hours); one term
Prerequisite(s):
ENGN MGT 4A01, 4A03 and registration in any Engineering and Management program
Antirequisite(s):
ENGN MGT 5EP3

ENGN MGT 5E03 ENTREPRENEURIAL PROCESSES AND SKILLS
Students will develop an awareness of, and skills in, innovation and entrepreneurial behaviour. Emphasis will be placed on becoming a more effective team player, becoming more aware of one’s own learning style and entrepreneurial orientation, and understanding the processes of business idea generation, development and evaluation.
One lecture (three hours); term one
Prerequisite(s):
ENGN MGT 4A03 and registration in any Engineering and Management program, minimum CA of B-, permission of the MEEI Program in consultation with the Director of the Engineering and Management program.
# 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.

<table>
<thead>
<tr>
<th>DEPARTMENT/PROGRAM</th>
<th>School of Engineering Practice / Masters of Engineering Entrepreneurship &amp; Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE</td>
<td>Breaththrough Technology Venture Development</td>
</tr>
<tr>
<td>COURSE NUMBER</td>
<td>SEP 721</td>
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<tr>
<td>COURSE CREDIT</td>
<td>FULL COURSE ( )</td>
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<td>HALF COURSE ( x )</td>
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<td></td>
<td>QUARTER (MODULE) ( )</td>
</tr>
<tr>
<td>INSTRUCTOR(S)</td>
<td>David K. Potter</td>
</tr>
<tr>
<td>PREREQUISITE(S)</td>
<td>SEP 720</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>

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

<table>
<thead>
<tr>
<th>CHANGE IN COURSE TITLE</th>
<th>PROVIDE THE CURRENT COURSE TITLE:</th>
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</table>

<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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</table>

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

<table>
<thead>
<tr>
<th>OTHER</th>
<th>EXPLAIN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Request change to 600 level course designation, SEP *6EE3, to accommodate participation by undergraduates from the Engineering and Management program.</td>
</tr>
</tbody>
</table>

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

**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?)

This is the second core course in the MEEI program

2. EXPECTED ENROLMENT:

40

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

Course material is introduced through lectures and seminars by external speakers.

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.)

There are 4 individual written assignments.

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 intended for students within the Engineering Entrepreneurship and Innovation program. This change is being proposed to accommodate undergraduates in the Engineering & Management program.

PLEASE PROVIDE THE CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Samir Chidiac    Email: chidiac    Extension: 26558    Date: Oct. 25, 2010

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

SGS/medy
ENGN MGT SEE3      BREAKTHROUGH TECHNOLOGY VENTURE DEVELOPMENT
An introduction to the concepts and practice of developing a market entry strategy and establishing the product proof-of-concept. Students learn to integrate customer needs, market research, and strategic market approach into the technology proof-of-concept plan in order to facilitate the responsible use of capital.
One lecture (three hours); term two
Prerequisite(s):
ENGN MGT SE03 and registration in any Engineering and Management program

ENGN MGT SEP3      NEW ENTERPRISE CAPSTONE PROJECT
Students work in multidisciplinary teams to carry out a feasibility study for the creation of a new, knowledge-based business.
No lectures, individual meetings with course instructor; term one
Prerequisite(s):
Registration in any Engineering and Management program
Corequisite(s)
ENGN MGT SE03
Antirequisite(s):
ENGN MGT SB03