



Dean of Graduate Studies

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MEMORANDUM

ATTENTION Senate  
FROM Wade Parkhouse, Dean of Graduate  
Studies  
RE: Faculty of Applied Sciences

DATE 7 December 2012  
No. GS2012.40

Acting under delegated authority at its meeting of 3 December, 2012, the SGSC approved the replication of the existing MASc and PhD programs in the School of Engineering Science (ENSC) for the School of Mechatronics Systems Engineering (MSE) and is forwarding it to Senate for information.

**Effective Date is Summer 2013**

**Faculty of Applied Sciences**

School of Mechatronics Systems Engineering

1. Proposal for: MASc and PhD programs in MSE

**Mechatronic Systems Engineering Course Initiation**

**Faculty of Applied Sciences Graduate Programs Committee**

**Ed Park and Robert D. Cameron**

**October 10, 2012**

**Introduction**

The School of Mechatronic Systems Engineering (MSE) will be officially established on April 1, 2013 taking on responsibility for the existing graduate (MAsc and PhD) programs of all students currently supervised by Mechatronic Systems Engineering faculty members.

As the standard mnemonic for the School, the MSE label is proposed to be introduced for all Mechatronic Systems Engineering courses. In general, current ENSC courses that are Surrey-based courses used in the MSE curriculum are proposed to be relabelled as MSE courses. At present, these have been special topics and directed studies offerings.

For simplicity and clarity, a two-stage process is proposed for establishing the Fall 2013 graduate curriculum in Mechatronic Systems Engineering.

1. Course replication only, with minimal curriculum content changes, to be effective May 2013 (this proposal).
2. The normal curriculum changes anticipated for the 2013-14 academic year, to be expressed in terms of the relabelled MSE courses and proposed for the academic calendar effective September 2013.

The remainder of this document thus focuses on the proposal to re-label and replicate ENSC courses to become MSE courses, as well as the consequent changes to calendar text, without any change in underlying content. It is organized into the following sections.

- I. ENSC Courses to be Replicated
- II. Replication of the ENSC Master of Applied Sciences Program
- III. Replication of the ENSC PhD Program

## I. ENSC Courses to be Replicated

A number of existing ENSC courses are both used at Surrey in the MSE curriculum as well as at Burnaby. These include special topics, directed studies and thesis courses. Each of these courses is proposed to be replicated in accord with the following table.

| <b>Existing ENSC Course (To be Retained)</b> | <b>Replicated MSE Course</b>         |
|----------------------------------------------|--------------------------------------|
| <b>ENSC 891-3 Directed Studies I</b>         | <b>MSE 891-3 Directed Studies I</b>  |
| <b>ENSC 892-3 Directed Studies II</b>        | <b>MSE 892-3 Directed Studies II</b> |
| <b>ENSC 893-3 Special Topics I</b>           | <b>MSE 893-3 Special Topics I</b>    |
| <b>ENSC 894-3 Special Topics II</b>          | <b>MSE 894-3 Special Topics II</b>   |
| <b>ENSC 895-3 Special Topics III</b>         | <b>MSE 895-3 Special Topics III</b>  |
| <b>ENSC 898-18 MASc Thesis</b>               | <b>MSE 898-18 MASc Thesis</b>        |
| <b>ENSC 899-6 PhD Thesis</b>                 | <b>MSE 899-6 PhD Thesis</b>          |

## II. Replication of ENSC Master of Applied Science Program

The Master of Applied Sciences program in Engineering Science is proposed to be replicated for the School of Mechatronic Systems Engineering as shown by the following current and proposed calendar entries. Note that the Master of Engineering program is not replicated.

| Current Engineering Science Calendar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Proposed Mechatronics Calendar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p><b>Engineering Science Master of Applied Science Program</b></p> <p><i>School of Engineering Science   Faculty of Applied Sciences</i></p> <p>The master of applied science (MASc) is a full-time program with primary emphasis on the thesis rather than course work, is more exploratory than the part-time master of engineering (MEng) program, and covers a greater range of study.</p> <p><b>Admission Requirements</b></p> <p>The normal admission requirement is a bachelor's degree in electrical engineering, computer engineering, engineering science or a related area, with a 3.0 cumulative grade point average (CGPA) (B grade) from a recognized university, or equivalent.</p> <p><b>Transfer from MEng to MASc Program</b></p> <p>Normally transfer from the MEng to the MASc will be considered under the following conditions.</p> <ul style="list-style-type: none"> <li>— a minimum undergraduate cumulative grade point average (CGPA) of 3.3 is required.</li> <li>— on at least two courses within the master of engineering science program, a minimum CGPA of 3.5 is required</li> </ul> <p><b>Course Requirements</b></p> | <p><b>Mechatronic Systems Engineering Master of Applied Science Program</b></p> <p><i>School of Mechatronic Systems Engineering   Faculty of Applied Sciences</i></p> <p>The master of applied science (MASc) is a full-time program with primary emphasis on thesis work.</p> <p><b>Admission Requirements</b></p> <p>The normal admission requirement is a bachelor's degree in mechanical engineering, electrical engineering, mechatronics engineering or a related field, with a 3.0 cumulative grade point average (CGPA) (B grade) from a recognized university, or equivalent in accord with SFU Graduate General Regulation 1.3.3.</p> <p><b>Course Requirements</b></p> <p>Students complete a total of 30 units consisting of a minimum of 12 units of courses, and a thesis equal to 18 units. The courses will normally be selected, in consultation with the senior supervisor. At least six units must be mechatronic systems engineering graduate courses. At most, three units may be directed studies.</p> <p>Additional courses may be required to correct deficiencies in the student's background.</p> <p>If the subject matter of a required course has been previously completed with graduate credit, the course may not be completed again for</p> |

| <b>Current Engineering Science Calendar</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Proposed Mechatronics Calendar</b>                                                                                                                                                                                                                              |
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| <p>Students complete a total of 30 units consisting of a minimum of 12 units of courses, and a thesis equal to 18 units. The courses will normally be selected, in consultation with the senior supervisor. ENSC 820 may not be used towards the MASc course requirements. At least six units must be ENSC graduate courses. At most, three units may be directed studies.</p> <p>Additional courses may be required to correct deficiencies in the student's background.</p> <p>If the subject matter of a required course has been previously completed with graduate credit, the course may not be completed again for credit.</p> <p><b>Thesis</b></p> <p>The thesis is based on an independent project with a significant research component. The student defends the thesis in an exam, in accordance with regulations. See Graduate General Regulations for more requirements.</p> | <p>credit.</p> <p><b>Thesis</b></p> <p>The thesis is based on an independent project with a significant research component. The student defends the thesis in an exam, in accordance with regulations. See Graduate General Regulations for more requirements.</p> |

### III. Replication of ENSC PhD Program

The PhD program in Engineering Science is proposed to be replicated for the School of Mechatronic Systems Engineering as shown by the following current and proposed calendar entries. Some clean-ups of calendar language have been made for consistency.

| <b>Current Engineering Science Calendar</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Proposed Mechatronics Calendar</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <p><b>Engineering Science Doctor of Philosophy Program</b></p> <p><i>School of Engineering Science   Faculty of Applied Sciences</i></p>                                                                                                                                                                                                                                                                                                                                          | <p><b>Mechatronic Systems Engineering Doctor of Philosophy Program</b></p> <p><i>School of Mechatronic Systems Engineering   Faculty of Applied Sciences</i></p>                                                                                                                                                                                                                                                                                                                 |
| <p><b>Admission Requirements</b></p> <p>For admission to the doctor of philosophy (PhD) program, a student must have a master's degree in electrical engineering, mechanical engineering, physics, computer science or a related field, have submitted evidence of capability to undertake substantial original research, and have identified a faculty member as senior supervisor.</p> <p>See graduate general regulation 1.3 for other PhD program admission requirements.</p> | <p><b>Admission Requirements</b></p> <p>For admission to the doctor of philosophy (PhD) program, a student must have a master's degree in mechanical engineering, electrical engineering, mechatronics engineering or a related field, have submitted evidence of capability to undertake substantial original research, and have identified a faculty member as senior supervisor.</p> <p>See graduate general regulation 1.3 for other PhD program admission requirements.</p> |
| <p><b>Residence Requirement</b></p> <p>Students will conform to the residence requirement as stipulated in graduate general regulation 1.7.</p>                                                                                                                                                                                                                                                                                                                                   | <p><b>Residence Requirement</b></p> <p>Students will conform to the residence requirement as stipulated in graduate general regulation 1.7.</p>                                                                                                                                                                                                                                                                                                                                  |
| <p><b>Transfer from the Master's Program to the PhD Program</b></p> <p>Proceeding to a PhD program without completing a master's degree is discouraged. However, a student may be admitted after at least 12 months in the master of applied science (MASc) program if all non-thesis course requirements have been completed with a 3.67 or better cumulative grade point average</p>                                                                                            | <p><b>Transfer from the Master's Program to the PhD Program</b></p> <p>Proceeding to a PhD program without completing a master's degree is discouraged. However, a student may be admitted after at least 12 months in the master of applied science (MASc) program if all non-thesis course requirements have been completed with a 3.67 or better cumulative grade point average</p>                                                                                           |

(CGPA), outstanding potential for research has been shown, and approval of the student's supervisory committee, graduate program committee and senate graduate studies committee has been given.

### **Course Requirements**

The minimum requirement is 18 units beyond that of the MASc degree. Six of these units will be for prescribed courses in the specialization in which the student is enrolled. Alternatives can be substituted with the approval of the student's supervisory committee. At most, six units may be senior undergraduate courses. At most, six units may be directed studies. At least six units must be within engineering science, although ENSC 820-3 may not be used towards these six units. Additional courses may be required to correct deficiencies in the student's background.

### **Previous Credit**

If the subject matter of a listed course has been previously completed with graduate credit, the course may not be completed again for credit.

### **Qualifying Examination**

To qualify the student will submit a brief written research proposal and defend it orally to his/her supervisory committee within the first 24 months of admission. The proposal's defence will be judged according to the feasibility and scientific merits of the proposed research, and demonstration of a sophisticated understanding of general material in the student's major area of research. This level of understanding is associated with senior undergraduate and first year graduate course material.

The possible outcomes of the qualifying examination are 'pass,' 'marginal' and 'fail.' A student with 'marginal' will be required to re-submit the research proposal and defend it for the second and final time within six months and/or to complete more courses. A 'failing'

(CGPA), outstanding potential for research has been shown, and approval of the student's supervisory committee, graduate program committee and senate graduate studies committee has been given.

### **Course Requirements**

The minimum requirement is 18 units beyond that of the MASc degree. At least six units must be mechatronic systems engineering graduate courses. At most, six units may be senior undergraduate courses. At most, six units may be directed studies. Alternative technical courses outside mechatronic systems engineering can be substituted with the approval of the student's supervisory committee. Additional courses may be required to correct deficiencies in the student's background.

### **Previous Credit**

If the subject matter of a listed course has been previously completed with graduate credit, the course may not be completed again for credit.

### **Qualifying Examination**

To qualify the student will submit a brief written research proposal and defend it orally to his/her supervisory committee within the first 24 months of admission. The proposal's defence will be judged according to the feasibility and scientific merits of the proposed research, and demonstration of a sophisticated understanding of general material in the student's major area of research. This level of understanding is associated with senior undergraduate and first year graduate course material.

The possible outcomes of the qualifying examination are 'pass,' 'marginal' and 'fail.' A student with 'marginal' will be required to re-submit the research proposal and defend it for the second and final time within six months and/or to complete more courses. A 'failing'

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| grade requires withdrawal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | grade requires withdrawal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>Thesis</b></p> <p>Students define and undertake original research, the results of which are reported in a thesis. An examining committee is formed as defined in graduate general regulation 1.9.3. Students conform to residence requirements (see graduate general regulation 1.7.3). The senior supervisor will be an engineering science faculty approved by the graduate program committee.</p> <p>The student's progress will be reviewed every 12 months by a supervisory committee of three or more faculty members. At each annual review, the student presents a summary of his/her work to date, with the first review being the research proposal defence described in the section for Qualifying Examination (see above). Students not making satisfactory progress in their research topics, or failing to demonstrate satisfactory knowledge and understanding of recent publications in their general area of research, or failing to have their revised research proposal approved by the supervisory committee within 20 months of admission, may be required to withdraw as per section 1.8.2 Review of Unsatisfactory Progress of the graduate general regulations.</p> | <p><b>Thesis</b></p> <p>Students define and undertake original research, the results of which are reported in a thesis. An examining committee is formed as defined in graduate general regulation 1.9.3. Students conform to residence requirements (see graduate general regulation 1.7.3). The senior supervisor will be an engineering science faculty approved by the graduate program committee.</p> <p>The student's progress will be reviewed every 12 months by a supervisory committee of three or more faculty members. At each annual review, the student presents a summary of his/her work to date, with the second review normally being the research proposal defence described in the section for Qualifying Examination (see above). Students not making satisfactory progress in their research topics, or failing to demonstrate satisfactory knowledge and understanding of recent publications in their general area of research, or failing to have their revised research proposal approved by the supervisory committee within 24 months of admission, may be required to withdraw as per section 1.8.2 Review of Unsatisfactory Progress of the graduate general regulations.</p> |