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MEMORANDUM

ATTENTION Senate
FROM Wade Parkhouse, Chair of Senate
 Graduate Studies Committee (SGSC)
RE: Faculty of Applied Sciences

DATE September 13, 2016
No. GS2016.32

A handwritten signature in blue ink, appearing to read 'W. Parkhouse', is written over the 'No.' field of the memorandum.

For information:

Acting under delegated authority at its meeting of October 3, 2016, SGSC approved the following curriculum changes, **effective Summer 2017** (except as noted):

School of Computing Science

a) New course: CMPT 875 Computation for Biomolecular Data (effective Fall 2017)

School of Engineering Science

- a) Course change (prerequisite): ENSC 854
- b) Course change (prerequisite): ENSC 859
- c) Course change (description, prerequisite): ENSC 702
- d) New course: ENSC 703 Graduate Co-Op Practicum III
- e) New course: ENSC 880 PhD Qualifying Examination



MEMORANDUM

Attention Dr. Wade Parkhouse
Dean, Graduate Studies

Date September 22, 2016

From Dr. Mirza Faisal Beg mfbeg@sfu.ca
Faculty of Applied Science, Graduate Studies Committee

Re: 1) CMPT 875: new course proposal - Biomolecular Data Computation
2) ENSC 854, 859: course prerequisite change and ENSC 880: New course - PhD qualifying examination

The faculty of Applied Sciences Graduate Studies Committee would like to send the following two items for consideration by SGSC. These have been approved by FGSC by electronic vote.

- 1) CMPT 875: new course proposal - Biomolecular Data Computation
- 2) ENSC 854, 859: course prerequisite change, ENSC 880: New course - PhD qualifying examination, ENSC 702 – graduate coop practicum II changes, and a new course ENSC 703 that proposes a third graduate coop practicum term.

Documents for the above items are attached with this memo. I request you to please place these on the agenda for the next SGSC meeting.

Cc: Dr. Greg Mori, Director, School of Computing Science
Dr. Glenn Chapman, Director, School of Engineering Science
Dr. Farid Golnaraghi, Director, School of Mechatronic Systems Engineering

New Graduate Course Proposal

Please save the form before filling it out to ensure that the information will be saved properly.

Course Subject (eg. PSYC)	CMPT	Number (eg. 810)	875	Units (eg. 4)	4
Course title (max 100 characters including spaces and punctuation) Computation for Biomolecular Data					
Short title (for enrollment/transcript - max 30 characters) Computation: Biomolecular Data					
Course description for SFU Calendar * Covers a breadth of topics of current relevance to the analysis of biomolecular data. Starting from a discussion of algorithmic techniques used in bioinformatics, the course proceeds to biomolecular data-focused data mining and computer systems, and finishes with some cutting-edge applications.					
Rationale for introduction of this course The fields of bioinformatics and computational biology are rapidly evolving, and unless graduate students are able to quickly gain an appreciation for its different facets, they will find themselves at a disadvantage in the job market, whether in academia or in industry.					
Effective term and year Fall 2017			Course delivery (eg 3 hrs/week for 13 weeks) 3 hours a week for 13 weeks		
Frequency of offerings/year Once a year in the Fall			Estimated enrollment/offering 8-15 students		
Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.) None					
Prerequisite and/or Corequisite ** None					
Criminal record check required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, then add this requirement as a prerequisite.					
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus					
Course Components <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Research <input type="checkbox"/> Practicum <input type="checkbox"/> Online <input type="checkbox"/>					
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> In Progress/Complete				Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Repeat for credit? *** <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Total completions allowed? _____		Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Final exam required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Combined with an undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:					

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.

** If a course is only available to students in a particular program, that should be stated in the prerequisite.

*** This mainly applies to a Special Topics or Directed Readings course.

RESOURCES

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course Leonid Chindelevitch, Martin Ester, Arrvindh Shriraman, Faraz Hach
Additional faculty members, space, and/or specialized equipment required in order to offer this course Cedric Chauve (Mathematics Department) will give several guest lectures.

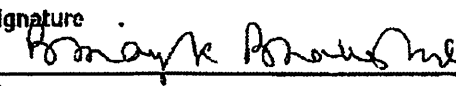
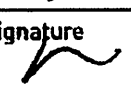
CONTACT PERSON

Department / School / Program School of Computing Science	Contact name Leonid Chindelevitch	Contact email leonid@sfu.ca
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DEPARTMENTAL APPROVAL

REMINDER: New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

Department Graduate Program Committee BINAY BHATTACHARYA	Signature 	Date Aug 29, 2016
Department Chair Greg Mon	Signature 	Date Sep. 1, 2016

LIBRARY REVIEW

Library review done? YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

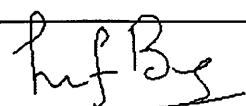
OVERLAP CHECK

Overlap check done? YES N/A

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content. An overlap check is not required for some courses (ie. Special Topics, Capstone, etc.)

FACULTY APPROVAL

This approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/Department commits to providing the required Library funds and any other necessary resources.

Faculty Graduate Studies Committee (FGSC) Mirza Faisal Beg	Signature 	Date September 22, 2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature	Date
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
Course Attribute Value: _____
Instruction Mode: _____
Attendance Type: _____

If different from regular units:
Academic Progress Units: _____
Financial Aid Progress Units: _____

Rationale: The fields of bioinformatics and computational biology are rapidly evolving, and unless graduate students are able to quickly gain an appreciation for its different facets, they will find themselves at a disadvantage in the job market, whether in academia or in industry.

The current offerings at the School of Computing Science do not meet the demands of this fast-paced environment. CMPT 711, the graduate Bioinformatics Algorithms course, does a good job of covering the fundamentals such as alignment algorithms, phylogenetic inference and secondary structure prediction, but is necessarily limited in scope. CMPT 829, the graduate Special Topics in Bioinformatics course, includes discussion of cutting-edge bioinformatics research, but is limited to those areas in which the particular faculty member has sufficient expertise, and does not do justice to the multifaceted nature of the skills required to do cutting-edge research. This new course proposal brings together multiple faculty members to instruct the course in order to address these issues.

Course description: Covers a breadth of topics of current relevance to the analysis of biomolecular data. Starting from a discussion of algorithmic techniques used in bioinformatics, the course proceeds to biomolecular data-focused data mining and computer systems, and finishes with some cutting-edge applications.

Faculty members: Leonid Chindelevitch, Martin Ester, Arrvindh Shriraman, Faraz Hach.

Grading scheme: 4 assignments worth 10% each, one per module; a final exam worth 60%.

Course outline:

Module 1: Algorithms for biomolecular data (Leonid Chindelevitch) - 4 weeks

Week 1) Review, core algorithmic techniques through algorithms for sequence analysis (dynamic programming, hidden Markov models)

Week 2) Tree algorithms (phylogenetic inference, sequence evolution models, parsimony/likelihood/Bayesian tree inference and ancestral reconstruction, MCMC methods)

Weeks 3-4) Combinatorial optimization and applications to biological networks analysis (linear programming, integer programming, metabolic networks, gene regulatory networks)

Module 2: Data mining for biomolecular data (Martin Ester) - 3 weeks

Week 5) Data mining in sequential data (clustering, classification, frequent patterns)

Week 6) Graphical models (Bayesian networks, Markov random fields, probabilistic matrix factorization)

Week 7) Data mining in biological networks (module detection, discovery of genetic markers, detecting causal patterns, quasi-experimental design)

Module 3: Computer systems for biomolecular data (Arrvindh Shriraman) - 3 weeks

Week 8) Special computational hardware for biomolecular data (GPU, CUDA)

Week 9) Parallel architectures for biomolecular data (MPI, Map-Reduce)

Week 10) Distributed architectures for biomolecular data (multicore, multithreading)

Module 4: Applications of biomolecular data (Faraz Hach) - 3 weeks

Week 11) Data structures for next-generation data (BWT-FM, Hash Tables, de Bruijn graphs, pan-genome graphs, Bloom filters)

Week 12) Analysis of next-generation sequencing data (mapping, indexing)

Week 13) Compression of next-generation sequencing data (lossy and lossless compression, random access)

Reading list:

Module 1: Jones, Pevzner. *An Introduction to Bioinformatics Algorithms*. MIT Press, 2004.

Gusfield. *ReCombinatorics - The Algorithmics of Ancestral Recombination Graphs and Explicit Phylogenetic Networks*. MIT Press, 2014.

Junker, Schreiber. *Analysis of Biological Networks*. Wiley, 2008.

Module 2: Aggarwal, *Data Mining*. Springer, 2015. [chapter 15]

Han, Kamber. *Data Mining – Concepts and Techniques*. Morgan Kaufmann, 2008. [chapter 8]

Module 3: Puder, Römer, Pilhofer. *Distributed Systems Architecture - A Middleware Approach*. Morgan Kaufmann, 2005.

Culler, Singh, Gupta. *Parallel Computer Architecture, a Hardware/Software Approach*. Morgan Kaufmann, 1998.

Module 4: Felsenstein. *Inferring Phylogenies*. Sinauer Associates, 2004.

Mäkinen, Belazzougui, Cunial, Tomescu. *Genome-scale Algorithm Design; Biological Sequence Analysis in the Era of High-Throughput Sequencing*. Cambridge University Press, 2015.



Graduate Course Change

Attach a separate document if more space is required.

Course Subject/Number	ENSC 854	Units	3	Effective Term and Year	Summer 2017
Course Title	Integrated Microsensors and Actuators				
Rationale for Change:	Prerequisites have changed.				

Proposed Changes (Check all that apply)

Course number
 Units*
 Title
 Description
 Prerequisite
 Other _____

Complete only the fields to be changed

FROM	TO
Course Subject/Number	Course Subject/Number
Units	Units*
Course Title	Course Title (max 100 characters)
Course Short Title	Course Short Title (max 30 characters)
Description	Description
Prerequisite ENSC 370, 453, 495 or permission of instructor.	Prerequisite ENSC 475 and ENSC 495 or permission of instructor.
Other	Other

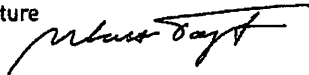
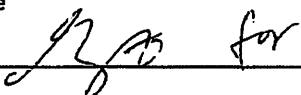
* Program requirements may need to be revised when course units are changed. Please review the calendar and submit any relevant program revisions resulting from this course change.

REMINDER: All course changes must be identified on a cover memo and confirmed as approved when submitted to FGSC and SGSC.

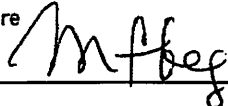
CONTACT PERSON

Department / School / Program School of Engineering Science	Contact name Ash M. Parameswaran	Contact email paramesw@sfu.ca
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DEPARTMENTAL APPROVAL

Department Graduate Program Committee Ivan Bajic	Signature 	Date September 20, 2016
Department Chair Glenn Chapman	Signature  for	Date Sept 21, 2016

FACULTY APPROVAL

Faculty Graduate Studies Committee (FGSC) MIRZA FAISAL BEG	Signature 	Date Sept 21, 2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature 	Date Oct 17 / 16
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
 Course Attribute Value: _____
 Instruction Mode: _____
 Attendance Type: _____

If different from regular units:
 Academic Progress Units: _____
 Financial Aid Progress Units: _____



Graduate Course Change

Attach a separate document if more space is required.

Course Subject/Number	ENSC 859	Units	3	Effective Term and Year	Summer 2017
Course Title	Biomedical Microdevices and Systems				
Rationale for Change:	One of the prerequisites no longer exists.				

Proposed Changes (Check all that apply)

Course number
 Units*
 Title
 Description
 Prerequisite
 Other _____

Complete only the fields to be changed

FROM	TO
Course Subject/Number	Course Subject/Number
Units	Units*
Course Title	Course Title (max 100 characters)
Course Short Title	Course Short Title (max 30 characters)
Description	Description
Prerequisite Recommended, ENSC 330; ENSC 495/851 or ENSC 854.	Prerequisite Recommended: ENSC 495/851 or ENSC 854.
Other	Other

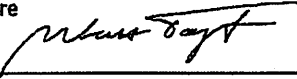
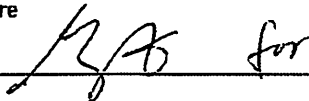
* Program requirements may need to be revised when course units are changed. Please review the calendar and submit any relevant program revisions resulting from this course change.

REMINDER: All course changes must be identified on a cover memo and confirmed as approved when submitted to FGSC and SGSC.

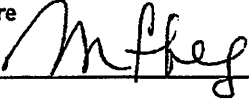
CONTACT PERSON

Department / School / Program School of Engineering Science	Contact name Bonnie Gray	Contact email brgay@sfu.ca
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DEPARTMENTAL APPROVAL

Department Graduate Program Committee Ivan Bajic	Signature 	Date September 20, 2016
Department Chair Glenn Chapman	Signature  for	Date Sept 21, 2016

FACULTY APPROVAL

Faculty Graduate Studies Committee (FGSC) MIRZA FASAL BEG	Signature 	Date Sept 21, 2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature 	Date Oct 17/16
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
 Course Attribute Value: _____
 Instruction Mode: _____
 Attendance Type: _____

If different from regular units:
 Academic Progress Units: _____
 Financial Aid Progress Units: _____



Graduate Course Change

Attach a separate document if more space is required.

Course Subject/Number	ENSC 702	Units	3	Effective Term and Year	Summer 2017
Course Title	Graduate Co-Op Practicum II				
Rationale for Change:	To clarify the procedures for registration and completion of the course.				

Proposed Changes (Check all that apply)

Course number
 Units*
 Title
 Description
 Prerequisite
 Other _____

Complete only the fields to be changed

FROM	TO
Course Subject/Number	Course Subject/Number
Units	Units*
Course Title	Course Title (max 100 characters)
Course Short Title	Course Short Title (max 30 characters)
Description Following ENSC 701-3, this course is the second term of work experience in the School of Engineering Science Co-operative Education Program for graduate students. A final report will be submitted and graded by the student's Senior supervisor.	Description Following ENSC 701-3, this course is the second term of work experience in the School of Engineering Science Co-operative Education Program for graduate students. A final report will be submitted and graded by the student's Senior Supervisor or delegate.
Prerequisite ENSC 701-3, a minimum CGPA of 3.0, and approval of Senior Supervisor.	Prerequisite ENSC 701-3, a minimum CGPA of 3.0, and approval of the Senior Supervisor and a GPC representative.
Other	Other

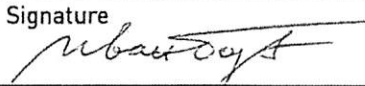
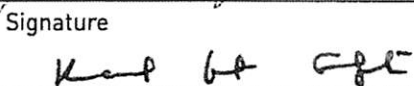
* Program requirements may need to be revised when course units are changed. Please review the calendar and submit any relevant program revisions resulting from this course change.

REMINDER: All course changes must be identified on a cover memo and confirmed as approved when submitted to FGSC and SGSC.

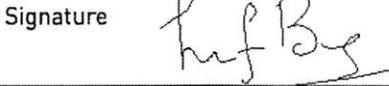
CONTACT PERSON

Department / School / Program Engineering Science	Contact name Ivan Bajic	Contact email ibajic@ensc.sfu.ca
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DEPARTMENTAL APPROVAL

Department Graduate Program Committee Ivan Bajic	Signature 	Date FEB. 4, 2016
Department Chair Kamal Gupta	Signature 	Date Feb 4, 2016

FACULTY APPROVAL

Faculty Graduate Studies Committee (FGSC) Mirza Faisal Beg	Signature 	Date September 22, 2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature 	Date Oct 17/16
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
Course Attribute Value: _____
Instruction Mode: _____
Attendance Type: _____

If different from regular units:
Academic Progress Units: _____
Financial Aid Progress Units: _____

New Graduate Course Proposal

Please save the form before filling it out to ensure that the information will be saved properly.

Course Subject (eg. PSYC)	ENSC	Number (eg. 810)	703	Units (eg. 4)	3
Course title (max 100 characters including spaces and punctuation) Graduate Co-Op Practicum III					
Short title (for enrollment/transcript - max 30 characters) Grad Co-Op III					
Course description for SFU Calendar * Following ENSC 701-3 and ENSC 702-3, this course is the third term of work experience in the School of Engineering Science Co-operative Education Program for graduate students. A final report will be submitted by the student and graded by the student 's Senior Supervisor or delegate.					
Rationale for introduction of this course Allows students to take a third coop practicum term. Graduate co-op will give students valuable industrial experience, prompt new ideas for their research, and improve the financial support of students.					
Effective term and year Summer 2017			Course delivery (eg 3 hrs/week for 13 weeks) co-op in industry		
Frequency of offerings/year			Estimated enrollment/offering		
Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.) none					
Prerequisite and/or Corequisite ** ENSC 702-3, a minimum CGPA of 3.0, and approval of the Senior Supervisor and a GPC representative					
Criminal record check required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, then add this requirement as a prerequisite.					
Campus where course will be taught <input type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input checked="" type="checkbox"/> Off campus					
Course Components <input type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Research <input checked="" type="checkbox"/> Practicum <input type="checkbox"/> Online <input type="checkbox"/> _____					
Grading Basis <input type="checkbox"/> Letter grades <input checked="" type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> In Progress/Complete				Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Repeat for credit? *** <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Total completions allowed? _____		Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Required course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Combined with an undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:					

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.

** If a course is only available to students in a particular program, that should be stated in the prerequisite.

*** This mainly applies to a Special Topics or Directed Readings course.

RESOURCES

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course
Additional faculty members, space, and/or specialized equipment required in order to offer this course none

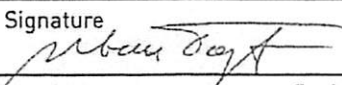
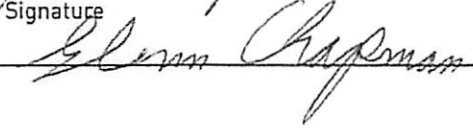
CONTACT PERSON

Department / School / Program	Contact name	Contact email
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DEPARTMENTAL APPROVAL

REMINDER: New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

Department Graduate Program Committee Ivan Bajic	Signature 	Date SEPT. 26, 2016
Department Chair GLENN CHAPMAN	Signature 	Date Sept 26 '16

LIBRARY REVIEW

Library review done? YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

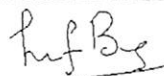
OVERLAP CHECK

Overlap check done? YES N/A


The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content. An overlap check is not required for some courses (ie. Special Topics, Capstone, etc.)

FACULTY APPROVAL

This approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/Department commits to providing the required Library funds and any other necessary resources.

Faculty Graduate Studies Committee (FGSC) Mirza Faisal Beg	Signature 	Date 09/26/2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature 	Date Oct 17/16
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
 Course Attribute Value: _____
 Instruction Mode: _____
 Attendance Type: _____

If different from regular units:
 Academic Progress Units: _____
 Financial Aid Progress Units: _____

ENSC 703 – Graduate Co-Op Practicum III

Course outline

Description

This course is the third term of work experience in the School of Engineering Science Co-operative Education Program for graduate students. A final report will be submitted and graded by the student's senior supervisor.

This course will not count towards the degree minimum for any of the graduate degrees in the School of Engineering Science – M.Eng., M.A.Sc., or Ph.D.

Prerequisites

ENSC 702-3 and a minimum CGPA of 3.0. Enrollment in this course requires the approval of the Senior Supervisor and the Chair of the Graduate Program Committee, or a designate.

Application

In order to apply for ENSC 703, the student should submit the co-op application form to the engineering co-op office, along with the transcript, a progress report, and a synopsis of the co-op work performed so far and the plans for the work to be completed during ENSC 703.



New Graduate Course Proposal

Please save the form before filling it out to ensure that the information will be saved properly.

Course Subject (eg. PSYC)	ENSC	Number (eg. 810)	880	Units (eg. 4)	0
Course title (max 100 characters including spaces and punctuation) PhD Qualifying Examination					
Short title (for enrollment/transcript - max 30 characters) PhD Qualifying Exam					
Course description for SFU Calendar * Qualifying examination for admission to doctoral candidate standing in the School of Engineering Science. A written thesis proposal is to be submitted to the Supervisory Committee and presented orally no earlier than two weeks after submission. 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.					
Rationale for introduction of this course The course will provide a record of when a PhD student passes the qualifying examination, which is important for students' progress assessment and funding.					
Effective term and year Summer 2017			Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs/term		
Frequency of offerings/year 3			Estimated enrollment/offering 10		
Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.) N/A					
Prerequisite and/or Corequisite ** ENSC PhD student					
Criminal record check required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, then add this requirement as a prerequisite.					
Campus where course will be taught <input checked="" type="checkbox"/> Burnaby <input type="checkbox"/> Surrey <input type="checkbox"/> Vancouver <input type="checkbox"/> Great Northern Way <input type="checkbox"/> Off campus					
Course Components <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> Research <input type="checkbox"/> Practicum <input type="checkbox"/> Online <input type="checkbox"/>					
Grading Basis <input type="checkbox"/> Letter grades <input checked="" type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> In Progress/Complete			Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Repeat for credit? *** <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Total completions allowed? <u>2</u>		Repeat within a term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Required course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Final exam required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Combined with an undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:					

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.

** If a course is only available to students in a particular program, that should be stated in the prerequisite.

*** This mainly applies to a Special Topics or Directed Readings course.

RESOURCES

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course All ENSC faculty members who are supervising PhD students and/or serving on PhD supervisory committees
Additional faculty members, space, and/or specialized equipment required in order to offer this course N/A

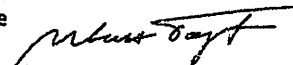
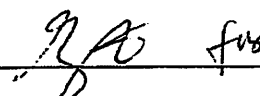
CONTACT PERSON

Department / School / Program School of Engineering Science	Contact name Ivan Bajic	Contact email ensc-grad-chair@sfu.ca
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DEPARTMENTAL APPROVAL

REMINDER: New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

Department Graduate Program Committee Ivan Bajic	Signature 	Date September 20, 2016
Department Chair Glenn Chapman	Signature 	Date Sept. 21, 2016

LIBRARY REVIEW

Library review done? YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

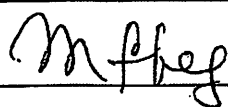
OVERLAP CHECK

Overlap check done? YES N/A

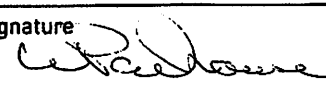
The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content. An overlap check is not required for some courses (ie. Special Topics, Capstone, etc.)

FACULTY APPROVAL

This approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/Department commits to providing the required Library funds and any other necessary resources.

Faculty Graduate Studies Committee (FGSC) MIRZA FAISAL BEG	Signature 	Date Sept 21, 2016
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) Wade Parkhouse	Signature 	Date Oct 17/16
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ADMINISTRATIVE SECTION (for DGS office only)

Course Attribute: _____
 Course Attribute Value: _____
 Instruction Mode: _____
 Attendance Type: _____

If different from regular units:
 Academic Progress Units: _____
 Financial Aid Progress Units: _____

ENSC 880 – PhD Qualifying Examination

Course outline

All Ph.D. candidates are required to pass a qualifying examination in School of Engineering Science. To qualify, the student will submit a concise written research proposal and defend it orally to his/her supervisory committee within the first 24 months of admission or transfer to the Ph.D. program. The proposal defense will be judged according to the feasibility and scientific merits of the proposed research, sufficient breadth and understanding of material in the student's major area of research, and a good preparation to perform the research. A sound background knowledge, associated with senior undergraduate and first year graduate course material, will be also expected.

Scheduling of the PhD Qualifying Examination

The scheduling of the examination should be arranged at least two weeks prior to the proposed date. Once the candidate and his/her supervisory committee agree on a suitable date/time, the Graduate Program Assistant will book a room.

Conduct of Examination

The student should prepare a written research proposal for the examining committee's perusal at least two weeks prior to the examination date. The document should be reviewed and approved by the Senior Supervisor prior to the submission to the other committee members.

The suggested total length of the proposal is 40 pages or less, in a SFU-approved thesis style. Typically, a proposal consists of the components listed below, with maximum recommended length of each component is given in brackets. It is understood that the structure of the proposal may be field- or problem-specific, so the list below is only a guideline.

- Introduction: (10 pages in total)
 - Background and Motivation (2 pages)
 - Previous Work (6 pages)
 - Summary of Proposed Work (1 page)
 - Expected Contribution (1 page)
- Research Proposal: (23 pages in total)
 - Objectives of Research or Hypothesis to be Tested (2 pages)
 - Theory (6 pages)
 - Experimental/Computational Methodology (7 pages)
 - Preliminary Analysis/Modeling and Results, and/or Validation of Methodology (5 pages)
 - Anticipated Problems and Solutions (3 pages)
- Management: (3 pages in total)
 - Work Plan and Schedule (2 pages)
 - Required Support and Sources (1 page)
- References: (4 pages in total)

It is understood that at this stage of the Ph.D. program, some candidates may not have produced any new findings or results yet. However, clear objectives, expected contributions and the research plan/methodology should be presented. Any preliminary results should be summarized as well.

The oral presentation normally consists of a brief (20-30 minute) presentation of the research proposal by the student, followed by questions and then a deliberation of the examination committee. The duration of the examination should not normally exceed two hours. Each member of the examination committee, starting with the non-Senior Supervisor member(s), will be given an opportunity to question the candidate in two rounds of questions.

Composition of the Qualifying Examination Committee

The Qualifying Examination Committee will consist of the Supervisory Committee members, and will normally be chaired by the Senior Supervisor or a faculty member appointed by the Graduate Program Committee Chair. In the event that the Qualifying Examination Committee Chair is not a member of the supervisory committee, he or she will be non-voting.

Attendance at the Qualifying Examination

The Qualifying Examination is not public. In addition to the examination committee members, the Director of the School, the Associate Director, and/or the Graduate Program Committee Chair may attend the examination without prior notice.

Deliberation

Immediately after the completion of the oral examination, the candidate is asked to leave the room. Assessment is performed in two steps. First, before discussion, each examiner identifies her/his provisional recommendation (pass/marginal/fail, see below) to provide a framework for a full discussion. Following this, a full discussion takes place. Upon completion of the deliberations, a formal vote shall be taken. The result can be:

1. Passed as submitted.
2. Marginal, in which case the candidate will be required to re-submit the research proposal and defend it for the second and final time within six months and/or take more courses.
3. Failed, in which case the candidate will be required to withdraw from the Ph.D. program.

The chair of the examination committee notifies the candidate of the decision of the committee immediately upon the end of the deliberation, and the Ph.D. Qualifying Examination Results form is signed by all examiners and submitted to the Graduate Program Committee Chair. In case of a fail, a copy of the completed PhD Qualifying Examination Results form should be forwarded to the Associate Director, and, within seven days, each examiner must submit a written assessment of the overall performance of the candidate to the Graduate Program Committee Chair and the Associate Director, with a copy to the Dean of Graduate Studies (DGS) as supporting material for the termination of the candidate's Ph.D. program.