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**MEMORANDUM**

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**ATTENTION** Senate

**DATE** June 17, 2021

**FROM** Jeff Derksen,  
Chair of Senate Graduate Studies  
Committee (SGSC)

**RE:** New Course Proposal

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**For information:**

Acting under delegated authority at its meeting of June 1, 2021, SGSC approved the following new course, effective **Spring 2022:**

**Faculty of Applied Sciences**

School of Mechatronic Systems Engineering

- 1) New course: MSE 802 Engineering Research Methods



Memo:

TO: Dr Jeff Derksen (Graduate Dean), Daria Babeshko, Dr Parvaneh Saeedi (FAS ADR)

FROM: Dr Patrick Palmer, Graduate Program Chair, MSE.

DATE: May 25, 2021

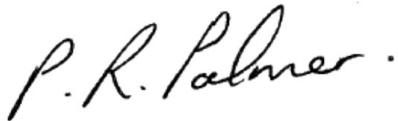
SUBJECT: New Graduate Course Proposal MSE 802

The School of Mechatronic Systems Engineering is submitting the MSE 802 Course Proposal for approval.

The course has been run as a temporary course twice and found to be very successful.

We should like the course to be effective from Spring 2022.

Yours sincerely,

A handwritten signature in black ink that reads "P. R. Palmer." The signature is written in a cursive style with a period at the end.

Patrick Palmer  
604 367 3372

# New Graduate Course Proposal

Course Subject (eg. PSYC) <b>MSE</b>	Number (eg. 810) <b>802</b>	Units (eg. 4) <b>3</b>
Course title (max. 100 characters) <b>Engineering Research Methods</b>		
Short title (for enrollment/transcript - max. 30 characters) <b>Engineering Research Methods</b>		
Course description for SFU Calendar (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) Formulating an appropriate research question, conducting literature reviews, understanding elements of a research proposal, evaluating the real-world impact of a research question, understanding design and statistical analysis of research experiments. Examines safety and ethics guidelines in conducting research, effective and ethical communication of research findings, and policies of scientific contributions. Special emphasis is given to effective oral and written communication of scientific material that may arise from thesis work. Covers a variety of issues that may arise in various stages of conducting research projects, such as conflicts of interest, patents, authorship guidelines and EDI.		
Rationale for introduction of this course Thesis-based graduate programs in engineering require students to master various skill sets from asking the right research question to conducting various types of experiments, and effective communication and dissemination of research findings including public speaking and writing journal articles. To prepare students for the road, this course provides an overview of key principles involved in conducting research across a variety of engineering disciplines. The intent is for students to apply the gained knowledge in this course to their individual thesis topic and research field through course assignments, reports, and presentations.		
Term of initial offering (eg. Fall 2019) <b>Spring 2022</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>3 hrs/week for 13 weeks</b>	
Frequency of offerings year <b>once</b>	Estimated enrollment per offering <b>25</b>	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)		
Prerequisite and/or Corequisite <b>Enrollment in a research-based program</b>		
Criminal record check required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No if yes is selected, add this as prerequisite	Additional course fees? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Campus where course will be taught <input type="checkbox"/> Burnaby <input checked="" 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"/> Independent <input type="checkbox"/> Capstone <input type="checkbox"/> _____		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/ Unsatisfactory <input type="checkbox"/> In Progress / Complete		
Repeat for credit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Total repeats allowed? <b>0</b>	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	Capstone course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Combined with a undergrad course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

\* See important definitions on the curriculum website.

## RESOURCES

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

Faculty member(s) who will normally teach this course <b>Faranak Farzan, Patrick Palmer, Ed Park, Carolyn Sparrey</b>
Additional faculty members, space, and/or specialized equipment required in order to offer this course

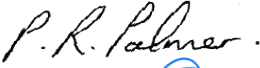
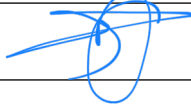
## CONTACT PERSON

Academic Unit / Program <b>Patrick Palmer</b>	Name (typically, Graduate Program Chair) <b>Graduate Program Chair</b>	Email
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need no sign

Graduate Program Committee <b>Patrick Palmer</b>	Signature 	Date <b>April 23, 2021</b>
Department Chair <b>Woo Soo Kim</b>	Signature 	Date <b>April 23, 2021</b>

## FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC ( gsc-list@sfu.ca) to check for an overlap in content


Overlap check done?  YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee <b>Parvaneh Saeedi</b>	Signature 	Date <b>May 20, 2021</b>
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee <b>Jeff Derksen</b>	Signature 	Date <b>June 10, 2021</b>
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### ADMINISTRATIVE SECTION (for DGS office only)

Library Check: \_\_\_\_\_  
 Course Attribute: \_\_\_\_\_  
 Course Attribute Value: \_\_\_\_\_  
 Instruction Mode: \_\_\_\_\_  
 Attendance Type: \_\_\_\_\_

If different from regular units:  
 Academic Progress Units: \_\_\_\_\_  
 Financial Aid Progress Units: \_\_\_\_\_

# Graduate Course Information Form

## Simon Fraser University Mechatronic Systems Engineering

**Date:** 25 February 2021

**Course number:** 802

**Course title:** Engineering Research Methodology

**Instructors:** Dr Faranak Farzan (Creator and Lead) & Co-Instructors Drs Edward Park, Patrick Palmer and Carolyn Sparrey

**Frequency of course offering:** Every Spring

### **Course description:**

Thesis-based graduate programs in engineering require students to master various skillsets from asking the right research question to conducting various types of experiments, and effective communication and dissemination of research findings including public speaking and writing journal articles. To prepare students for the road, this course provides an overview of key principles involved in conducting research across a variety of engineering disciplines.

The intent is for students to apply the gained knowledge in this course to their individual thesis topic and research field through course assignments, reports, and presentations.

The course will cover several fundamental topics such as: formulating an appropriate research question, conducting literature reviews, understanding elements of a research proposal, evaluating the real-world impact of a research question, designing research experiments, understanding applications of various statistical methodologies, safety and ethics guidelines in conducting research, effective and ethical communication of research findings, and policies of scientific contributions.

Throughout the course, a special emphasis will be given to effective communication of scientific outputs that may arise from a thesis work, such as scientific posters, oral communications, peer-reviewed publications, and patents. The course will also cover how to best handle conflict of interests that may arise in various stages of conducting research projects. To cover these wide range of topics, the course will draw on expertise of various permanent and invited speakers.

### **Learning Outcomes:**

- 1) Understand and apply key principles involved in conducting engineering research & navigating thesis-based graduate studies
- 2) Understand the key elements of a research proposal

- 3) Analyze a research question critically, and evaluate the real-world impact of answering that question
- 4) Demonstrate the ability to conduct literature review
- 5) Demonstrate the ability to understand when and how to obtain ethics approval for a research project
- 6) Understand various methods of statistical analysis and apply the appropriate methodology to one's own research topic
- 7) Learn the safety and/or ethics guidelines involved in conducting and communicating engineering research findings, and demonstrate academic integrity in handling intellectual property
- 8) Learn and demonstrate the ability to communicate research findings effectively through journal papers, posters, and scientific talks

### **Tentative Weekly Syllabus:**

Week 1) Introduction into Graduate Studies & Engineering Research

Week 2) Key Elements of a Research Proposal in Engineering Part I

Week 3) Key Elements of a Research Proposal Part II

Week 4) Literature Review and Peer Review

Week 5) Research Tools and Design of Experiments

Week 6) Design and Statistical Analysis of Experiments

Week 7) Ethics and Safety in Conducting Research

Week 8) Evaluating Real-world Impact of a Research Question

Week 9) Preparing Journal Papers

Week 10) Effective Presentation Skills

Week 11) Intellectual Property

Week 12) How to Give and Receive Peer-Review

Week 13) Presentations by Students

### **Textbook:**

NA

### **Recommended readings:**

1. J. Antony (2014). *Design of Experiments for Engineers and Scientists*. 2<sup>nd</sup> Ed. Publisher(s): Elsevier. Hardcover ISBN: 9780080994178; eBook ISBN: 9780080994192
2. D.V. Thiel (2014). *Research Methods for Engineers*. Cambridge University Press Online ISBN:9781139542326. DOI: <https://doi.org/10.1017/CBO9781139542326>
3. D.C. Montgomery and G.C. Runger (2013). *Applied Statistics and Probability for Engineers*. 6<sup>th</sup> Edition. Publisher(s): Wiley. ISBN: 9781118539712
4. J. Schimel (2011). *Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded*. Publisher(s): Oxford University Press. ISBN - 10:0199760241. ISBN - 13:9780199760244
5. A. Hofmann (2013). *Scientific Writing and Communication Papers, Proposals, and Presentations*. Publisher(s): Oxford University Press. ISBN: 9780190278540, 0190278544

**Prerequisites:** Enrollment in graduate program

**Tentative Grading:**

Assignments	55%
Draft Paper	30%
Presentation	15%

**Does the course have a project?** No

If yes, please provide details:

NA

**Teaching competency:**

Proposed instructors for the course include Drs Faranak Farzan, Edward Park, Carolyn Sparrey, and Patrick Palmer. Dr. Farzan has led the course development and initial rounds of offering of the course. She holds a Research Chair in Technology Innovations in the School of Mechatronics Systems engineering. She leads a multi-disciplinary research program with experience in mentoring and teaching of students of various engineering background. She has supervised and graduated many Ph.D. and MSc Students, and has authored over 80 peer-reviewed journal articles in high calibre journals and has a strong track record in writing successful grants. She is invited as keynote lecturer and speaker at numerous local, national and international institutes on regular basis.