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MEMORANDUM

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

DATE 10 February 2015
No. GS2015.03

**For information:**

At its meeting of January 5, 2015, SGSC approved the Professional Master's in Engineering in Mechatronic Product Realization by Cohort Special Arrangements and forwarded it to SCUP for information at its meeting on February 4, 2015.

Acting under delegated authority at its meeting of January 5, 2015, SGSC approved the following program proposal and new courses effective Fall 2015:

School of Mechatronic Systems Engineering

Program Proposal: Professional Master's in Engineering in Mechatronic Product Realization (Cohort Special Arrangements)

New course: MSE 900 Engineering in the Canadian Context

New course: MSE 921 Product Realization Project I

New course: MSE 922 Product Realization Project II

New course: MSE 995 Advanced Modelling and Prototyping



FACULTY OF APPLIED SCIENCES

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MEMORANDUM

ATTENTION Dr. Mary-Ellen Kelm
Acting Dean, Graduate Studies

DATE November 13, 2014

FROM Dr. Uwe Glässer
Graduate Studies Committee, Faculty
of Applied Sciences

PAGES 1/1

RE: Professional Masters Program in Mechatronic Product Realization (Cohort Special Arrangements Program)

The Faculty of Applied Sciences Graduate Studies Committee has unanimously approved by electronic vote on November 12, 2014 the attached proposal submitted by the School of Mechatronic Systems Engineering (MSE) to introduce a Professional Masters Program in Mechatronic Product Realization as a Cohort Special Arrangements Program.

This proposal builds directly on the Computing Science proposal for introducing a Professional Masters Program in Big Data.

Would you please place this proposal on the agenda for the next SGSC meeting?

cc: Dr. Martin Ester, Director, School of Computing Science
Dr. Farid Golnaraghi, Director, School of Mechatronic Systems Engineering
Dr. Kamal Gupta, Director, School of Engineering Science

enclosures



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MEMORANDUM

ATTENTION Dr. Gord Myers, Associate Vice-President, Academic
FROM Dr. Uwe Glässer, Acting Dean
RE: Professional Masters Program in Mechatronic Product Realization

DATE February 5, 2015

PAGES 1/1

I have reviewed the proposal and budget submitted by the School of Mechatronic Systems Engineering to introduce a Professional Masters Program in Mechatronic Product Realization as a Cohort Special Arrangements Program. The proposed program is built on the model of the Professional Masters Program in Big Data. I fully agree with the proposal and recommended tuition fees. The proposed budget is acceptable and it was developed with input from my office.

I am writing to seek your approval to proceed with the program and advertise it for September 2015 admission.

If you have any questions, please contact me.

cc: Dr. Jon Driver, Vice-President, Academic
Dr. Wade Parkhouse, Dean, Graduate Studies

**Program Proposal for Professional Master's in Engineering in
Mechatronic Product Realization**

(Cohort Special Arrangements Program)

**School of Mechatronic Systems Engineering
Faculty of Applied Science
Simon Fraser University**

**Dec. 19, 2014
Revised: Feb 5, 2015**

Executive Summary

Mechatronic Product Realization (MPR) covers the entire product development process for mechatronic systems and products. Given the rapid growth of new information technologies, digital circuits, and additive manufacturing technologies, the market for new mechatronic products is growing exponentially in all industry sectors such as consumer products and electronics, automotive, medical, industrial, and aerospace.

The primary goal of the MSE Professional Master's in Engineering in Mechatronic Product Realization (MPR) is to help Canada stay competitive in a rapidly growing world through a leading edge professional degree program in mechatronic product realization by providing its graduates with training in mechatronic product design and manufacturing technologies, as well as real-world experience through an industrial co-op program that will expedite their absorption into the job market.

The School of Mechatronic Systems Engineering (MSE), started at the SFU Surrey Campus in Fall 2007¹. MSE is a multidisciplinary accredited² engineering program that uniquely integrates mechanical, electronics, control, software, and computer engineering for the design and development of computer controlled electromechanical products and systems. The MSE program, which is offered exclusively at the SFU's Surrey campus, also includes business and communications courses so professional graduates are better prepared for market challenges. The School is proudly considered to be ranked among the top engineering programs in Canada.³ Our graduating engineers (grad and undergrad) are trained to work in industries including electronics, automotive, medical, aerospace, etc. with distinctive education in business and entrepreneurship.

Building upon the success of our undergraduate and graduate programs, the M. Eng. degree in MPR at MSE provides its students with a premier curriculum, through dedicated courses, design projects, and industrial co-op for professionals seeking to expand their career opportunities in product design and manufacturing.

The MPR program includes three semesters of project-based course work and (a minimum of) one semester industrial co-op. The MPR tuition is \$26,000 per student for domestic students and \$31,200 for international students, which will make it self-sufficient for a class of 20 students. Our market research and consultation with various groups including immigrant and community organizations, Society of Internationally Trained Engineers Society (SITE), local industries, MSE industrial advisory board, FAS External Advisory Board, Canadian Manufacturers and Exporters (CME), and APEGBC point to a clear need for such a program. MPR is expected to have an initial intake of twenty (20) students and is envisaged to launch in September 2015. Our plan is to prototype the program with the objective of converting it to a regular program after the three years under the Cohort Special Arrangements Program.

¹ Formally as a new school in April 2013

² Accreditation by the Canadian Engineering Accreditation Board

³ McLean's Magazine March 2011

Curriculum

a) Aims, goals, and/or objectives

The primary goal of the MSE Professional Master's Program (M. Eng.) in Mechatronic Product Realization (MPR) is to help Canada stay competitive in a rapidly growing world through a leading edge professional degree program in mechatronic product realization by providing its graduates with training in mechatronic product design and manufacturing technologies, as well as real-world experience through an industrial co-op program that will expedite their absorption into the job market.

b) Target audience

Through our rather intensive market research including industry surveys, focus groups, feedback from Canadian Manufacturers and Exporters, and APEGBC, we have identified two groups that are our potential students.

- Internationally Trained Engineers (ITEs), and
- Professionals seeking to expand their career opportunities.

d) Curriculum Details

Total: 30 units. These units are divided into three main sections: 15 units of graduate course work; 12 units of specialized lab and project work; and 3 units for co-op.

Graduate Course work: 15 units. Among the 15 units, the following lists the specifics:

- At least six units from the following courses:
 - MSE 726-3 Introduction to Engineering Design Optimization (instructor: G. Wang),
 - MSE 727-3 Finite Element Analysis (instructor: G. Wang, can also be taught by C. Sparrey, S. Arzanpour), and
 - MSE 780-3 Manufacturing Systems (instructor: K. Oldknow, can also be taught by E. Park)
- The rest of the units from the following courses:
 - MSE 801-3 Research and Publication Methods (instructor: M. Hindy),
 - MSE 900-3 Engineering in the Canadian Context (*a new course*, See Appendix I), and
 - Any other technical graduate courses offered from MSE.

Lab Courses: 12 units

- MSE 995-6 Advanced Modeling and Prototyping, *a new course*, see Appendix I.
- MSE 921-3 Product Realization Project I, *a new course*, see Appendix I.
- MSE 922-3 Product Realization Project II, *a new course*, see Appendix I.

Co-Operative Education: MSE 793-3 Graduate Co-op

A term of co-operative education is an integral part of this program. Students will register in MSE 793-3 and be expected to find a suitable industry partner for the co-op term with the assistance of the co-op office. The students may also opt to conduct research at one of the MSE research labs as a paid research assistant. Alternatively, the student may appeal to substitute an elective course for the co-op term.

Among the above-mentioned course, MSE 990-3, MSE 995-6, MSE 921-3, and MSE 922-3 are four new courses to be created for the proposed program. Course descriptions of these are in the Appendix I.

A suggested timetable is given below:

Semester	Courses	
1-FALL 9 or 12 units	3 or 6 units of courses (Recommended: MSE 900-3)	<u>MSE 995-6 Advanced Modeling and Prototyping</u>
2-Spring Co-op 3 units	MSE 793-3	
3-Summer 9 units	6 units of courses	<u>MSE 921-3 Product Realization Project 1</u>
4-Fall 9 or 6 units	6 or 3 units of courses (Recommended: MSE 801-3)	<u>MSE 922-3 Product Realization Project 2</u>

e) Distinctive characteristics

Rooted in the belief that experiential learning is likely the most effective way to train engineers in product realization, this program is designed to have a focus on hands-on product design and manufacturing experiences weaved with selected courses in advanced theory and methods. Among the required 30 units, students will have 15 units directly related to experiential learning, which includes intensive lab work, real-world product design projects, and an industrial co-op. For the rest of 15 units, students will take at least 6 units from design and manufacturing methods courses. In order to educate well-rounded engineers in product realization, there are also 6 units that students can take from MSE 801-3, which focus on

communication, and MSE 900-3 that covers standard and codes, law and ethics, engineering economics and project management. Students can also take 3 units or more from other advanced technical courses offered in MSE. The curriculum design addresses the needs of ITEs to help them integrated in Canadian workforce. Their specific needs of technical communication, APEGBC recognition, and Canadian work experiences can be addressed through completing this program. The curriculum also addresses the practicing engineers' needs to be well-rounded in the entire product development process, to appreciate the product realization in the context of business, to gain new knowledge in mechatronics, and to gain project management experiences.

In summary, currently there is no similar program in BC or in Canada with the following distinctive features:

- 1) Course work: Mechatronic Product Realization with intensive hands-on experiences
- 2) Product Realization projects, combined with law, ethics, and business aspects of engineering, and
- 3) Industrial co-op

Learning Methodologies

The program focuses on experiential learning. Three new lab-based courses (MSE 995-6, MSE 921-3, and MSE 922-3) are created for this program and will be delivered through apprentice-type training using MSE machine shops and labs. The additional new course (MSE 900-3), along with other existing graduate courses, will be delivered through lectures, tutorials, and labs. The co-op program is expected to be administrated through SFU Work Integrated Learning (WIL) office and to provide and equip students with practical work experience and enhance their employable skills.

Faculty

One term faculty (with PEng, preferably with PhD) in the area of Design and Manufacturing will be hired to provide the School with support in teaching and research activities in the areas linked to the MPR. As proposed, five faculty members will be involved to teach regular graduate courses including the new MSE 900-3. Existing faculty members of MSE can cover these courses. For the new lab-intensive courses including MSE 995-6, 920-3 and 921-3, we need to hire a limited-term faculty member to take charge and teach these courses. Significant amount work will be required to design and prepare the lab exercises, teach the fundamentals, and supervise their lab and projects. The new term faculty will work closely with machinists and technologists of MSE to deliver these three courses.

Existing faculty members will be directly involved in teaching courses related to the proposal include, alphabetically:

- Dr. Farid Golnaraghi (MSE 921-3, MSE 922-3)
- Dr. Maureen Hindy (MSE 801-3)
- Dr. Kevin Oldknow (MSE 780-3, MSE 900-3)

- Dr. Krishnan Vijayaraghavan (MSE 995-6)
- Dr. Gary Wang (MSE 726-3, MSE 727-3)

A short CV of the above faculty members are in Appendix V.

All other MSE faculties will be indirectly involved when students from the program take their individual graduate courses.

The hiring of the LT faculty member will be on hold until the enrollment reaches a sufficient number. It is expected that in the first year the above listed faculty members will fill the teaching needs as sessional instructors.

Need for program

There is a high demand for engineering professional degree programs in Canada with a few successful Professional Master's programs established across Canada. The MPR will fill a niche market that is not currently filled. The program was conceived after full discussions and consultation with following persons and organizations:

- MSE advisory Board including
 - o Matt Dion (VP marketing Elastic Path),
 - o Bruce Fingarson (General Manager & COO Surrey Fluid Power Ltd.), and
 - o Gillian Pichler, (Director, Registration & Licensing APEGBC). Engineering practice is regulated by the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC).
- Faculty of Applied Science External Advisory Board
- Canadian Manufacturers and Exporters (CME)
- Society of Internationally Trained Engineers (SITE) in BC
- S.U.C.C.E.S.S
- Progressive Intercultural Community Services Society (PICS)
- Local manufacturers focus group including
 - o Arie Van Muyen, Manager of Engineering, Ellet Industries
 - o Chris Campbell, Senior Manager, R&D, Indoor General Area, Philips Lighting North America
 - o Dory Meynert, VP Supply Chain, Creation Technologies
 - o Ray Wong, Chief of Engineering, SeaStar Solutions
 - o Wes Hallam, Director of Manufacturing, Corvus Energy
 - o Victor Goncalves, Director of Engineering, Alpha Technologies
 - o Laura Petrescue, Manager of Engineering and Technology Development, Avcorp Industries, Inc.

Evidences of student interest and labour market demand:

- A survey of the market has been conducted. See the attached labor market survey results from our current co-op employers in the Appendix VI.1. This survey was to gauge the likelihood of companies supporting practicing engineers taking this program. It is found

that about $\frac{1}{4}$ of the employers would likely do so, which is slightly higher than what we expected. It is also found through the survey that “Advanced Manufacturing” might not be the best area, therefore, we organized a focus group of local manufacturers afterwards and change the focus and the title of the program (see below).

- A focus group of local manufacturers indicates that the market calls for mechatronic product designer and manufacturers. Therefore the program name was changed from “Advanced Manufacturing” to “Mechatronic Product Realization” to address a wide scope of product development technologies that include both product design and manufacturing.
- Our largest target student group is the Internationally Trained Engineers (ITEs). A focus group of ITEs has been organized at MSE Surrey and overwhelming positive responses from the group. Currently SITE-BC has close to 800 members and the desire to have a higher degree in a Canadian university as well as the Canadian industry experience is very strong. Please see Appendix VI.2 for the support letter from SITE-BC president.
- CME has a *path2work* program that is mandated to place ITEs to the workforce. CME is a strong supporter of the proposed MPR program

APEGBC will recognize their education in MPR and will deem the graduates having the same credentials as any graduate from a Canadian accredited engineering program, i.e., the graduates are eligible to apply for Engineer In Training (EIT) with no need to take additional courses or exams. APEGBC will further recognize their co-op experience as Canadian work experience. Please see Appendix VI.3 for their support letter. APEGBC council is going to meet on Feb 13 to review all the items written in the support letter, and possibly approve these policies to recognize the education qualification and Canadian experiences of MPR graduates.

Admission

To qualify for admission to the Professional Master’s program (M. Eng.) in Mechatronic Product Realization, a student must satisfy the university admission requirements for a master's program as stated in Section 1.3.3 of the Graduation Admission section of the SFU calendar and the student must hold a bachelor's degree or equivalent in Mechanical Engineering, Electrical Engineering, Mechatronic Engineering, Engineering Science or a related field with a cumulative grade point average (GPA) of 3.0 (on a scale of 0.0 - 4.33) or the equivalent.

The School's Graduate Admission Committee may offer conditional admissions to exceptional students who do not meet the above requirement. Minimally we require demonstrated competence in the third year level equivalent to MSE 312-3 (Mechatronic Design II), and MSE 381-3 (Feedback Control Systems). Students who do not have the proper background may take MSE 381-3 and MSE 312-3 in the summer semester before the fall cohort begins and then join the M.Eng. program in Mechatronic Product Realization.

We wish to be inclusive of a variety of incoming students, including SFU students from related disciplines who wish to obtain a master's degree; international students; and professionals who wish to advance their knowledge in the area of Mechatronic Product Realization.

Appendices

Appendix I

Please see the attached scanned New Graduate Course Proposal forms.



FACULTY OF APPLIED SCIENCES

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MEMORANDUM

ATTENTION Dr. Mary-Ellen Kelm
Acting Dean, Graduate Studies

DATE December 10, 2014

FROM Dr. Uwe Glässer
Graduate Studies Committee, Faculty
of Applied Sciences

PAGES 1/1

RE: New graduate courses for Professional Masters in Mechatronic Systems Engineering

The Faculty of Applied Sciences Graduate Studies Committee has unanimously approved by electronic vote on December 10, 2014 a proposal by the School of Mechatronic Systems Engineering (MSE) to introduce the following four new graduate courses as part of their proposal for a Professional Masters Program in Mechatronic Product Realization.

- MSE 900 (Engineering in the Canadian Context)
- MSE 995 (Advanced Modelling and Prototyping)
- MSE 921 (Product Realization Project I)
- MSE 922 (Product Realization Project II)

I have initiated an overlap review by the other SFU Faculties and also requested a review by SFU Library. Both reviews are currently in progress.

Would you please place this proposal on the agenda for the next SGSC meeting?

cc: Dr. Martin Ester, Director, School of Computing Science
Dr. Farid Golnaraghi, Director, School of Mechatronic Systems Engineering
Dr. Kamal Gupta, Director, School of Engineering Science

enclosures



New Graduate Course Proposal

Attach a separate document if more space is required.

Course Subject (eg. PSYC) MSE	Number (eg. 810) 900	Units (eg. 4) 3
Course title (max 100 characters including spaces and punctuation) Engineering in the Canadian Context		
Short title (for enrollment/transcript - max 30 characters) Engr. in Canadian Context		
Course description for SFU Calendar * Engineering economics, standard and codes, law and ethics, introduction to engineering management, and other topics related to practicing engineering in Canada. Seminars from practicing engineers and managers will be given in the course. This course does not count towards the units required for a MSc or PhD degree.		
Rationale for introduction of this course Many students who receive their first degree in other countries need to know Canadian specific standards and codes, taxation rules (Engineering Economics), law and ethics, and project management approaches. As the majority of graduate students in MSE has international background, this course will benefit them and prepare them for working in Canada.		
Term of initial offering Fall 2015	Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs a week for 13 weeks	
Frequency of offerings/year 1/year	Estimated enrollment/offering 20	
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.) Nil.		
Prerequisite and/or Corequisite ** Graduate standing		
Educational Goals (optional) Knowledge in engineering economics, standard and codes, law and ethics, and project management in the Canadian context. Proficiency with pertinent calculation and engineering tools.		
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 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 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 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 type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input 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? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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 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 Dr. K. Oldknow
Additional faculty members, space, and/or specialized equipment required in order to offer this course Dr. G. Wang, Dr. F. Golnaraghi, and Dr. M. Hindy. No new labs or equipment needed.

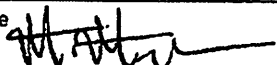

CONTACT PERSON

Department / School / Program MSE	Contact name Dr. K. Oldknow	Contact email koldknow@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 M. Moallem	Signature 	Date Dec 9, 2014
Department Chair G. Wang (Acting)	Signature 	Date Dec 9, 14

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.

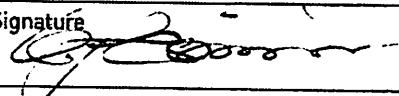
OVERLAP CHECK

Overlap check done? YES


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.

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) WWE GLASSER, FAS	Signature 	Date Jan 5/2015
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) WADE PARKHOUSE	Signature 	Date Jan 21/15
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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: _____

MSE 900-3 Engineering in the Canadian Context

Description:

The course aims to prepare students for practicing engineering with a focus on the Canadian context. Content includes engineering economics, standard and codes, law and ethics, and introduction to engineering management. Invited seminars from practicing engineers and managers will be given in the course. This course does not count towards the units required for a MSc or PhD degree.

Content

1. Engineering methods
2. Engineering economics
 - a. Time value of money and economic equivalence
 - b. Project Analysis: Payback, Net Present Value and Rate of Return
 - c. Depreciation and Corporate Income Tax
 - d. Capital Budgeting and Cost of Capital
3. Standards and Codes
4. Law and Ethics
5. Cross-functional project teams, team building, and team management
6. Project scheduling and project control on time, cost, and risk
7. Documentation and communications
8. Project management software
9. Quality management

Assessment

Assignments	15%
Mid-term exam	25%
Participation in class & seminars	10%
Final Exam	50%

Textbooks

Contemporary Engineering Economics: A Canadian Perspective, Third Canadian Edition
Chan Park, Ming Zuo and Ronald Pelot, Pearson Canada, 2011, ISBN 0-321-53876-5

Canadian Professional Engineering and Geoscience: Practice and Ethics: Fifth Edition
Gordon C. Andrews, Nelson College Indigenous, 2013, ISBN 0176509909

Prerequisite

Graduate standing.



New Graduate Course Proposal

Attach a separate document if more space is required.

Course Subject (eg. PSYC) MSE	Number (eg. 810) 921	Units (eg. 4) 3
Course title (max 100 characters including spaces and punctuation) Product Realization Project I		
Short title (for enrollment/transcript - max 30 characters) Product Real. Proj. I		
Course description for SFU Calendar * Students work in teams with industry and academic advisors on practical product realization projects. Students will conceive and design a mechatronic product. Students need to interact with project sponsors to define the design problem, perform patent, literature and information search, generate concepts, analyze concepts, and perform detailed designs. Project management, documentation, and technical communication are essential components of the course.		
Rationale for introduction of this course This course, together with MSE 922, provides students unique product realization experience on real-world design projects. This is to simulate the work place environment. Students also gain valuable soft skills such as communication, teamwork, and project management.		
Term of initial offering Spring 2016	Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs a week for 13 weeks	
Frequency of offerings/year 1/year	Estimated enrollment/offering 20	
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.) Nil.		
Prerequisite and/or Corequisite ** Graduate standing in the Professional Master's program in Mechatronic Product Realization		
Educational Goals (optional) Training of the product realization process. Project management practices. Technical communication in both written and oral formats. Team work and management.		
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 checked="" 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 checked="" 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	
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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? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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:		

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

*** This 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 Dr. F. Golnaraghi
Additional faculty members, space, and/or specialized equipment required in order to offer this course Dr. G. Wang, Dr. K. Vijayaraghavan, Dr. K. Oldknow. Existing labs and spaces of MSE will be used. No new labs or equipment needed.

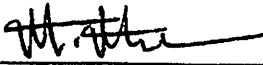

CONTACT PERSON

Department / School / Program MSE	Contact name Dr. F. Golnaraghi	Contact email mfgolnar@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 M. Moallem	Signature 	Date Dec 9, 2014
Department Chair G. Wang (Chair)	Signature 	Date Dec 9, 14

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.

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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) W. GLASSER, FG	Signature 	Date Jan 5 2015
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) WADE PARKHOUSE	Signature 	Date Jan 15/15
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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: _____

Product Realization Project I (MSE 921-3)

Description for MSE 921:

The course is a project-based course, in which students work in teams with industry and academic advisors on practical product realization projects. Students will conceive and design a mechatronic product. Students need to interact with project sponsors to define the design problem, perform patent, literature and information search, generate concepts, analyze concepts, and perform detailed designs. Project management, documentation, and technical communication are essential components of the course.

Instructor:

Dr. Farid Golnaraghi, Dr. G. Wang, New Instructor (TBA)

Student Assessment for MSE 921:

Grade will be based on the following:

Project Definition	15
Design Specification Report	15
Concept Design and Selection Report	40
Project Management	10
Sponsor's Evaluation	20
Total	100%

Resources Required:

MSE machine shop, prototyping lab, and technical support from machinists and technologists

Prerequisite:

Graduate standing in Professional Master's program in Mechatronic Product Realization



New Graduate Course Proposal

Attach a separate document if more space is required.

Course Subject (eg. PSYC) MSE	Number (eg. 810) 922	Units (eg. 4) 3
Course title (max 100 characters including spaces and punctuation) Product Realization Project II		
Short title (for enrollment/transcript - max 30 characters) Product Real. Proj. I		
Course description for SFU Calendar * Students work in teams with industry and academic advisors on practical product realization projects. Students will build prototypes, perform pertinent tests, and improve the product as designed in MSE 921. Project management, documentation, and technical communication are essential components of the course.		
Rationale for introduction of this course This course, together with MSE 921, provides students unique product realization experience on real-world design projects. This is to simulate the work place environment. Students also gain valuable soft skills such as communication, teamwork, and project management.		
Term of initial offering Summer 2016	Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs a week for 13 weeks	
Frequency of offerings/year 1/year	Estimated enrollment/offering 20	
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.) Nil.		
Prerequisite and/or Corequisite ** MSE 921		
Educational Goals (optional) Training of the product realization process. Project management practices. Technical communication in both written and oral formats. Team work and management.		
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 checked="" 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 checked="" 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Repeat for credit? *** <input type="checkbox"/> Yes <input type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input 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? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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 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 Dr. F. Golnaraghi
Additional faculty members, space, and/or specialized equipment required in order to offer this course Dr. G. Wang, Dr. K. Vijayaraghavan, Dr. K. Oldknow. Existing labs and spaces of MSE will be used. No new labs or equipment needed.

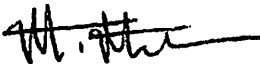
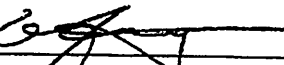
CONTACT PERSON

Department / School / Program MSE	Contact name Dr. F. Golnaraghi	Contact email mfgolnar@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 M. Moallem	Signature 	Date Dec 9, 2014
Department Chair G. Wang (Acting)	Signature 	Date Dec 9, 14

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


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.

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) Wade Parkhouse, Act	Signature 	Date Jan 15/2015
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) WADE PARKHOUSE	Signature 	Date Jan 15/15
---	---	--------------------------

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: _____

Product Realization Project II (MSE 922-3)

Description:

The course is a continuation of MSE 921, in which students work in teams with industry and academic advisors on practical product realization projects. Students will build prototypes, perform pertinent tests, and improve the product as designed in MSE 921. Project management, documentation, and technical communication are essential components of the course.

Student Assessment:

Grade will be based on the following:

Detailed Design Report	30
Prototype	20
Oral Presentation and Demonstration	10
Project Management	10
Sponsor's Evaluation	30
Total	100%

Resources Required:

MSE machine shop, prototyping lab, and technical support from machinists and technologists

Prerequisite:

MSE 921



New Graduate Course Proposal

Attach a separate document if more space is required.

Course Subject (eg. PSYC) MSE	Number (eg. 810) 995	Units (eg. 4) 6
Course title (max 100 characters including spaces and punctuation) Advanced Modeling and Prototyping		
Short title (for enrollment/transcript - max 30 characters) Adv. Modeling & Prototyping		
Course description for SFU Calendar * Hands-on practice with solid modeling, machine shop, measuring, and rapid prototyping tools. Knowledge and skills in geometric modeling, engineering materials, geometric dimensioning and tolerancing, and quality control. Students gain understanding of the advantages and limitation of geometric modeling and machines tools, and know to utilize these tools for rapid product realization.		
Rationale for introduction of this course Normally engineering graduates need more practical hands-on experiences to manufacturing products that they design. By providing such a course, students can gain deeper appreciation of the product development process from modeling to fabrication, and thus enable and equipment them to shorten the product development process with the advanced tools.		
Term of initial offering Fall 2015	Course delivery (eg 3 hrs/week for 13 weeks) 6 hrs a week for 13 weeks	
Frequency of offerings/year 1/year	Estimated enrollment/offering 20	
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.) Nil.		
Prerequisite and/or Corequisite ** Graduate standing in the Professional Master's program in Mechatronic Product Realization		
Educational Goals (optional) Knowledge in modeling, machining, rapid prototyping, dimensioning and tolerancing, measurement. Proficiency in using modeling and manufacturing tools to model, communicate, fabricate, and improve a product design. Understanding of using the modeling and prototyping tools in the product development process.		
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 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 checked="" 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 type="checkbox"/> No	Total repeats allowed? _____	Repeat within a term? <input type="checkbox"/> Yes <input type="checkbox"/> No
Required course? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Final exam required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Additional course fees? 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 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 The new term faculty to be hired
Additional faculty members, space, and/or specialized equipment required in order to offer this course Dr. K. Vijayaraghavan, Dr. G. Wang. MSE machine shops and computer labs will be used to offer this course, which has all the needed equipment.

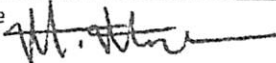
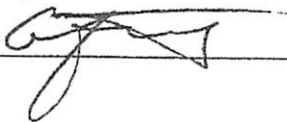
CONTACT PERSON

Department / School / Program MSE	Contact name Dr. K. Vijayaraghavan	Contact email krishna_vijayaraghavan@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 M. Moullem	Signature 	Date Dec 9, 2014
Department Chair G. Wang (Acting)	Signature 	Date Dec 9, 14

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


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.

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) UWE GLASSER, FAS	Signature 	Date Dec 5 2015
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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee (SGSC) WADE PARKHOUSE	Signature 	Date Jan 15/15
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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: _____

Advanced Modelling and Prototyping (MSE 995-6)

Description:

The course emphasizes hands-on practical CAD, machine shop, and rapid prototyping skills. Besides knowledge in geometric modeling, engineering materials, geometric dimensioning and tolerancing, and quality control, students will gain hands-on experience on solid modeling, machine tools, coordinated measuring machine, and rapid prototyping. The course aims to make students better design engineers by helping them understand advantages and limitation of geometric modeling and machines tools, and utilize these tools for rapid product realization.

Instructor:

Dr. Krishna Vijayaraghavan, Dr. Gary Wang, New Instructor (TBA)

Delivery Method:

Intensive lab instruction with some lectures. Machinists: Mustafa Sajid, Zain Khanzada.

Materials:

Textbooks (Required/Recommended book):

Engineering Graphics with Solidworks 2012, by David C. Planchard (Author), Marie P. Planchard (Author) [isbn # 9781585037803] (or 2013 version)

Supplementary:

Geometric Dimensioning and Tolerancing for Mechanical Design, 2nd edition, Gene R. Cogorno

Student Assessment:

Grade will be based on the following:

Class Assignments	10
Lab	30
Midterm	20
Final Exam	40
Total	100%

Topics:**In-class topics (25 hours):**

Topics	Description	Hours
1.	Basics of Engineering Materials	2
2.	Introduction to Machine shop	2
3.	Materials in tools	1
4.	Calculation in machining (tooling speed)	2
5.	Introduction to gears and gearing in machining	2
6.	Other fabrication: Casting, extrusion	1
7.	Introduction to SolidWorks and contrasting it with traditional CAD	1
8.	Constraining sketches in SolidWorks and Extrusion	3
9.	Creating 3D parts from 2D drawings	3
10.	Working Drawing & Dimensioning	3
11.	Tolerancing Symbols, GD&T in SolidWorks and fits	3
12.	Image Transfer Techniques	1
13.	Introduction to 3D printer	1

In-lab topics (70 instruction hrs in total):

Topics	Description	Hours
1.	Lathe Machine, operations and Work holding devices (in class)	2
2.	Milling Machine and operation and Work holding devices (in class)	2
3.	Tools, Tool materials and Tool holding (in class)	2
4.	Drilling, Tapping, Boring and Reaming (in class)	2
5.	Measuring instruments (in class)	2
6.	Lathe machine instructions and demonstrations (in Machine shop)	3
7.	Milling machine instructions and demonstrations (in Machine shop)	3
8.	Measuring instrument and Lay out demonstration (in Machine shop)	2
9.	Quick demonstration on CNC machine, and 3D printer (in Machine shop)	1
10.	Drill presses instructions (in Machine shop)	1
11.	Band Saws instructions (in Machine shop)	1
12.	Brake press, Shear press and Notcher. Instructions (in Machine	1

	shop)	
13.	Lathe machining exercise (in Machine shop)	6
14.	Milling machining exercise (in Machine shop)	6
15.	Layout, Band saw, Shearing & Bending and filling exercises. (in M shop)	3
16.	To address concerns and questions (in Machine shop)	3
17.	Prototyping & Rapid Prototyping (In class)	5
18.	Innovations and advancements (In class)	2
19.	Introduction to Objet studio (In class)	3
20.	Importing a CAD model and getting it ready for printing (In class)	2
21.	Objet studio exercises (In class)	3
22.	Introduction to coordinate measuring machine (CMM) (In lab)	3
23.	Demonstrations and Training (In lab)	3
24.	Using Objet30 3D printer and post processing (In lab)	3
25.	Exercise (3D Printer (In lab)	3
26.	Exercise CMM (In lab)	3

Appendix II Calendar Entry

Mechatronic Systems Engineering

Professional Master of Engineering in Mechatronic Product Realization

The school offers a professional Master of Engineering degree that involves taking courses and a co-op term.

Admission Requirements

To qualify for admission to the Professional Master's program (M. Eng.) in Mechatronic Product Realization, a student must satisfy the university admission requirements for a master's program as stated in Section 1.3.3 of the Graduation Admission section of the SFU calendar and the student must hold a bachelor's degree or equivalent in Mechanical Engineering, Electrical Engineering, Mechatronic Engineering, Engineering Science or a related field with a cumulative grade point average (GPA) of 3.0 (on a scale of 0.0 - 4.0) or the equivalent.

The School's Graduate Admission Committee may, at its discretion, offer admissions to exceptional students who do not meet the above requirement. Minimally we require demonstrated competence in the third year level equivalent to MSE 312-3 (Mechatronic Design II), and MSE 381-3 (Feedback Control Systems). Students who do not have the proper background may take MSE 312-3 and MSE 381-3 in the summer semester before the fall cohort begins and then join the M.Eng. program in Mechatronic Product Realization.

Program Requirements

Students will complete 30 units of graduate work. These units are divided into three sections: 15 units of graduate course work; 12 units of specialized lab/project work; and 3 units for co-op.

Course work

Five 3 unit courses must be taken from the choices below:

- At least six units from the following courses:
 - o MSE 726-3 Introduction to Engineering Design Optimization
 - o MSE 727-3 Finite Element Analysis
 - o MSE 780-3 Manufacturing Systems
- The rest of units from the following courses:
 - o MSE 801-3 Research and Publication Methods
 - o MSE 900-3 Engineering in the Canadian Context
 - o Any other technical graduate courses offered from MSE.

Lab Courses

Students will take the following lab/project based courses. Only students enrolled in the professional master's program in Mechatronic Product Realization will be permitted to enroll in these courses:

- MSE 995-6 Advanced Modeling and Prototyping
- MSE 921-3 Product Realization Project I
- MSE 922-3 Product Realization Project II

Co-Operative Education

A term of co-operative education is an integral part of this program. Students will register in MSE 793-3 and be expected to find a suitable industry partner for the co-op term with the assistance of the co-op office. The students may also opt to conduct research at one of the MSE research labs as a paid research assistant. Alternatively, the student may appeal to substitute an elective course for the co-op term.

Academic Requirements within the Graduate General Regulations

All graduate students must satisfy the academic requirements that are specified in the graduate general regulations (residence, course work, academic progress, supervision, completion time, and degree completion), as well as the specific requirements for the program in which they are enrolled, as shown above.

Appendix III

Detailed budget is given below based on the assumption of 15 domestic students and 5 international students.

Budget

Professional Masters Program in Mechatronic Product Realization
 Mechatronic Systems Engineering
 5-Feb-15

Assumption	# domestic students # intl. students					
	15	5				
Expenses	Unit Cost (\$)	# Units	Cost for		Comment	
			Each Cohort			
Limited term faculty	121,379	1	161,839		Annual salary \$121,379	
Program Assistant (part-time)	25,465	1	33,953		Annual salary \$25,465	
Technical Support	32,000	1	32,000			
Teaching assistants	2,230	20	44,608			
Course development	10,000	1	10,000			
Co-op Coordinator (half-time)	37,500	1	37,500			
Publicity	10,000	1	10,000			
Lab material and maintenance	16,000	1	16,000			
Grad Fellowship	6,000	2	12,000			
		Total	357,900			

Income/domestic	Credits/student	Fee/credit	Fee/student	VPA share	FAS share	Income/student
Regular courses	15	479	7,182	0.32	0	4,884
Lab courses	12	1,507	18,084	0.32	0.03	11,928
Co-op	3	245	735	0.32	0.25	375
Total			26,001			17,187

Income/International	Credits/student	Fee/credit	Fee/student	VPA share	FAS share	Income/student
Regular courses	15	479	7,182	0.32	0	4,884
Lab courses	12	1,941	23,292	0.32	0.04	15,205
Co-op	3	245	735	0.32	0.25	375
Total			31,209		Total	20,464

Total Income	360,120
Total Expense	357,900
Net	2,220

Budget Justification

Limited Term Faculty

A limited term faculty member is essential to the new lab courses that form the backbone of our proposed program. We follow Policy A 12.05 on Limited Term Research Faculty. The salary for the limited term faculty will be at Step 4 on the Associate Professor salary scale, and combined with a market differential, the salary will be \$103,240 plus 17.57% benefits which amounts to \$121,379. This salary is consistent with the similar position at the School of Computer Science

for their Big Data professional master's program. Given the program is 4-semester long, the expense for the faculty is scaled to four semesters. The same treatment is applied to the program assistant.

Program Assistant

The program assistant will be a CUPE staff member who will assist with admissions, ongoing paperwork related to the program, assisting students with their visa letters, collecting feedback from students and coordinating with the co-op program. The salary will start at \$1510.03 biweekly (Step 7) x 26 weeks with 29.72% benefits will lead to a half-time salary of \$25,464.54.

Technical Support

The three lab courses would require significant technical support from our technicians and machinists. It is anticipated some of the lab courses may be offered in evenings to avoid conflict with existing curriculum and to accommodate working students. The cost is estimated to be \$8,000 per term to pay for their time. The total cost for four terms is thus \$32,000.

Teaching Assistants

Teaching assistants will be paid at \$1312 per base unit (for PhD students; the rate is slightly lower for master's students). We have allocated 17 base units per 10 students for this program. Thus for 20 students the TA expenses will be \$44,608. This is more TA support than in our normal graduate program, but warranted by the lab coursework in this program.

Co-op Coordinator

We aim to support the co-op program with a half-time co-op coordinator position. While this expense is more than we collect in co-op fees, it does reflect the fact that our program requires a co-op term for each student in the program, co-op coordinators typically handle 60-90 students, and so a half-time co-op coordinator position is justified for our planned intake of 20 to 30 students. A 0.5 FTE (half-time) co-op position is funded at \$37,500.

Lab Material and Maintenance

The new lab courses demand high material consumption, machine shop maintenance, and machine tool repair costs. The material costs for machining, 3D prototyping, and product prototyping are high; and the maintenance and repair costs for high-end machines such as CNC, 3D Printers, and CMC are high. We thus budget for \$16,000 per year as on-going expenses for the purposes.

Graduate Awards

The current plan is to offer two graduate awards at \$6,000 each from the School of Mechatronic Systems Engineering to attract top students to our program. With more enrollment in the program, potentially more awards can be given.

Start and end Dates:

It is planned that this proposed program will commence in the fall semester of 2015. The last date of admission to this program under this Cohort Special Arrangements Program will be September 2017.

Appendix IV

The following faculty members from Computing Science are the members of the steering committee for this program:

- Farid Golnaraghi, Professor and Director, mfgolnar@sfu.ca
- Kevin Oldknow, Lecturer, koldknow@sfu.ca
- Krishna Vijayaraghavan, Assistant Professor, kvijayaraghavan@sfu.ca
- Gary Wang, Professor, gary.wang@sfu.ca

For now, please direct all correspondence about this proposal to Gary Wang.

Appendix V

Please see the attached CV for involved faculties.

Appendix VI Supplementary Material

1. Survey and results
2. Support letter from SITE-BC
3. Support letter from APEGBC

VI.1 Survey and Results

SFU Professional Master's Degree in Advanced Manufacturing⁴

Simon Fraser University's School of Mechatronic Systems Engineering (MSE) is considering offering a Professional Master's Program in Advanced Manufacturing. Key areas of training will include: Advanced Modelling and Prototyping, Modern Product Design, Additive Manufacturing, Manufacturing Controls, Engineering Communication, Project Management and Documentation, Business of Engineering and Entrepreneurship, Engineering Law and Ethics, Capstone Projects, and Industry Mentor-ship.

Q1 . Please indicate the size of your company (number of employees)

- 0 - 50
- 50 - 100
- 100 - 500
- 500+

Q2 . Please indicate your company's industry sector

*

Q3 . Please provide your company's name (optional)

Answer :

Q4 . Please provide your position (title) at your company (optional)

Answer :

Q5 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire a 4-month intern (total salary approx. \$12,000)

- Definitely would hire
- Might hire
- Definitely would not hire

Q6 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire an 8-month intern (total salary approx. \$24,000)

- Definitely would hire
- Might hire
- Definitely would not hire

Q7 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire a permanent employee that has completed this program.

⁴ The old name for the proposed program, which is subsequently changed to MPR to cover a wider scope.

- Very likely
- Somewhat likely
- Not likely

Q8 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to support one of your existing employees in taking the program (total expected tuition approx. \$30,000)

- Very likely
- Somewhat likely
- Not likely

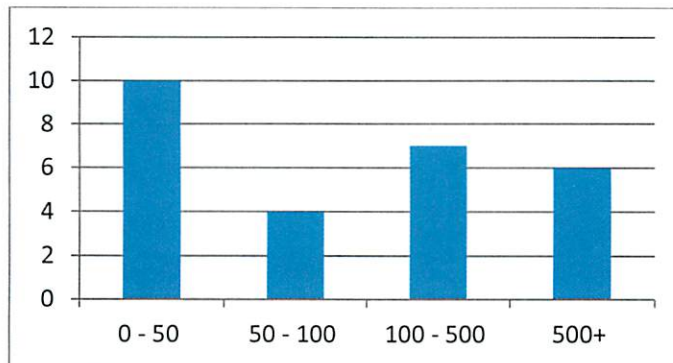
Q9 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing are there any specific areas of training that you would recommend including / excluding from the program?

*

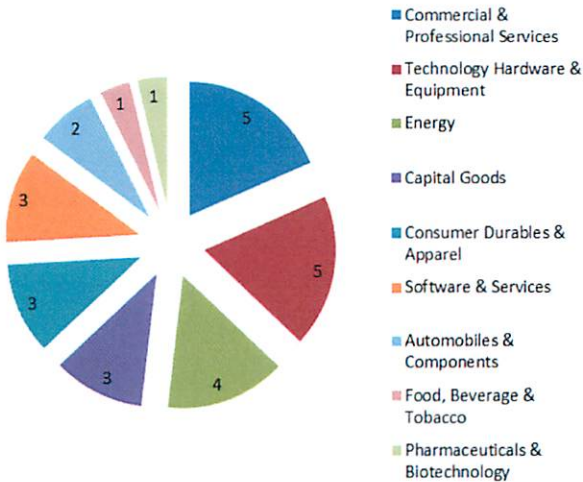
Results:

In total 27 responses have been received. The survey results are summarized as below:

Q1 . Please indicate the size of your company (number of employees)



Q2 . Please indicate your company's industry sector



Q3 . Please provide your company's name (optional)

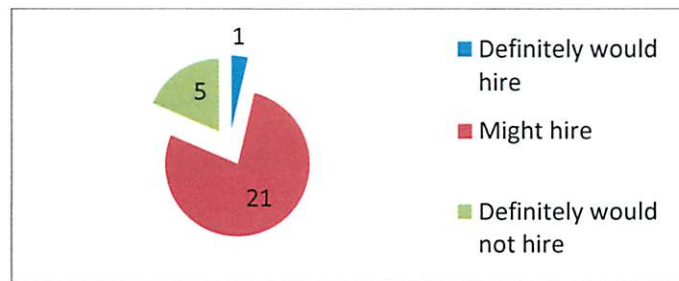
- Mustang Survival
- AstroGraphic Industries Ltd.
- Unifiller Systems
- International Market Access, Inc.
- Murray Latta Progressive Machine
- Surrey Fluid Power Ltd.
- SNC-Lavalin Inc.
- Mustang Survival
- Lange Installations Ltd
- International Submarine Engineering
- Schneider Electric
- Eaton
- AFCC
- Sanjel
- Photon Control R&D Ltd.

Q4 . Please provide your position (title) at your company (optional)

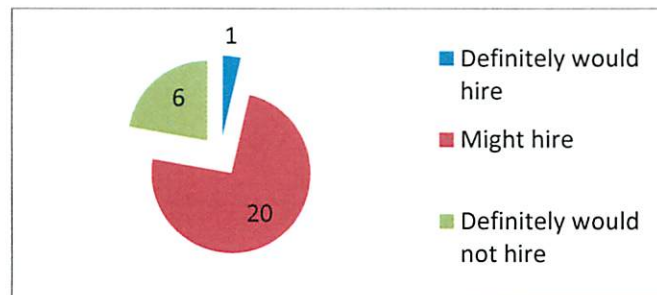
- President
- Owner and President
- CEO

Communications Director
President
HR Manager
General Manager and COO
Director, Facility Engineering
senior process engineer
Manager, Research & Technology
Owner
VP Operations
Project Manager
University Recruiter
Mechanical Manager

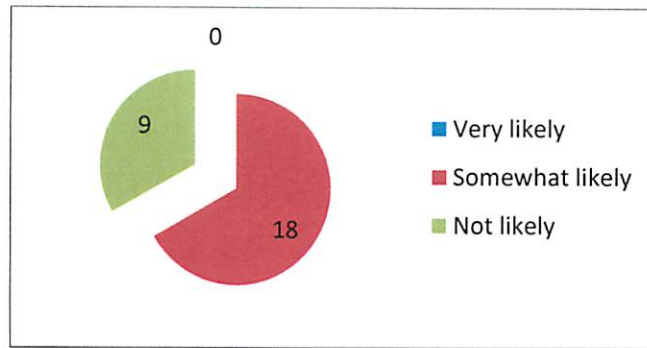
Q5 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire a 4-month intern (total salary approx. \$12,000)



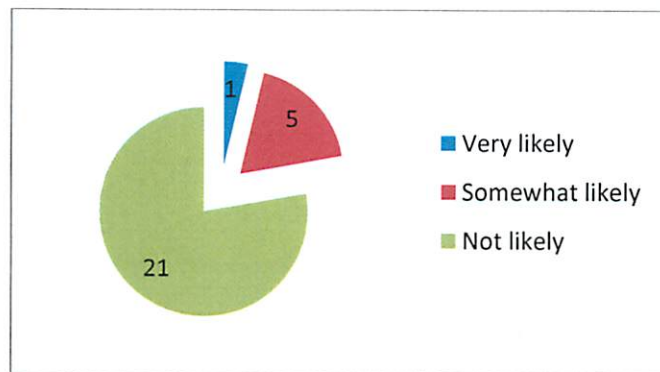
Q6 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire an 8-month intern (total salary approx. \$24,000)



Q7 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to hire a permanent employee that has completed this program.



Q8 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing, please indicate how likely you would be to support one of your existing employees in taking the program (total expected tuition approx. \$30,000)



Q9 . Given the description of the proposed Professional Master's Program in Advanced Manufacturing are there any specific areas of training that you would recommend including / excluding from the program? (CommentBox)

Only the 5 most recent submissions are displayed for brevity.

Insufficient information to properly reply to this question

A good basic understanding in the field specific to the direction of manufacturing in question.

Understanding of costs and financials is very important to be able to make realistic decisions.

International logistics / supply chain management, Canada-USA Cross-border issues. The Border Policy Research Institute at Western Washington University might be a good partner.

Definitely include innovation as well as adapting change to new technologies

VI.2 Support Letter from SITE-BC



Society of Internationally Trained Engineers of British Columbia

October 28, 2014
School of Mechatronic Systems Engineering
Simon Fraser University
250-13450 102 Avenue
Surrey BC Canada V3T 0A3

To whom it may concern.

Re: Letter of Support for the "Mechatronic Product Realization Master's Degree at School of Mechatronic Systems Engineering, Simon Fraser University".

I am writing this letter in support of the project to create the "Mechatronic Product Realization Master's Degree at School of Mechatronic Systems Engineering".

SITE BC (Society of Internationally Trained Engineers) is fully in support of this project as an option for internationally trained engineers (ITEs) to advance their careers in BC and Canada in general. Since SITEBC creation in 2004 as a non-profit organization, we have worked to represent the interests of British Columbia's internationally trained engineering community. SITE BC promotes utilizing the full potential of ITEs so they can more meaningfully contribute their knowledge and skills to strengthening the Canadian economy.

Being aware of the barriers that our members have to overcome in order to contribute their full potential, I am confident that this Master's Degree program will help the participants to enhance their technical and soft skills as a resource to improve their employability. The different topics addressed by this program in areas like leading edge advanced manufacturing technologies, technical communication, Canadian work experience, professional association recognition, and professional mentoring will be a powerful tool to facilitate the ITEs integration into the Canadian work force in the field of professional engineering.

Should you have any questions regarding this letter, please do not hesitate to contact me.

Sincerely yours,

Fernando Borja P.Eng., MBA.
SITE BC President
Cell: (604) 376 4987
info@sitebc.ca
www.sitebc.ca

VI.3 Support letter from APEGBC



Building progress through innovation every day

200 - 4010 Regent Street, Burnaby, BC V5C 6N2
T. 604-430-8035 | F. 604-430-8085 | 1-888-430-8035
www.apeg.bc.ca

by email: gary_wang@sfu.ca

November 17, 2014

Dr. G. Gary Wang, P.Eng., FASME,
Professor and Acting Associate Director
School of Mechatronic Systems Engineering,
Simon Fraser University
School of Mechatronic Systems Engineering
250-13450 102 Ave.
Surrey, BC, V3T0A3

Dear Dr. Wang,

Re: Professional Master's Program in Mechatronic Product Realization

I am writing to express my support for Simon Fraser University's proposed Professional Master's in Mechatronic Product Realization. This innovative program will provide its graduates with a strong diverse skill set and introduction into the engineering practice in Canada in an area commensurate with their skills.

It is important to the Association that all those who wish to become academically-qualified to practice professional engineering in British Columbia have access to practical routes to achieve this goal. As you know, approximately 40% of APEGBC's new applicants for professional engineer registration are educated outside of Canada. Your proposed program will offer a path to Internationally Educated and Trained Engineers that gives them enhanced business and communication skills in addition to advanced knowledge for practice in Canada, all of which are key to successful and fulfilling employment in Canada.

The program can also build a strong bridge to the engineering profession in British Columbia. Graduates of this program who have previously graduated from four- to five-year university level undergraduate engineering programs that are aligned with the subject matter of the Master's program, will also have a high likelihood of being academically qualified for registration as professional engineers. Their application fee will also be waived if they apply for EIT enrolment or P.Eng. registration within 12 months of graduation from the program. In addition, their internship experience, if directly supervised by a professional engineer with expertise related to mechatronics engineering, will also have a strong likelihood of being counted towards the Canadian Environment experience requirement. Finally, participants who are APEGBC Student Members will also have the opportunity to log their experience and have it validated on APEGBC's online Competency Reporting Tool.

I cannot speak on behalf of the Association's Council; however I understand that Simon Fraser University plans to present the program to APEGBC's Council in 2015. Our Council will offer its comments at that time.

Please accept my best wishes for continued positive development of the program. I look forward working closely with you and your faculty to welcome its graduates into the engineering profession in British Columbia.

Sincerely,



Gillian Pichler, P.Eng.
Director, Registration

cc: Ann English, P.Eng. – Chief Executive Officer & Registrar, APEGBC
Tony Chong, P.Eng. – Chief Regulatory Officer & Deputy Registrar, APEGBC