SENATE OF SIMON FRASER UNIVERSITY
AGENDA – OPEN SESSION

Monday, November 5, 2018 – 5:30 pm
Room 3210 West Mall Complex

1. Approval of the Agenda

2. Approval of the Minutes of the Open Session on September 10, 2018

3. Approval of the Minutes of the Open Session on October 1, 2018

4. Business Arising from the Minutes

5. Report of the Chair

6. Question Period *

7. Reports of Committees

   A) Senate Committee on Agenda and Rules (SCAR)
      i) Revised Terms of Reference for Senate Committee on Undergraduate Studies (SCUS) S.18-100

   B) Senate Committee on Continuing Studies (SCCS)
      ii) Annual Report (For Information) S.18-101

   C) Senate Committee on University Priorities (SCUP)
      i) External Review of the Department of Biomedical Physiology and Kinesiology S.18-102
      ii) Full Program Proposal for the Master of Applied Science in Sustainable Energy Engineering S.18-103
      iii) Full Program Proposal for the Doctor of Philosophy in Sustainable Energy Engineering S.18-104
      iv) Full Program Proposal for the Master of Engineering in Mechatronic Product Realization S.18-105
      v) Full Program Proposal for the Master of Arts in Heritage Resource Management S.18-106
      vi) Full Program Proposal for the Graduate Certificate in Heritage Resource Management S.18-107

   D) Senate Committee on Undergraduate Studies (SCUS)
      i) Program Changes (For Information) S.18-108
ii) New Course Proposals (For Information) S.18-109
iii) Course Changes (For Information) S.18-110
iv) Program Changes (For Information) S.18-111
v) New Course Proposals (For Information) S.18-112
vi) Course Changes (For Information) S.18-113

E) Senate Graduate Studies Committee (SGSC)
   i) Program Changes (For Information) S.18-114
   ii) CSAR Master of Science in Accounting with Digital Analytics
       (For Information) S.18-115
   iii) CSAR Graduate Certificate in Accounting with Digital Analytics
        (For Information) S.18-116

F) Senate Nominating Committee (SNC)
   i) Senate Committee Elections (For Information) S.18-117

8. Other Business

9. Information
   i) Date of the next regular meeting – Monday, December 3, 2018.

Agenda items and papers for the December meeting will be required by the Secretary at noon on Thursday, November 15, 2018. Submissions may be emailed to senate@sfu.ca, but must be followed up by a signed paper submission. These items will be considered by the Senate Committee on Agenda and Rules on Tuesday, November 20, 2018 with Senate distribution on Friday, November 23, 2018. The Senate agenda and papers for this meeting are available on the Senate website at http://www.sfu.ca/senate/agenda.html.

Detailed curriculum papers can be found on Docushare at https://docushare.sfu.ca/dsweb/View/Collection-12682

Rummana Khan Hemani
Registrar

*Questions should be submitted in writing to Rummana Khan Hemani (email khan@sfu.ca) with “Senate Question” in the subject line by Wednesday, October 31st at 9:00 am.
TO: Senate

FROM Andrew Petter
Chair – Senate Committee on Agenda and Rules

DATE: October 25, 2018

SUBJECT: Revised SCUS Terms of Reference

Motion:

That Senate approve the revisions to the Senate Committee on Undergraduate Studies’ (SCUS) Terms of Reference.
MEMORANDUM

ATTENTION: Senate Committee on Agenda and Rules
FROM: Wade Parkhouse, Chair
RE: Senate Committee on Undergraduate Studies
Revised SCUS Terms of Reference (SCUS 18-59)

DATE: October 12, 2018
PAGES: 1/1

Action undertaken by the Senate Committee on Undergraduate Studies at its meeting of October 11, 2018, gives rise to the following recommendation:

Motion:

That Senate approve the revisions to the Senate Committee on Undergraduate Studies' (SCUS) Terms of Reference.
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<td>Associate Registrar</td>
<td>Secretary, Ex-officio (non-voting)</td>
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*Faculty delegates are nominated by the Faculty Dean.*
Terms of Reference

1. Taking into consideration the need for coordination and development of undergraduate programs within the University, SCUS shall:
   a. review and make recommendations to Senate on curriculum changes of a major nature and general matters affecting the curriculum
   b. under delegated authority, review and approve, where appropriate, all proposed new courses, course deletions, course changes and program revisions of a minor nature. These changes shall be reported in summary form to Senate.
   c. review and make recommendations to SCUP regarding new programs and credentials.
2. To recommend to Senate grading, examination, standing and continuance policies.
3. To recommend to Senate policies on undergraduate admissions, re-admissions, and credit transfer and where necessary, to provide general direction to the Registrar's Office in the interpretation of such policies.
4. To consider and decide on policy recommendations concerning undergraduate course registration and course withdrawal procedures and on the administration of undergraduate student records.
5. To consider and recommend to Senate policy recommendations from the Diverse Qualifications Adjudication Committee.
6. To consider and recommend to Senate policy recommendations regarding the WQB requirements.
7. The Committee quorum shall be eight voting members.
8. In the event that the Undergraduate Curriculum Committee Chair representative from a Faculty is unable to attend a meeting of SCUS, the Faculty is authorized to appoint a faculty replacement. [moved from Membership list footnote]
9. The Committee may establish sub-committees.
10. With a two-thirds majority vote, SCUS may delegate some of its powers to such sub-committees, or to the Chair/Vice-Chair. Undergraduate students must be represented on all sub-committees.
11. Committee meetings shall be open, except when addressing matters related to the privacy of individuals.

Meetings convened at the call of the Chair.
MEMO

Date: October 2018
To: Senate
From: Julia Denholm, Dean, Lifelong Learning
Re: 2017/2018 Senate Committee on Continuing Studies Annual Report to Senate

For Senate’s information, please find enclosed the 2017/2018 Annual Report of the Senate Committee on Continuing Studies.

Within Lifelong Learning, the Continuing Studies area offered over 32 programs and more than 400 courses to 6,000 students this year. Over 20 professional associations accept our courses and programs for certification and continuing education. The average age of our learners is over 40. Non-credit education continues to serve students of all ages with flexible learning opportunities on nights and weekends and, increasingly, online.

The Senate Committee on Continuing Studies is responsible to review all non-credit certificates and diplomas offered by the University. On behalf of the University, I would like to thank the members of the committee for supporting this important work.

Julia Denholm, PhD
Chair, Senate Committee on Continuing Studies
Dean, Lifelong Learning
Composition and Mandate

The current membership of the Senate Committee on Continuing Studies (SCCS) is the Dean of Lifelong Learning (chair), Dean of Libraries, two faculty members, two at-large members, one convocation member and one student (see Appendix A). The SCCS meets twice each year (fall and spring) and is responsible to Senate for policy with respect to the overall development of the University’s continuing education credit and non-credit programs. The Committee also reviews, at regular intervals, existing and proposed non-credit programs; develops procedures for the approval of various categories of credit-free instruction; and receives, for consideration and approval, programs proposed as suitable for non-credit certificate and diploma granting status. The SCCS reports its activities annually to Senate. Numbers included in this report are based on the fiscal year 2017/2018.

Actions of the SCCS in 2017/2018

The Senate Committee on Continuing Studies met on October 12, 2017. A quorum was not reached for the planned May 10, 2018 meeting, so approvals were obtained through online vote.

At the Fall 2017 meeting the Committee:
- approved revisions to the Certificate Program for Community Economic Development
- ratified the Annual Report to Senate for 2016/2017
- approved 313 non-credit certificate and diploma graduates

At the Spring 2018 meeting the Committee:
- reviewed the suspension of the following certificates:
  - Business to Business Marketing
  - Digital and Mobile Marketing
  - Marketing Management
  - Visual Analytics
- approved 331 non-credit certificate and diploma graduates

Total enrollments in Lifelong Learning’s credit and non-credit courses are provided in Appendix B.
Appendix A

Senate Committee on Continuing Studies, 2017 - 2018 Members

Judy Smith, Lifelong Learning (Chair)
Gwen Bird, Librarian
David MacAlister, Faculty Senator
Lyn Bartram, Faculty Senator
Stephen Spector, Faculty Member
Peter Ruben, Faculty Member
Tracey Leacock, Convocation Senator
Inman Baharmand, Student
Mikayla Roberts, Alternate Student
MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

RE: External Review of the Department of Biomedical Physiology and Kinesiology (SCUP 18-25)

DATE: October 17, 2018

TIME

At its October 10, 2018 meeting, SCUP reviewed and approved the Action Plan for the Department of Biomedical Physiology and Kinesiology that resulted from its External Review.

The Educational Goals Assessment Plan was reviewed and is attached for the information of Senate.

Motion:

That Senate approve the Action Plan for the Department of Biomedical Physiology and Kinesiology that resulted from its External Review.

c: A. Brooks-Wilson
Paul Kench
MEMORANDUM

ATTENTION: Peter Keller, Chair, SCUP

FROM: Wade Parkhouse, Vice-Provost and Associate Vice-President, Academic

RE: Faculty of Science: External Review of the Department of Biomedical Physiology and Kinesiology

Attached are the External Review Report and the Action Plan for the Department of Biomedical Physiology and Kinesiology. The Educational Goals Assessment Plan is included, for information only, with the Action Plan.

Excerpt from the External Review Report:
"As an overall statement, the Review Committee found BPK to be an “engaged”, high quality program with high quality faculty, staff and students."

Following the site visit, the Report of the External Review Committee* for the Department of Biomedical Physiology and Kinesiology was submitted in April 2018. The Reviewers made a number of recommendations based on the Terms of Reference that were provided to them. Subsequently, a meeting was held with the Dean of the Faculty of Science, the Chair of the Department of Biomedical Physiology and Kinesiology and the Director of Academic Planning and Quality Assurance (VPA) to consider the recommendations. An Action Plan was prepared taking into consideration the discussion at the meeting and the External Review Report. The Action Plan has been endorsed by the Department and the Dean.

Motion:

That SCUP approve and recommend to Senate the Action Plan for the Department of Biomedical Physiology and Kinesiology that resulted from its external review.

*External Review Team:
  Alan Salmoni, Western University (Chair of External Review Committee)
  Peter Backx, York University
  Audrey Hicks, McMaster University
  Wallace MacNaughton, University of Calgary
  Nancy Forde (internal), Simon Fraser University

Attachments:
2. Department of Biomedical Physiology and Kinesiology Action Plan
3. Department of Biomedical Physiology and Kinesiology Educational Goals Assessment Plan

cc Paul Kench, Dean, Faculty of Science
    Angela Brooks-Wilson, Chair, Department of Biomedical Physiology and Kinesiology
Simon Fraser University  
Department of Biomedical Physiology and Kinesiology  
External Review Report

Review Committee:
Dr. Alan Salmon, Western University  
Dr. Peter Backx, York University  
Dr. Audrey Hicks, McMaster University  
Dr. Wallace MacNaughton, University of Calgary  
Dr. Nancy Forde, Simon Fraser University  

External Review Committee 2018 – Terms of Reference

The Review Committee was tasked to assess the Unit (BPK) and comment on its strengths and weaknesses, and on opportunities for improvement. The Review Committee was asked to make recommendations that address major challenges and opportunities.

Specifically, the review process was intended to ensure that:

1. The quality of the Unit’s programs (graduate and undergraduate) is high and there are measures in place to ensure the evaluation and revision of the teaching programs. Some issues to consider include:
   - degree requirements, structure, breadth, orientation and integration of the programs including the cooperative education program and the course offering schedule of the graduate programs;
   - enrolment management issues, student progress and completion, and support for graduate students;
   - educational goals that are clearly aligned with the curriculum and are assessable.

2. The quality of faculty research is high, and faculty collaboration and interaction provide a stimulating academic environment.

3. Unit members participate in the administration of the Unit. Some issues to consider include Unit size, adequacy and effectiveness of the administrative complement and facilities.

4. The Unit’s workplace environment is conducive to the attainment of their objectives, including working relationships within the Unit, with other University units, the community and the Unit’s alumni.

5. Future plans of the Unit are appropriate and manageable.

6. Issues of specific interest to the University and/or the Unit that the Review Committee should consider during the review were:
   6.1. There is a perception among faculty that there has been continuous growth of undergraduate student numbers, but little net change in faculty and resources. Please provide input on how to optimize the use of our resources.
6.2. Do you agree with the proposed plans for hiring the next new research and teaching faculty (and their disciplines) into BPK?
6.3. What more, if anything, should our program be doing to prepare our KIN, BIF and BNEU Majors for future careers?
6.4. Please recommend any strategies to optimize/maximise research funding.
6.5. Do you see value in allowing students to enter the BPK graduate program through an accelerated BSc/MSc?

Review Process

- A site visit was conducted by the Review Committee from March 7th to March 9th, 2018
- During the visit the Review Committee met with the following:
  - Wade Parkhouse, Associate VP Academic,
  - Glynn Nicholls, Director, Academic Planning
  - Dugan O’Neil, Associate VP Research
  - Jeff Derksen, Dean, Graduate Studies
  - Claire Cupples, Dean, Faculty of Science
  - Bal Basi, Coordinator, UCIL
  - Angela Brooks-Wilson, Chair, BPK
  - BPK Research faculty
  - BPK Teaching faculty
  - BPK Undergraduate Program Committee Chair, Richard Ward
  - BPK Graduate Program Committee Chair, Tom Clayton
  - BPK staff
  - Co-op education administrators – D. Bemister (BPK) & S. Tonsaker (SFU)
  - BPK Undergrad students
  - BPK Graduate students

- Prior to the site visit the Review Committee was provided with documentation describing both the internal and external context for the review. Documents included:
  - Terms of Reference (see above) for the external review
  - BPK Self Study Report with appendices
  - Data on SFU Research Grants and Contracts to Academic Departments
  - Faculty of Science Five-Year Plan (2013-2018)
  - BPK faculty CVs
  - SFU Senate Guidelines for External Reviews
  - SFU Strategic Vision
  - SFU Strategic Research Plan (2016-2020)
  - Senior Administrative and Senior Academic Structure Charts

- Following the site visit the Review Committee was asked to file a summary of its detailed findings within 6 weeks of the visit (found below).
Context for the Review and Report

SFU’s Strategic Vision is... “to be the leading engaged university defined by its dynamic integration of innovative education, cutting edge research and far-reaching community engagement”.

Specific goals include:
- Engaging students [to equip SFU students with the knowledge skills, and experiences that prepare them for life in an ever-changing and challenging world]
- Engaging research [to be a world leader in knowledge mobilization building on a strong foundation of fundamental research]
- Engaging communities [to be Canada’s most community-engaged research university]

SFU also in its Strategic Vision commits to several underlying principles.
- Academic and intellectual freedom
- Diversity
- Internationalization
- Respect for Aboriginal peoples and cultures
- Supportive and healthy work environment
- Sustainability

Not surprisingly, the BPK Self Study follows closely from and adheres to these goals and principles. Also not surprisingly, the Self Study finds its place in the Faculty of Science five-year academic plan (2013-2018) and importantly SFU’s Strategic Research Plan (2016-2020). Of note for the Review Committee was how well the Department of Biomedical Physiology and Kinesiology (BPK) seems to not only embrace SFU’s vision and goals, but indeed could be seen as a campus leader in SFU’s Mission. As an overall statement, the Review Committee found BPK to be an “engaged”, high quality program with high quality faculty, staff and students.

An important contextual factor present in several documents was SFU’s statement that the next few years will likely be a period of “consolidation rather than growth” (p.1 of Five Year Academic Plan of the Vice President Academic). Tables 7, 8, and 9 (p.33) of the SFU Institutional Accountability Plan and Report suggest that revenue generated by domestic undergraduate and graduate students has leveled off. As in other institutions in Canada, international students have been recruited to offset at least some of this funding shortfall (see Table 6, p.31). A conservative approach to “growth” is taken in the Review Committee’s recommendations reported below.

Another important contextual factor is the realization that, despite the federal government’s recent budget commitment to fundamental science research, Tri-Council funding will likely become more competitive and perhaps less reliable as a source of consistent research funding (see Figure 2, p. 35 of the SFU Institutional Accountability Plan and Report). Therefore, in spite of the fact that the researchers in the entire Faculty of Science including BPK have been impressively successful in obtaining research grant funding compared to the rest of the University (see Table 1, p.3 of the Faculty of Science Academic Plan 2013-2018), the challenge for research funding will likely increase. An area of growth for research funding would seem to be industry sponsored research (see Figure 2, p. 35 of the Institutional Accountability document). Critically important to what the Review Committee recommends below is the
fact that the Committee learned during their meeting with Dr. O’Neil (AVPR) that SFU has a large number of unused CRC positions available and would like to have them occupied.

Of particular relevance to BPK is the rise in student numbers (AFTE’s) over the past decade with a smaller change in faculty complement (CFL), as validated in Graph 1 and Graph 2 of the Faculty of Science 5-year academic plan 2013-2018 (see also Figure 1 and 2 of the BPK Self Study). This means that BPK has a relatively high student to faculty ratio. The Review Committee notes that this trend is likely not specific to BPK at SFU, but indeed reflects the high popularity of Kinesiology programs across Canada. Importantly, BPK has recently made adjustments that have allowed BPK research faculty to have teaching loads commensurate with the rest of the Faculty of Science.

Also related to student numbers, it is important to note that BPK has had a rather consistent number of graduate students over the past 5-7 years (see Figure 14, p.33 of the BPK Self Study). Recently there has been a strategic increase in doctoral students with an offsetting decrease in master’s level students. The BPK Self Study reports that the research faculty supervise, on average, 2-3 graduate students each. Whereas this number likely varies somewhat across research faculty, this supervisor to grad student ratio seems reasonable (and was seen to be reasonable by SFU’s Dean of Graduate Studies).

Specific Detailed Comments as it relates to the Review Committee’s Terms of Reference

The numbers used below refer to the numbers in the Terms of Reference for the review process (see p.1-2 above). Writing in red indicates specific Review Committee recommendations.

1.0 Quality of the BPK Unit’s Programs

Undergraduate Program

BPK has three degree programs supporting 3 distinct undergraduate majors, KIN (Kinesiology), Biomedical Physiology (BIF), and Behavioural Neuroscience (BNEU). This grouping is not only very unique to Canada, but shows a high degree of innovation on the part of BPK. This also signals a good degree of co-operation among Departments/Faculties at SFU. While many of the core courses are shared across the three programs, there are specialized courses as well. BNEU is most innovative as the degree core program is jointly supported by BPK and Psychology. The implementation of the BNEU program, by necessity, resulted in at least one new faculty position in BPK.

The requirements, structure, breadth and orientation of all three programs seems largely appropriate and of high quality. Evidence of this is the fact that the KIN and BIF degree programs are accredited by CCUPEKA and ACDP respectively. The Review Committee is not aware of a similar accreditation in Neuroscience. All three programs meet SFU’s structure and breadth requirements as well.

The Review Committee noted that enrollment management and degree completion time are significant challenges in BPK. A significant issue is the fact that the department has little to no control over the direct entry students enrolling from secondary school into BPK. This is challenging because there is no certainty on student numbers from year to year (numbers have gone up significantly over the past several years), making long-term course scheduling and planning difficult. The Review Committee recommends that the entrance average from secondary school be similar to that of Kinesiology at UBC, a prime competitor for undergrad students entering from high school. BPK obviously does not want to
be viewed as a second-class program. The Review Committee understands that this will raise the required entrance GPA above that of other departments in the Faculty of Science, as it was reported that UBC’s entrance average is approximately 90%. However, it should be noted that UBC’s entrance average is commensurate with Kinesiology programs in Ontario. There is also a perception that many of the current entering high school students are not of high academic quality. To the degree that this is true, the Review Committee recommends that the continuation GPA be relatively high to ensure that only high-quality students progress to second year. On a regular basis BPK has allowed a significant number of students to enter the programs as internal transfers. BPK views this as a means to ensure high quality students in the program as these internal transfers have a proven university performance record. The process has validity. The Review Committee recommends, however, that BPK take strategic control of the number of internal transfers within the Faculty of Science, as 100 internal transfers per year (a statistic provided to the Committee during its meetings) seems too high given the lack of control for direct entrants from secondary school. An unusually high secondary direct entry number could be offset by a lowering of the number of internal transfers. Whereas there was some resistance to this latter idea in our meetings, the Review Committee thinks a pragmatic approach to student numbers is warranted, particularly in light of the relatively large class sizes in many lower level courses and the frequent comments made about “high” teaching loads by BPK faculty.

The Review Committee did not spend a significant amount of time discussing the educational goals as they align with the curriculum, except to note they are a work in progress and highly relevant to the future of the programs. There was some discussion of a curriculum mapping process that is also ongoing to ensure that progression through the program follows a logical course and that there is not undue redundancy within courses. For example, in the meeting with the undergrad students they mentioned that much attention is paid to ion channels in several courses, due to the overlapping interests of research faculty running these courses. The Review Committee also heard that some upper level electives are very specialized (e.g., an entire course on ECG). The Review Committee heard from faculty that there is a need for “capstone” courses at the end of a student’s program. All these comments are important and valid considerations. To deal with these and all related curricular issues, the Review Committee strongly recommends that the educational goals and mapping exercises be accelerated with a completion date of early 2019. The Committee appreciated the section in the Self Study that deals with teaching innovation (pp.39-41) and the close ties with SFU’s teaching support (Dr. Cindy Xin). Also appreciated was the idea of the “Teaching Circle” to continue the dialogue amongst professors as it relates to teaching innovation. This dialogue is particularly important for new faculty hires. There is, however, no evidence that there has been an attempt to strategically infuse these practices. It is obvious that the content of the courses as well as the teaching process are important. Critical thinking was mentioned frequently, but it was surprising to the Review Committee that there was little mention of teaching innovative/creative thinking. Many real-world problems require significant innovative thinking for solutions. If universities are to produce tomorrow’s leaders as most claim, then creating innovative/creative thinkers seems essential. Dr. Finegood’s involvement in the Semester for Dialogue program at the downtown campus begins to address this issue. However, the Review Committee recommends that infusing creative/innovative thinking more broadly into the educational goals be considered critically important during the educational goal setting process.

Obviously, because of its position in the Faculty of Science, the BPK programs have a considerable number of base-level “science” courses. Whereas this may be ideal, it may be practical to consider whether this number can be scaled back. There was acceptance of this idea by the undergrad students we interviewed, but push back from some faculty when we suggested reducing the Calculus content, for example. One reason to consider some flexibility here is the fact that Anatomy is a third-year course in
the KIN program, whereas in many Kinesiology programs this offering occurs as a lower level course. The Review Committee recommends moving Anatomy to second year, as anatomy is conceptually necessary in many upper level BPK courses. It is also common practice in other kinesiology programs to count anatomy as a “science” course. Reducing the number of base level science courses may make additional space for upper level electives in and outside of BPK. Many kinesiology programs in Canada feel a good number of open electives is educationally critical. The Review Committee recommends that serious attention be paid to scaling back some of the program requirements, thus adding more flexibility for open electives. Pragmatically this would provide reduced student pressure on upper level BPK electives. This move would also help with upper level course scheduling, a significant challenge mentioned by the undergrad students interviewed.

Several faculty (research and teaching) expressed the desire for undergraduates to gain more “hands-on” experience in research labs, and an increase in “experiential learning” overall. While the Review Committee agrees with this, particularly as it relates to future grad student recruitment and increased employment options post-graduation, it is understood that available places in research labs and supervisor time may be limiting. Nevertheless, the Review Committee recommends that the Department explore ways to increase undergraduate opportunities to gain lab-based research experience. The accelerated bachelors program may be a vehicle to do this.

The Review Committee also identified challenges confronting undergraduate students in navigating and ensuring course availability. In fact, it seems likely that the long time to graduation in the undergraduate program can be traced, at least in part, to difficulties in the enrollment into either core required courses or courses that students wished to take.

Co-op Program

While producing many curricular challenges for the department and the students, the Co-op program is clearly a strength of BPK with 52% of the students electing to participate. This experience provides students with a significant educational addition to their classroom experiences plus valuable job experience and career direction. The fact that students can elect this experience in any semester is a wonderful opportunity and a huge challenge for all stakeholders. For example, the academic advisor often has a feeling of being overwhelmed with student inquiries (see strong recommendation below). Most significantly, the successful Co-op program in BPK necessitates the offering of core courses during all three semesters, particularly in KIN. Because BPK leads SFU in co-operative student experiences it likely also explains why BPK has a high ratio of teaching to research faculty and the departmental “enthusiasm” for Centre for Online and Distance Education (CODE) courses.

In our discussion with D. Bemister and S. Tonsaker, the Review Committee learned that the Co-op placements for KIN majors are thriving/exemplary, whereas the BIF placements need concerted effort to match the KIN success (It was noted that the KIN Co-op has been in place considerably longer than for the other two degree programs). Work to identify BIF and BNEU placements is underway and was noted to be very challenging by D. Bemister. The Review Committee also learned that some faculty believe the community-based Co-op placements can produce important research opportunities for students and research faculty. Given SFU’s mission to be a research-intensive, community-engaged institution, this observation seems critical. The Review Committee suggests that the search for new and innovative Co-op placements could/should be viewed as a creative process to identify unique research opportunities, but also a means to identify new, never-before-thought-of jobs/careers for BPK students and graduates. Lululemon and Forteus, as well as hospitals in the region, were examples mentioned by research faculty.
The Review Committee supports the request to make the 0.5 Co-op Career Advisor a full-time position. The request seems entirely consistent with student need and government pressure on post-secondary institutions in Canada to be “career relevant”.

Graduate Program

As supported by our discussion with Jeff Derksen, Dean of Graduate Studies and our own audit of the graduate program in BPK, as well as a visit to two research labs, our overall assessment is that the graduate program is of high quality. Both the MSc and PhD seem well conceptualized and run with excellent research facilities. Of particular note, was the significant success of BPK graduate students in obtaining scholarships (data supplied by the Dean of Graduate Studies). This success is to be commended.

There were, however, some important issues and opportunities uncovered during discussions with stakeholders. Perhaps spawned by the lengthy time to completion in the undergrad program, the time to completion in the MSc program was judged by the Review Committee to be excessive (8 semesters on average is too long, 6 on average being optimal). The time to completion seems to be driven by BPK supervisor expectations and extended funding by them beyond 6 semesters. The Review Committee suggests BPK discuss this issue, led by the Graduate Program Committee Chair to consider ways to shorten this time line. For example, we learned in our interview with the BPK graduate students that some MSc students complete as many as three research studies during their MSc thesis work. This seems excessive. It is noted that this number may change with the accelerated MSc/PhD.

Some discussion centered around graduate course offerings as a workload challenge and a professor involvement issue. The BPK Self Study (p. 36) presents the possibility of developing modularized graduate courses. In our discussion, the Committee learned from Nancy Forde that the Physics Department at SFU is considering the same thing and indeed has proposed developing 1-credit modules. This strategy seems to have much merit and indeed may have merit across the Faculty of Science at SFU. One-credit modules across the Faculty of Science would allow for a tailoring of a graduate student’s courses to their individual needs, add educational flexibility, and potentially reduce course burden in any one department, while giving each research faculty an opportunity to be involved in teaching graduate courses. The Review Committee strongly recommends that this idea be aggressively explored, perhaps initially with discussions between BPK and Physics.

Supervision issues consumed most of the Review Committee’s two interviews with BPK graduate students, as this was seen as a pressing issue by them and definitely generated a good degree of emotion during the discussions. Three issues were most prominent. First, many graduate students reported working well beyond the suggested hours a week in their TA assignments, even though a maximum commitment is mandated in the graduate student collective agreement. The second issue identified by the graduate students was the supervisor-student working relationship. Whereas most supervisor-student relations are working well, some have fallen off the rail with no remediation seen to be open to the students. Several students seem to be remiss in having an annual supervisory committee meeting, and some reported distinct difficulties in having regular contact/interaction with their supervisor. Third was the low level of financial support, relative to the high cost of living in Vancouver. The Review Committee makes three strong recommendations to address these issues.

- The TA hours of work in any one term must honour the collective agreement, and these hours need to be tracked by the Department Chair. This is a workload issue for the graduate students (potentially affecting time to completion) and the department.
• A comprehensive contract between the supervisor and graduate student must be developed/improved (the committee learned from the Grad Program Chair that a contract exists, but was unknown to the 7 graduate students interviewed, and its use was not enforced by the Department). The contract must outline student and supervisor expectations and responsibilities including funding for students. Most importantly, the contract process must be monitored carefully by the department, particularly in the early stages of a student-supervisor relationship, and should be revisited annually by the student and supervisor. In addition to the contract, an official milestone strategy would facilitate time to completion of requirements such as thesis proposals.
• The University and BPK must increase their financial support of graduate students to remain competitive, to limit the need for students to seek outside employment opportunities in order to pay their bills, and to attract the best graduate students internally and externally.

Mentoring of young inexperienced supervisors could undoubtedly play a significant role in the BPK graduate program. If not already in place, the Review Committee recommends that a supervisor mentoring program be standardized for new research faculty appointments. The department may want to refer to a recent article in University Affairs about graduate student supervision (www.universityaffairs.ca/April2018, page 48). Of relevance may be the suggestions about departmental discussions of such issues and the training program for supervisors developed at Memorial.

2.0 Quality of Faculty Members Research

As judged by the Review Committee and supported by AVP-R, Dugan O’Neil, the quality and quantity of BPK publications and grants is high. Data received from Dugan O’Neil places BPK third among Faculty of Science departments in Tri-Council funding from 2011-2017. **BPK is to be commended for such strong performance in the face of declining national success rates in Tri-Council competitions.** Almost all research faculty (20 of 23 listed in the Unit Biographies in the Appendix) are well or relatively well funded. Only 3 research faculty are presently unfunded. The SFU data also suggest that this strong performance has been sustained for some time. A significant dip in grant funding seen in the 2012 to 2013 period (see Fig. 4 and 10 in the Self Study document) was suggested to be the result of the cessation of one researcher’s very sizable non-profit supported grant. Otherwise, the funding has been relatively consistent with the possible exception of more recent CIHR funding. The number of publications shows (Fig. 12 in the Self Study) steady increase over time as well. A perusal of journals within the publications outlined in the Appendix to the Self Study also suggest good quality/impact. The obvious question is how to maintain or expand this productivity.

In discussions with research faculty in BPK the Review Committee learned that the collaborative efforts inside and outside of the department are strong, including collaboration beyond SFU (see also pages 42 and 43 of the Self Study). This strong collaboration includes both younger and older, established researchers in BPK.

While the research clusters described on pages 21-22 in the BPK Self Study appear conceptually appropriate for the research faculty and SFU’s strategic research areas, leadership of these groups was less obvious. Explicit leadership in these groups would ensure cross pollination within and across the five clusters as well as outside the unit. Many/most research teams organically evolve but stimulating opportunities including leading team grants and providing an internal climate for collaboration is helpful. Spawning relationships across campus and into the community benefit from the mentoring and experience of established researchers. For example, Glen Tibbits seemed to us to be a leader in the
Cardiovascular Physiology Group and he outlined exciting initiatives that would expand collaborations and research opportunities thereby making BPK a centre for innovative and impactful research. Other less senior BPK faculty also have exciting research programs that could be strengthened by providing opportunities for leadership development and expanding funding opportunities. The Review Committee recommends that a leader of these groups be formalized, perhaps forming an ad hoc committee whose role would be to spawn cross pollination and strategic cooperation within and across clusters and beyond.

A significant concern voiced by some research faculty was the apparent disconnect in communication links from upper management down to the department and individual researchers level. When meeting with Dugan O'Neil, the Review Committee learned of the significant number of unfilled CRC positions, SFU Innovates, and the Community Trust Endowment Fund. When the Review Committee shared this information with research faculty in BPK the reaction was, “this is news to us”. It is obvious for the Review Committee to suggest improving communication amongst important research stakeholders at SFU. On a positive note, Dugan O’Neil identified several initiatives to address this issue and to ensure all researchers are able to take advantage of SFU seeding opportunities. These initiatives combined with strengthening leadership are seen as imperative for the growth and impact of research activities within and beyond BPK.

On a related note, faculty researchers remarked on the extensive support for CFI proposals and implementation of successful applications, including great support from the Dean of the Faculty of Science. All of this was sincerely appreciated. There was some disagreement among research faculty as to whether other research support was optimal. Strategic support of young/first-time grant applicants was acknowledged by the Dean and BPK researchers. If possible, further support beyond that described above would also be appreciated. One research faculty, for example, would appreciate help finding appropriate funding opportunities. This also seems likely to be improved by the AVP-R initiatives discussed. For example, the Committee learned from Dugan O'Neil of the new technology/industry services being planned, well beyond the existing support (e.g., patent application).

An oft-mentioned comment from research faculty was the fact that departmental meetings are dominated by discussions around undergraduate teaching. One research faculty member suggested that, as it relates to departmental meetings, grad studies and research are treated as “add-ons”. This sentiment was relayed to the Department Chair. The Review Committee recommends that this bias at departmental meetings be curbed by starting many meetings discussing research initiatives and issues related to the graduate program. Perhaps a report on new initiatives and opportunities by the leaders of the research clusters described above would be a good fixture in the meetings.

As many administrators and the Review Committee noted, a “bums-in-seats” tone was noted in the Self Study. We were informed that the instructions for the Self Study directed that a financial argument must be provided for any new resources (thus the bums-in-seats tone). This tone was problematic because SFU Administration, including the Dean, indicated to the Review Committee that a strong research-based rationale was more important or equally important when arguing for new research faculty hires. The Review Committee learned that the VP-A was responsible for hiring decisions. The Review Committee felt that it would be helpful if the VP-A and VP-R coordinate their messaging, particularly since it seemed to the Committee that the best argument for research faculty was facilitation of BPK’s and SFU’s research mandate, including CRC chairs. Requests for CRC chairs would be a good example of the “tone” suggested for new research faculty hires. This commentary is revisited below under new faculty hires.
Current research facilities were noted to be adequate presently. Future growth will likely outstrip present research space. However, a new Life Sciences building was mentioned by the AVP-R as the number one SFU building priority. Clearly this will be a significant opportunity for BPK research infrastructure.

3.0 Unit Members Participation in the Administration of the Unit

The primary governance of the unit is directed by several committees mandated in the Department’s constitution:

- Committee of the Whole
- Undergraduate Program Committee (UPC)
- Graduate Program Committee (GPC)
- Tenure and Promotion Committee

Two other ad hoc committees are also listed:

- Search committee for Staff
- Search committee for Faculty

The primary administrators are the Chair of the Department as well as Chairs of the Undergraduate and Graduate Program Committees.

Whereas the Committee of the Whole is comprised of most members in the department, the other committees have smaller sizes/representation. These committees have adequate student representation and voting privileges. A perusal of the departmental biographies in the Appendix suggests that most faculty serve on at least one committee either within the department or within the Faculty of Science or University at large (e.g., animal care, grant review panels like CIHR). Several faculty play significant roles on university-wide committees. Very important to note is the fact that several faculty members serve on Tri-Council (e.g., CIHR) and other major funding agency (e.g., Heart and Stroke Foundation) scientific review committees. While noteworthy, it is important to continue this latter participation if BPK wants to be seen as active partners in the research mission of these agencies, and to maintain a presence at the national level. Understandably the participation of staff on unit committees is less than that of the research and teaching faculty, but there is no doubt that staff play an integral role in the management of the department and are well respected for doing so.

A critical aspect of the administration of the department are the faculty members who agree to take on administrative roles within the department (e.g., Chair). The Self Study document mentions specifically “succession planning” for administrators like the Chair (see page 8 of the Self Study). The Review Committee strongly encourages this succession planning to continue as it is critical to the life of BPK. Explicitly targeting associate and assistant positions to mentor new administrators for the future ensures continuity of governance, but also ensures that new hires do not have to be used to hire administrators. If an internal appointment strategy is to be used, it will be critical to ensure administrators are given the opportunity to maintain at least a minimal research program while being an administrator. The Review Committee suggests that team grant participation in the identified research clusters is a vehicle for this strategy of ensuring that faculty taking on significant administrative roles stay active in research. This approach will also ensure that department leaders have active research programs to return to once their administrative appointments expire. Three-year terms for chairs appears reasonable in the above model.
Overall, the review panel felt that there are really no issues here, as BPK appears to be very efficiently run and morale and collegiality appears strong (e.g., there were no issues raised and much praise offered for departmental co-workers).

4.0 Unit’s Workplace Environment

The workplace environment appears to be quite positive based on the fact that teaching evaluations are strong and research productivity is high, relative to other units in the Faculty of Science and other units in the University. In a recent survey (see Self Study pp. 57-58) 90% of faculty and staff reported the workplace to be collegial and 86% reported the atmosphere has improved compared to five years ago. There is a high degree of trust and confidence amongst faculty and staff and this certainly came across in our departmental interviews.

A slightly more restrained interpretation of the data seems warranted when considering some of the other comments from the survey. There is an indication of very committed and passionate faculty and staff (p.56, first paragraph, “indeed, BPK committee work is the subject of considerable passion”) and the Review Committee sensed this passion on more than one occasion. This suggests significant physical and emotional energy are being interjected into the Unit’s mission and this is to be very highly commended. The caveat to this enthusiasm is the fact that this same commitment can also lead to burnout, as suggested in the Self Study document (see the bottom of p.57 and the top of p.58 that address workload, life balance, and burn out). In this section it was reported that, “46% don’t feel they can reasonably balance the demands of work and personal life and 53.9% feel they don’t have energy left at the end of most workdays for their personal life”.

A good example of the contrasting views is the section in the Self Study that reviews the wonderful work on “Internal and External Alliances/Partnerships/Collaborations and Internationalization” (pp42-43). BPK faculty and staff are to be highly commended for their work here. In contrast, however, is the likelihood that the more successful this enterprise is, the more effort that is expected. Indeed, excessive work becomes normative. For example, whereas these alliances are essential to the research, teaching and innovation mission of the unit, the development and maintenance of alliances is undoubtedly stressful and energy demanding. In short, an “engaged university” has its down side, particularly for committed and passionate faculty, staff and students.

Some degree of this stress is undoubtedly “self-inflicted”. We heard from many instructors that the increase in class sizes has significantly increased their workload (and/or that of TAs) due to the time needed to grade written assignments/papers/exams. When questioned whether there was room to maybe limit the number of written assignments in these large classes we were often given the answer that this would negatively affect the quality of the class. In these situations, to preserve work/life balance perhaps pragmatism might need to outweigh idealism. Life balance is certainly something addressed in BPK courses in health and to a significant degree this is a self-management issue. On the other hand, the Unit and particularly the Chair must set a tone/culture that makes life balance a priority for faculty and staff (and students) and balance is expected to be normative behaviour. It can easily be argued that BPK employees should be (life balance) role models for the university at large and BPK students in particular. Since many BPK graduates will also be intimately involved in the same challenges for clients they need to imitate healthy practices and learn to be role models themselves. The Review Committee recommends that an ad hoc committee be struck that studies these burnout and life balance issues and makes recommendations on effective countermeasures.
The Review Committee recognizes and applauds the BPK Mental Health and Wellness Committee and its work, particularly as it relates to undergraduate and graduate students. As reported in every university in North America, the undergraduate and graduate students in BPK vocalized a significant degree of stress and anxiety. The Review Committee strongly recommends this committee continue its work and that the department discuss ways to infuse proactive sound mental health strategies into its curriculum. Talking about mental and physical health and participating in active, balanced living is essential.

5.0 Future Plans

The Review Committee found the future plans to be generally logical and valid. Some of the plans were, however, somewhat abstract in their description. In our review of the self-help document sent to departments to guide a departmental self study, it appeared that BPK had followed the guidelines. It was surprising that there was no explicit (roughly process and outcome) evaluations added to the BPK plans (nor could this suggested format be found in the self-help document). The Review Committee suggests that consideration be given to the inclusion of plan evaluation be added to the self-help guide. Tracking success of plans seems obviously critical to their accomplishment.

BPK Long-Term Goal 1: To systematically collect data from BPK Alumni at multiple time points to track their career paths and analyze and interpret the data to inform curricular scope.

The Review Committee learned that the Alumni office at SFU is not extensive and likely could not provide much support for the proposed work. It was also noted in our discussions that many of the Co-op placements are with BPK alumni. In light of this fact, the Review Committee does not recommend allotment of resources (time and money) to the tracking of BPK alumni (proposal found on page 54 of the BPK Self Study). This exercise will undoubtedly be very time consuming and not likely successful. Instead, we recommend that the department work closely with D. Bemister and S. Tonsaker to harvest similar information from co-op worksites. These sites can obviously identify (and likely has) job and career preparation shortcomings, as well as future opportunities. It is also recommended that the Chair of BPK sponsor regular meetings between Co-op staff and BPK faculty/staff (e.g., twice per year) to discuss opportunities, information collecting strategies, and other symbiotic initiatives. To further inform curricular decisions (and to capture those students that do not elect to do co-op) it is also recommended that the Department initiate an annual exit survey of their graduates.

BPK Long-Term Goal 2: Maintain and build research strength in human health across the lifespan.

A weakness of the description in the Self Study on page 46 in this area appears to be in its conceptualization. Lifespan health is clearly not just people studying health of different age groups from children to older adults. Challenge 3 in SFU’s Strategic Research Plan 2016-2020 appears to take a developmental approach, particularly as it relates to prevention. It is noted that, although four of the five clusters described in the BPK Self Study are connected to aging, a “lifespan approach” is not explicitly mentioned in the clusters. The Review Committee feels that addressing lifespan health successfully would require significant new hires. Directed recruitment in this area would require a significant (likely unfeasible) commitment of resources in order to achieve the critical mass necessary to ensure success and impact in this area. Developing expertise in “lifespan health” is more likely to be achieved through collaborations or adjunct and cross appointments of researchers from other units.
BPK Long-Term Goal 3: Continue to build our considerable research strength in the area of technology and innovation.

There is no question this is an important direction to take given the existing momentum and given SFU’s Strategic Research Plan 2016-2020 (Research Cluster 2). This area may be ideal for a Tier 1 or 2 CRC appointment to BPK or to another department in the Faculty of Science with a cross appointment to BPK. Professors Max Donelan and Andy Hoffer can play leadership roles in this initiative, as can others noted on page 23-24 in the BPK Self Study.

Since this initiative aligns with SFU’s Research Cluster 2, there are undoubtedly many researchers in many departments with expertise in this area. The Review Committee therefore suggests that a research leader in BPK be appointed to explore relationships across SFU to build capacity. Clearly research synergies on and off campus are SFU’s long-term goal.

BPK Long-Term Goal 4: Strengthening existing areas of interdisciplinary research excellence by increasing the use of SFU resources such as those related to Big Data.

In discussions with research faculty, it seemed clear that interdisciplinary research is occurring within research clusters and through the collaborations that BPK researchers have established within and outside SFU. Most interdisciplinary studies are centered around complex conceptual issues or real-world problems. Department members are encouraged to continue to seek and solidify these relationships and to seek out the platforms being developed at SFU (and beyond). For example, interdisciplinary research seems comfortably housed in a Big Data framework. The question is whether future recruitment of research faculty should target scientists that have expertise in analyzing big data or expertise in neuroscience or health device innovation, etc.

BPK Long-term Goal 5: Continue to build engagement with community partners.

This goal seems reasonable for an “engaged university”, the nature of the BPK academic program, the BPK co-op program, and the externally driven research engagement. The Review Committee agrees there is considerable departmental momentum in this area. The Co-op program and the community-centered research seem natural vehicles for continued evolution. The Department is encouraged to work closely with the Office of Advancement to identify areas for community engagement and philanthropy to help develop projects, programs and platforms in the future.

6.0 Issues of Specific Interest

6.1 Unit Growth over the Past Decade

As mentioned above, the Self Study document presented a tone of bums-in-seats to justify new hires. Whereas the growth in student numbers is clear, the Dean of Science feels strongly that BPK, relative the other departments in the Faculty, has benefitted significantly from new hires in the past 7 years. The terms of reference for the review asked the Review Committee to provide input on how to optimize current resources. As reported above, the Review Committee has made several recommendations to control student growth and to gain curricular efficiencies. The Review Committee feels a pragmatic approach to student entry and course offerings can significantly alleviate some workload issues. In addition, the Review Committee discussed with some faculty members the idea of designing
pedagogical strategies to reduce faculty, and perhaps TA, workload. The Review Committee recommends the creation of an ad hoc committee to discuss and make recommendations on methods to optimize teaching strategies and pedagogical methods. Collaboration with Dr. Cindy Xin is an obvious suggestion.

6.2 Future Hires

The Review Committee categorically endorses the replacement hires for retiring/exiting BPK lecturers. The undergraduate teaching mandate of BPK cannot be maintained without this sustained support. The lecturers are in many ways the lifeblood of the BPK undergrad program and viewed by the Review Committee as a huge asset. Whereas the Review Committee is less clear on the optimal ratio of lecturers to research faculty, the current number of lecturers seems to be working well. The Review Committee sensed a significant amount of enthusiasm from this group when we met and also learned that many of them fill a research role in addition to their teaching. Indeed, some lectures have been named investigators on research grants and/or publications.

To not place the next suggestion at the bottom of this list, the Review Committee strongly recommends the hire of a second full-time academic advisor. Both the undergrads and the current academic advisor we met with affirmed that this was an urgent need. The Review Committee notes the complexities of the course scheduling around the Co-op program as a major impediment to yearly student planning and may be at least partially responsible for the slow undergraduate time to completion. Face to face meetings are the only effective ways to solve these complexities for many students. An additional person in that office will also free up some time to develop some online resources for students to assist them with their academic planning (e.g. program progression maps).

Whereas the Review Committee endorses the hiring of at least one new research faculty (and certainly replacements of future retirees) this is a more difficult aspect to comment on. We agree with the Department that the hiring a new exercise physiologist was highly desirable, particularly as it might bridge the physiology and kinesiology mandates of the Department, but the potential impact of this new position and how it might fit within the BPK clusters was only superficially described. Indeed, this same comment could be made for all the research faculty hires suggested in the Self Study (see some more specific suggestions in the discussion of long-term plans above). This lack of detail was at least partially the result of the bums in seats tone and the apparent miscommunication from SFU administration discussed above. The Review Committee recommends the Department clarifies the strategic rationale for new research faculty hires using research-based arguments within and outside BPK. The Review Committee strongly recommends that serious consideration be given to employing unfilled CRC chairs (see above in long-term planning comments) in the arguments presented. This latter strategy will require discussions with the Dean and the VP-R.

6.3 What more can be done to prepare the KIN, BIF, and BNEU majors for future careers?

Since the Review Committee saw the Co-op program as exemplary, much less attention was paid to this question (see comments above under “Co-op”). As already discussed above, alumni surveys were not supported as a vehicle to do this. Coordination with SFU Co-op and the implementation of graduate exit surveys was a suggested alternative for data collection.

Whereas BIF and BNEU co-op placements represent a significant challenge, as noted above, they also represent a great opportunity. Creating new, innovative co-op experiences will be a highly valuable
enterprise. Although this work may take some time, it seems highly doable given the tremendous past success, particularly in KIN. In the long run this effort will not only create valuable placements, but will spawn innovative career possibilities.

One suggestion the Review Committee could make is to move the soft skill training provided to students taking advantage of co-op experiences to all students. Indeed, since these are leadership skills (e.g., communication) it is easy to argue that these skills should be part of every BPK student’s academic training. Similar to the certificates provided for completed co-op placements, a certificate strategy could be developed for “soft skills” training.

6.4 Recommended strategies to optimize/maximize research funding

While the current level of research funding is admirable and indeed likely matches or exceeds many kinesiology-specific departments across Canada, comparisons are difficult. In addition, Dugan O’Neil reported BPK research productivity to be excellent (see comments above under “Research”). Since maximizing research funding implies that (more) money is a quality marker, which may or may not be true, the Review Committee suggests the following strategies for optimizing research funding.

- Whereas administrative research support from the Faculty of Science and above (e.g., support for writing CFI grants) is excellent, there was a sense from many BPK research faculty that more support would be beneficial, particularly around applications for grant funding.
- It would be helpful to sharpen the mentoring process for young researchers in BPK.
- The Review Committee learned of many great initiatives to spawn new research at SFU (e.g., SFU Innovate, Community Trust Endowment Fund). We also learned of the 10-12 unfilled CRC positions at SFU. Most of what the Review Committee then reported to the Department Chair and research faculty with a strikingly lack of awareness in BPK! The Review Committee strongly urges SFU Research and the Faculty of Science to expand and improve timely communication links down to the Departments and individual research faculty. This information is clearly essential to all research stakeholder for future research productivity to be maximized.
- Many BPK research faculty have been exemplary in forging research connections with other researchers across the SFU campus and externally, however, this is not true of all BPK research faculty, particularly some of the younger, inexperienced scientists. The mentoring process mentioned above would help in this regard, however, there could be more support provided at the departmental level. While five BPK research clusters were identified in the BPK Self Study, no leader and leadership process was identified for each cluster. The Review Committee also learned that some of the clusters are “lead” by junior researchers. A leader model and process should be identified by BPK with regular meetings designed to facilitate research ideas. It was reported to the Review Committee that there was little opportunity to discuss research at departmental meetings and elsewhere. Research leadership and discussion need to be much more prominent in the daily life of the department.

6.5 Accelerated BSc/MSc

There was significant support amongst research faculty to implement the accelerated BSc/MSc. In addition, the Review Committee heard support for the idea by SFU upper management. There were several perceived advantages including:

- A means to attract some of the brightest undergrads in the BPK program to a potential research career.
• A means to make up for a decrease in the number of MSc students produced with the accelerated MSc-to-PhD transition program recently implemented in the grad program as a way to attract doctoral students (which was successful). This strategy requires that undergrad students have access to a supervisor for an undergrad research thesis. Currently there are 10-12 students engaged in these courses. It was anticipated that this number will be sufficient to accommodate the demand for the accelerated BSc/MSc.

• The Review Committee supports the implementation of this new strategy with a caveat. The Self Study document cites the capacity of research faculty to host undergraduates in their research lab as a limiting factor in taking on more undergraduate students for an Honours thesis. We also heard from one faculty member that the percentage of Honours thesis students who move on to graduate school is actually relatively small (~10%). It would seem that strategies should be developed/implemented to increase the pool of undergraduate thesis students if this accelerated BSc/MSc option is to be effective.

• The current number of grad students per faculty (2-3) and total number of grad students in the program was judged by the Dean of Graduate Studies to be adequate at the current level. Increasing the number of grad students assumes there will be enough grant support by individual faculty to support these extra students financially. While this may not be doable for all research faculty, it appears this extra funding will not be problematic for some of the better funded researchers. In this light the Review Committee supports the idea, with a suggested review of the strategy in five years.

Concluding Remarks

It is clear to the Review Committee that BPK is in very good shape. The faculty, staff and students are vibrant, passionate about, and good at what they do. While we have made several suggestions, they are not major, as indeed there is nothing major that needs remedied. It was an extreme pleasure to do this work and the committee members appreciated the great cooperation and kind hospitality shown by all at SFU!

Alan Salmoni
Audrey Hicks
Peter Backx
Wallace MacNaughton
EXTERNAL REVIEW – ACTION PLAN

Section 1 – To be completed by the Responsible Unit Person e.g. Chair or Director

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<th>Unit under review</th>
<th>Date of Review Site visit</th>
<th>Responsible Unit person</th>
<th>Faculty Dean</th>
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<td>Biomedical Physiology and Kinesiology,</td>
<td>March 7-9, 2018</td>
<td>Dr. Angela Brooks-Wilson (Dept. Chair)</td>
<td>Dr. Paul Kench</td>
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<td>Faculty of Science</td>
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Notes

1. It is not expected that every recommendation made by the External Review Committee be covered by this Action Plan. The major thrusts of the Report should be identified and some consolidation of the recommendations may be possible while other recommendations of lesser importance may be excluded.

2. Attach the required plan to assess the success of the Educational Goals as a separate document (Senate 2013).

3. Should any additional response be warranted, it should be attached as a separate document.

1. PROGRAMMING

1.1 Action/s (description what is going to be done):

1.1.1 Undergraduate:

a) Plan and propose measures to control the number of BPK undergraduate students.

From the External Review report: “The Review Committee noted that enrollment management and degree completion time are significant challenges in BPK. ..... This is challenging because there is no certainty on student numbers from year to year (numbers have gone up significantly over the past several years), making long-term course scheduling and planning difficult.”

We will plan measures to better match the volume of students to BPK teaching capacity in order to maintain the high quality of the undergraduate programs and limit course access issues. This will include analysis of measures such as increasing the entrance average from secondary schools and maintaining relatively high continuation and internal transfer GPAs. We will work with the Dean of Science and others to adopt an approach that will help achieve better balance for BPK while still meeting the Faculty of Science enrollment targets.

b) Develop educational goals and conduct course mapping to inform potential revision of curricula.

We will develop Educational Goals, conduct course mapping and use this to inform curricular renewal. This process will include consideration of experiential learning, innovation and critical thinking skills.

c) Indigenization

We will contribute to SFU’s goal of having culturally safe and welcoming spaces by discussing with the Office of Aboriginal Peoples how to make BPK spaces welcome to Indigenous students. We will show welcome to potential Indigenous students by holding events such
as a tour of BPK. Faculty members and staff will be encouraged to take the Student Services’ San’yas Indigenous Cultural Safety Training Program, and Faculty members will be encouraged to take the SFU ‘Decolonizing Teaching’ course.

1.1.2 Graduate: Graduate program related objectives will be led by the BPK Graduate Program Committee (GPC).

a) Examine factors influencing MSc time to completion.

The GPC will analyze the distribution of MSc degree lengths and will consider the factors influencing it and potential ways to achieve faster completion, while maintaining appropriate standards. Factors to be considered include changes to graduate courses (for example, modular graduate courses are a possibility) and time spent as Teaching Assistants.

b) Develop a contract for expectations and responsibilities between graduate supervisors and graduate students.

The contract will include funding and duties of the graduate student and supervisor.

c) Conduct a systematic assessment of the funding of BPK graduate students in all labs.

Financial information from online graduate student progress reports will be individually checked with students.

1.2 Resource implications (if any):

- Additional advising capacity (+1.0 Undergraduate Advisor) was recommended by the External Reviewers, and is required to support current and future BPK students.

1.3 Expected completion date/s:

We expect to complete these goals within 3 years.
2. RESEARCH

2.1 Action/s (what is going to be done):

a) Work with the Faculty of Science and VP Research office to propose to strategically build research capacity in technology and innovation in the area of wearable technology in exercise physiology.

One way to build in this important area would be through designation of a CRC Chair, as well as through new Assistant Professor level hire(s). One senior and one junior hire would be ideal to achieve this goal. Such researchers would benefit from joining a department with strong and varied kinesiology and physiology research at the cellular, systems, organ and whole-body levels as well as expertise in innovation, including the founding of successful biotechnology companies. This would augment SFU’s already strong research / innovation context and provide critical mass to contribute to SFU’s positioning as a leader in wearable technology.

b) Seek opportunities to build research strength in Neuroscience to enhance the growing neuroscience emphasis across SFU on multiple campuses.

A CRC Chair would be one possible funding source to contribute to this goal, or alternatively a new Assistant Professor position. We will work with the Dean of Science and VP Research office to further this goal.

2.2 Resource implications (if any):

Resources that would allow achievement of goal 2.1a could include, for example, a CRC Chair and 1 junior researcher hire in the area of wearable technology and exercise physiology.

Resources that would allow achievement of goal 2.1b could include, for example, a 1 CRC Chair hire (or new Assistant Professor) in the area of neuroscience.

New hires would be associated with research program-specific startup and renovation costs. New hires would be housed in existing BPK space.

2.3 Expected completion date/s:

Dependent on timing of availability of resources such as CRC Chair allocations and new faculty hires.
3. ADMINISTRATION

3.1 Action/s (what is going to be done):

a) To inform future curriculum planning, analyze data from co-op employers on student gaps and strengths, and continue an annual exit survey.

The co-op program carries out ongoing data collection on student performance via employer and student evaluation forms and site visits. This data will be analyzed for indicators that may inform curricular planning. The department will continue to carry out a yearly exit survey, and analyze it for graduating students' perceived curricular gaps.

3.2 Resource implications (if any):

3.3 Expected completion date/s:

Yearly.

4. WORKING ENVIRONMENT

4.1 Action/s (what is going to be done):

a) Add structure to the existing mentorship program for young research faculty.

Currently, each Assistant Professor who wished to participate has had two successfully funded veteran researchers agree to mentor him or her. Going forward, we will (with input from young faculty members) develop a list of aspects of faculty life for which new faculty need mentoring, for example, strategies for: grant applications, collaborations, publishing, and in particular selection of and mentoring of graduate students and development of their projects. Veteran researchers who are particularly adept in a certain area will be called on to provide mentorship.

b) The BPK Mental Health and Wellness Committee will continue its important work.

To date, the BPK Mental Health and Wellness Committee has focused on student mental health and wellness issues; for example, members of this group were among the main advisors regarding design of the new student study space. Going forward, the Committee’s mandate will be expanded to include consideration of faculty and staff wellness.

4.2 Resource implications (if any):

4.3 Expected completion date/s:

Continuing.
<table>
<thead>
<tr>
<th>5.</th>
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<tbody>
<tr>
<td>5.1 Action/s:</td>
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<tr>
<td>5.2 Resource implications (if any):</td>
<td></td>
</tr>
<tr>
<td>5.3 Expected completion date/s:</td>
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</tbody>
</table>

The above action plan has been considered by the Unit under review and has been discussed and agreed to by the Dean.

<table>
<thead>
<tr>
<th>Unit Leader (signed)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Angela Brooks-Wilson</td>
<td>Title: Chair</td>
</tr>
</tbody>
</table>
Section 2 - Dean’s comments and endorsement of the Action Plan:

The department is to be congratulated on the constructive and complimentary report received from the external review team.

The goals outlined in the Department’s Action Plan are laudable, clearly intended to provide the best education for undergraduate and graduate students, and on-going success in the research and teaching missions. However, some of the details of the action plan may require modification before they are implemented.

While the goal of controlling undergraduate admission from high school is justified, achieving that by regulating grade point average (GPA) at the department level is impractical at present, since admission targets (and thus GPA) are set at the Faculty level and accountability for meeting the targets resides with the Dean. Even if differential GPAs at the department level are attainable, there will need to be very careful consideration of how targets can be met through admissions to other departments – clearly a matter of much discussion.

Science is starting to reassess the current academic advising model. While BPK does have insufficient advising capacity to accommodate its student population, other departments in the Faculty face growing pressure as well. The Faculty and its departments should assess collectively how to meet growing demands for advising in the most efficient and cost-effective manner. In the meantime, Science will work with BPK to provide additional help as needed.

Faculty Dean

Name: Paul Kench

Signature: [Signature]

Date: 12 September, 2018
Undergraduate Educational Goals and Assessment Plan

(Excerpted from the Self-Study for the 2018 External Review)

Objective: Develop multi-year plan to map and assess the curriculum of each program in Biomedical Physiology and Kinesiology in relation to educational goals. Use evidence to improve programs, inform subcommittees, inform students about programs, and provide data to document that expectations for each program are being met.

Benefits for Faculty: The assessment plan will provide objective analysis that will identify future directions for instructional development. Direct assessment will be utilized for evidence based decisions regarding the status of student achievement in individual classes, and provide indications of teaching success beyond student evaluations. The curriculum mapping process will allow the targeting of instruction to specific level of student knowledge and skill entering course as we will have objective measures of educational goal achievement within prerequisites. The design of targeted assessments for educational goals will provide data on student achievement within individual courses.

Benefits for Students: Students will experience a more cohesive progression through our programs following the implementation of evidence based decisions regarding student achievement. Mapping will provide students with a clearer understanding of what will be covered in a course, and what they are required to master from prerequisite courses. Students will be able to develop clear goals, objective indications of success and skills that can be clearly communicated with future employers.

Development of Educational Goals: Considerable effort has been put in to write Degree Level Expectations for each of our programs over the last five years. The 20-30 expectations for each of our major programs are divided into five categories based on Fink’s taxonomy; Foundational Knowledge, Application of Knowledge, Integration of Knowledge, Communication Skills, and Autonomy and Professional Capacity. These categories form the basis for our development of educational goals at the program level. At our recent department retreat we began the prioritization of Degree Level Expectations into five to ten clearly assessable goals per program. Faculty, Staff and Students will continue to be involved in the prioritization and rewriting of the expectations into educational goals for each program.

Table 1 shows a timeline and assessment plan. Included in the Appendix are DRAFT Degree Level Expectations for the following programs:

- Behavioural Neuroscience Major
- Biomedical Physiology Major
- Biomedical Physiology Minor (Draft)
- Kinesiology Major
- Kinesiology Minor
- Occupation Ergonomics Certificate
Table 1: Timeline and Assessment Plan

<table>
<thead>
<tr>
<th>Dates</th>
<th>Steps in Educational Goals Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 2017</td>
<td>DRAFT degree level expectations for development as educational goals, incorporate into external review self-study along with preliminary assessment plan.</td>
</tr>
<tr>
<td>January 2018</td>
<td>Collect course level educational goals from all BPK courses. Provide workshops for faculty who did not develop outcomes for courses during workshops in 2013. Acquire curriculum-mapping program. Initial surface mapping of prioritized expectations.</td>
</tr>
<tr>
<td>February 2018</td>
<td>Incorporation of recommendations from external review. Revision of goals. Determination of main objectives for first phase of educational goal assessment process. Prioritization of which courses and methods to assess achievement of goals.</td>
</tr>
<tr>
<td>May 2018</td>
<td>Deeper evaluation of first three goals using Fink’s taxonomy Foundational Knowledge, Application of Knowledge and Integration of Knowledge. (F, A, I)</td>
</tr>
<tr>
<td>January 2019</td>
<td>Deeper evaluation of remaining goals using Fink’s taxonomy Foundational Knowledge, Application of Knowledge and Integration of Knowledge. (F, A, I)</td>
</tr>
<tr>
<td>January 2020</td>
<td>Analyze data and propose action for four-year update. Consider constructing separate analysis for delivery to Administration, Departmental Subcommittees and Students. Compare to similar programs at other institutions. Address recommendations from External Review using evidence from assessment process.</td>
</tr>
</tbody>
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Undergraduate Educational Goals and Assessment Plan

Objective
Develop multi-year plan to map and assess the curriculum of each program in Biomedical Physiology and Kinesiology in relation to educational goals. Use evidence to improve programs, inform subcommittees, inform students about programs, and provide data to document that expectations for each program are being met.

Benefits for Faculty
The assessment plan will provide objective analysis that will identify future directions for instructional development. Direct assessment will be utilized for evidence based decisions regarding the status of student achievement in individual classes, and provide indications of teaching success beyond student evaluations. The curriculum mapping process will allow the targeting of instruction to specific level of student knowledge and skill entering course as we will have objective measures of educational goal achievement within prerequisites. The design of targeted assessments for educational goals will provide data on student achievement within individual courses.

Benefits for Students
Students will experience a more cohesive progression through our programs following the implementation of evidence based decisions regarding student achievement. Mapping will provide students with a clearer understanding of what will be covered in a course, and what they are required to master from prerequisite courses. Students will be able to develop clear goals, objective indications of success and skills that can be clearly communicated with future employers.

Development of Educational Goals
Considerable effort has been put in to write Degree Level Expectations for each of our programs over the last five years. The twenty to thirty expectations for each of our major programs are divided into five categories based on Fink’s taxonomy; Foundational Knowledge, Application of Knowledge, Integration of Knowledge, Communication Skill, and Autonomy and Professional Capacity. These categories form the basis for our development of educational goals at the program level.

At our recent department retreat we began the prioritization of Degree Level Expectations into five to ten clearly assessable goals per program. Faculty, Staff and Students will continue to be involved in the prioritization and rewriting of the expectations into educational goals for each program.

Included in the appendix are the approved Degree Level Expectations for the following programs:

- Behavioural Neuroscience Major
- Biomedical Physiology Major
Appendix
Undergraduate Educational Goals and Assessment Plan

- Biomedical Physiology Minor (Draft)
- Kinesiology Major
- Kinesiology Minor
- Occupation Ergonomics Certificate

**Timeline and Assessment Plan**

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<th>Dates</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>Prioritize degree level expectation for development as educational goals, incorporate into external review self-study along with preliminary assessment plan.</td>
</tr>
<tr>
<td>February 2018-April 2018</td>
<td>Collect course level learning outcomes from all BPK courses. Provide workshops for faculty who did not develop outcomes for courses during workshops in 2013.</td>
</tr>
<tr>
<td>May 2018-December 2018</td>
<td>Acquire curriculum-mapping program. Initial surface mapping of prioritized expectations.</td>
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<td>January 2019-December 2019</td>
<td>Incorporation of recommendations from external review. Revision of goals. Determination of main objectives for first phase of educational goal assessment process. Prioritization of which courses and methods to assess achievement of goals.</td>
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<tr>
<td>January 2020-December 2020</td>
<td>Deeper evaluation of first three goals using Fink’s taxonomy Foundational Knowledge, Application of Knowledge and Integration of Knowledge. (F, A, I)</td>
</tr>
<tr>
<td>January 2021-December 2021</td>
<td>Deeper evaluation of remaining goals using Fink’s taxonomy Foundational Knowledge, Application of Knowledge and Integration of Knowledge. (F, A, I)</td>
</tr>
<tr>
<td>January 2021-December 2021</td>
<td>Analyze data and propose action for four-year update. Consider constructing separate analysis for delivery to Administration, Departmental Subcommittees and Students. Compare to similar programs at other institutions. Address recommendations from External Review using evidence from assessment process.</td>
</tr>
</tbody>
</table>
Prioritized BPK Degree Level Expectations

Common (C), Kinesiology Major (KIN) and Biomedical Physiology Major (BIF) specific Degree Level Expectations prioritized at the Department Retreat November 2017.

Foundational Knowledge

(C) explain the individual and interactive function and regulation of major organs and organ systems at levels from genes to behavior.

(KIN) understand the fundamental concepts underlying disciplines related to kinesiology such as anatomy, physiology, exercise physiology, biomechanics, neuromechanics, motor learning, psychology, nutrition and ergonomics

Application of Knowledge

(C) show a working understanding of major methods of inquiry, and use these approaches and techniques to identify, isolate, and address problems.

(KIN) apply appropriate techniques to assess function, fitness and risks related to health and injury

(KIN) apply foundational knowledge to design and implement exercise programs for healthy and unhealthy individuals and populations, to prevent or manage injury and/or enhance performance

(KIN) apply foundational knowledge to implement rehabilitation and/or nutrition programs for healthy, unhealthy and at-risk individuals and populations, to prevent dysfunction and/or enhance performance

Integration of Knowledge

(C) integrate and synthesize a broad range of knowledge, skills and scientific approaches and apply these to diverse and novel challenges

(BIF) evaluate the strengths and limitations of various approaches and thereby be able to justify the choice of mode of inquiry and of analysis to answering questions and solving problems.

Communication Skills

(C) critically evaluate the scientific integrity of information presented in various forms, and detect and understand the implications of logical flaws and misdirection in an argument

(C) develop and communicate engaging scientific arguments in oral presentations, class discussions and written papers.

(C) use relevant scientific, technological, and statistical concepts, data and skills to explain and clarify ideas to diverse target audiences

Autonomy and Professional Capacity

(C) demonstrate critical, creative, and practical thinking to function autonomously as a self-directed learner throughout life
(C) work effectively with others as part of a team, and provide team leadership when appropriate

(C) demonstrate personal responsibility, ethical decision making, academic integrity, and social responsibility

(KIN) meet the academic and practical requirements of several discipline specific provincial, national and international certifications
Appendix
Degree Learning Expectations for the Kinesiology Major

All expectations should be read to include the initial clause: "A graduate from this program is able to"

**Foundational Knowledge**
- a) apply scientific knowledge to the study of human movement, physiology and health
- b) explain individual and interactive normal function of major organs and organ systems at levels from cells to behaviour
- c) understand the fundamental concepts underlying disciplines related to kinesiology such as anatomy, physiology, exercise physiology, biomechanics, neuromechanics, motor learning, psychology, nutrition and ergonomics
- d) critically evaluate the scientific integrity of information

**Application and Integration of Knowledge**
- a) integrate foundational knowledge into the broad scope of health, fitness and illness
- b) apply appropriate techniques to assess function, fitness and risks related to health and injury
- c) apply foundational knowledge to design and implement exercise programs for healthy and unhealthy individuals and populations, to prevent or manage injury and/or enhance performance
- d) apply foundational knowledge to implement rehabilitation and/or nutrition programs for healthy, unhealthy and at risk individuals and populations, to prevent dysfunction and/or enhance performance
- e) demonstrate a working understanding of major methods of inquiry in kinesiology, including their strengths and limitations.
- f) integrate and synthesize a broad range of knowledge, skills and scientific approaches and apply these to diverse and novel challenges
- g) justify choice of mode of inquiry and analysis to answer questions and solve problems
- h) develop and sustain a reasoned argument and be able to detect illogical arguments
- i) understand limitations when researching human health and behaviour
- j) appreciate what one doesn’t know and what the scientific community doesn’t know

**Communication Skills**
- a) read and understand discipline specific information
- b) listen, question and clarify to understand and appreciate points of view of others
- c) write, speak and present information in an engaging and effective manner
- d) use relevant scientific, technological, and statistical concepts, data and skills to explain and clarify ideas to diverse target audiences

**Autonomy and Professional Capacity**
- a) demonstrate critical, creative, and practical thinking
b) demonstrate the ability to function autonomously as a self-directed learner throughout life

c) work effectively with others as part of a team and provide team leadership when appropriate

d) demonstrate personal responsibility, accountability and ethical decision making in complex contexts

e) demonstrate behavior consistent with academic integrity, standards of professional practice and social responsibility

f) meet the academic requirements of several discipline specific provincial, national and international certifications.

g) qualify for membership in British Columbia Association of Kinesiologists (BCAK)

Honours

a) critique current research on methodological and statistical grounds

b) identify gaps in the relevant literature, formulate questions and a testable hypothesis

c) use learned procedures to evaluate which data are relevant and which are not, and to be able to explain the rational for these decisions

d) design a study to test the hypothesis

e) interpret the study results, draw defensible conclusions and understand their limitations

f) write and defend a thesis in an appropriate scientific format
Degree Level Expectations for the Kinesiology Minor

All expectations should be read to include the initial clause: "A graduate from this program is able to"

Foundational Knowledge
   a) translate scientific knowledge to the study of human movement, physiology and health
   b) recall individual and interactive normal function of major organs and organ systems at levels from cells to behaviour
   c) understand the fundamental concepts underlying some of the disciplines related to kinesiology such as anatomy, physiology, exercise physiology, biomechanics, neuromechanics, motor learning, psychology, nutrition and ergonomics
   d) evaluate the scientific integrity of information

Application and Integration of Knowledge
   a) use foundational knowledge into the broad scope of health, fitness and illness
   b) apply foundational knowledge to design and implement exercise programs for oneself.
   c) apply foundational knowledge to implement rehabilitation and/or nutrition programs for oneself.
   d) demonstrate an understanding of major methods of inquiry in kinesiology, including their strengths and limitations.
   e) develop and sustain a reasoned argument and be able to detect illogical arguments
   f) understand limitations of human health and behaviour research

Communication Skills
   a) read and understand discipline specific information
   b) listen, question and clarify to understand and appreciate points of view of others
   c) write, speak and present information in an effective manner

Autonomy and Professional Capacity
   a) demonstrate critical, creative, and practical thinking
   b) demonstrate the ability to function autonomously as a self-directed learner throughout life
   c) work effectively with others as part of a team
   d) demonstrate personal responsibility, accountability and ethical decision making in
   e) demonstrate behavior consistent with academic integrity and social responsibility
Degree Learning Expectations for the Occupational Ergonomics Certificate within the Kinesiology Major

All expectations should be read to include the initial clause: "A graduate from this program is able to"

**Foundational Knowledge**

a) apply scientific knowledge to the study of humans in occupational environments  
b) apply a systems approach to understanding, assessing and improving the interaction between social and technical elements in the workplace  
c) critically evaluate the scientific integrity of ergonomics research  
d) understand how the fundamental concepts underlying disciplines related to kinesiology such as anatomy, physiology, exercise physiology, biomechanics, anthropometry, motor learning, and psychology, account for risk development and provide solutions to address risks in the workplace

**Application and Integration of Knowledge**

a) integrate foundational knowledge into the broad scope of physical and mental health and illness in the workplace  
b) apply appropriate techniques to assess individual differences, task requirements, and environmental characteristics within the workplace  
c) apply foundational knowledge to design and implement effective solutions to prevent or manage physical and mental injury and/or enhance performance  
d) apply foundational knowledge to implement ergonomic, wellness and rehabilitation programs for healthy, unhealthy and at risk individuals and populations, to prevent dysfunction and/or enhance performance in the workplace  
e) demonstrate a working understanding of major methods of inquiry in ergonomics, including their strengths and limitations  
f) demonstrate a working understanding of Provincial, Federal and International legislation, standards and guidelines/standard practices relating to ergonomics in the workplace  
g) integrate and synthesize a broad range of knowledge, skills and scientific approaches and apply these to diverse and novel challenges  
h) justify choice of mode of inquiry and analysis to answer questions and solve problems  
i) develop and sustain a reasoned argument and be able to detect illogical arguments  
j) understand limitations when researching human health and behaviour  
k) appreciate what one doesn’t know and what the scientific community doesn’t know

**Communication Skills**

a) read and understand discipline specific information  
b) listen, question and clarify to understand and appreciate points of view of others  
c) translate knowledge effectively in both written and oral formats to diverse target audiences
Appendix

Degree Learning Expectations for the Occupational Ergonomics Certificate within the Kinesiology Major

d) write in a variety of formats, specific to the discipline of ergonomics, in an engaging and effective manner
e) use relevant scientific, technological, and statistical concepts, data and skills to explain and clarify ideas to diverse target audiences

Autonomy and Professional Capacity

a) demonstrate critical, creative, and practical thinking
b) demonstrate the ability to function autonomously as a self-directed learner throughout life
c) work effectively with others as part of a team and provide team leadership when appropriate
d) demonstrate personal responsibility, accountability and ethical decision making in complex contexts
e) demonstrate behavior consistent with academic integrity, standards of professional practice and social responsibility
f) meet the academic requirements of the Canadian Certification of Professional Ergonomists
g) qualify for membership in the Association of Canadian Ergonomists
Degree Level Expectations for the Biomedical Physiology Major

All expectations should be read to include the initial clause: "A graduate from this program is able to"

Foundational Knowledge
*(see Note 2)*

a) explain the individual and interactive normal function of major organs and organ systems at levels from cells to behavior
b) explain the individual and interactive regulation of major organs and organ systems at all levels from gene transcription to behavior
c) demonstrate command of material that probes current understanding of a subdiscipline of physiology (see note 3)
d) demonstrate an appreciation of the areas and ways in which physiology intersects with neighboring disciplines (e.g. biochemistry, anatomy, psychology, zoology)

Application of Knowledge

a) show a working understanding of major methods of inquiry for acquiring new understanding in physiology, including their strengths and limitations
b) use these approaches and techniques to identify, isolate, and address problems

Integration of Knowledge

a) integrate and synthesize a broad range of knowledge and skills and apply these to diverse and novel challenges
b) evaluate the strengths and limitations of various approaches and thereby be able to justify the choice of mode of inquiry and of analysis to answering questions and solving problems
c) develop and sustain a reasoned argument
d) appreciate what she doesn’t know and what the scientific community doesn’t know
e) detect and understand the implications of logical flaws / misdirection in an argument

Communication Skills

a) read and understand information presented in various forms (words, graphs, charts, diagrams, tables)
b) listen and ask questions to understand and appreciate the points of view of others — to be sure she understands the argument that is being developed.
c) write and speak so others pay attention and understand
d) use relevant scientific, technological, and mathematical concepts, data, and skills to explain or clarify ideas in an audience specific manner in more than 140 characters.
e) create and present developed arguments for diverse target audiences in oral, visual, written, and electronic formats — see also (1.a, 1.b, 3.a, 3.c, 4.b)
Appendix
Degree Level Expectations for the Biomedical Physiology Major

Autonomy and Professional Capacity
a) demonstrate critical, creative, and practical thinking (see note 4).
b) show the foundational knowledge, application and integrative skills to function autonomously as a self-directed learner throughout life.
c) work effectively with others as part of a team, and provide team leadership when appropriate.
d) demonstrate personal responsibility, accountability, and skills of inclusion and ethical decision-making in complex contexts.
e) use the comprehension and skills described herein to distinguish between science and pseudoscience.
f) demonstrate behavior consistent with academic integrity, standards of professional practice, and social responsibility.

Notes
1. The subject headings “Foundational Knowledge”, “Application of Knowledge”, “Integration of Knowledge”, “Autonomy and Professional Capacity” are used as defined in Fink’s taxonomy of learning {“A Taxonomy of Significant Learning”, in: Fink LD. Creating significant learning experiences. San Francisco, Jossey-Bass, 2003; 27-59} which is on Docushare.
2. The PIGs committee recognizes that many words used here in a technical sense have multiple definitions. For example, Wiktionary shows 10 definitions for “knowledge”. Accordingly we have decided to agree on a single definition, taken from Wiktionary, for such words. Thus: Knowledge == “Awareness of a particular fact or situation, a state of having been informed or made aware of something.”
3. For the purpose of this document subdisciplines of physiology align with the research groups in BPK – Cardiovascular physiology, neuroscience, neuromechanics, environmental physiology, chronic disease.
4. Critical thinking refers to the process of analyzing and evaluating something. Creative thinking occurs when one imagines and creates a new idea, design, or product; thus novelty and "fit with the context" play a key role. Practical thinking occurs when a person is learning how to use and apply something, as when trying to solve a problem or make a decision. The product here is a solution or decision whose effectiveness is paramount. {Fink, pp39-40}.

Honors (not developed)
a) from the literature identify gaps in current comprehension of that portion of the discipline that is addressed by the thesis.
b) critique current research on methodological and statistical grounds.
c) demonstrate intellectual rigor – this implies crafting an argument using a careful and “rigorous” procedure to evaluate which data are relevant to the argument and which are not (and why). The argument is developed using only the relevant data and “rigorously” excluding irrelevant data.
d) formulate informative questions about gaps identified in (6.a)
e) from the questions formulated in (6.d) craft testable hypotheses
f) design a study to test the hypothesis crafted in (6.e)
g) interpret the results of the study (6.f) in terms of the hypothesis (6.e)
h) integrate knowledge from various sub-disciplines to address contemporary issues in physiology.
i) show understanding of the reliability, utility, and relevance of information from multiple sources
j) appreciate the uncertainty, ambiguity and limits to understanding and methodologies and the ways in which these limitations might influence the analysis, interpretation and dissemination of information and skills
Degree Level Expectations for the Biomedical Physiology Minor

All expectations should be read to include the initial clause: "A graduate from this program is able to"

**Foundational Knowledge**
*(see Note 2)*

a) explain the individual and interactive normal function of major organs and organ systems at levels from cells to behavior
b) explain the individual and interactive regulation of major organs and organ systems at all levels from gene transcription to behavior
c) demonstrate command of material that probes current understanding of a subdiscipline of physiology (see note 3)
d) demonstrate an appreciation of the areas and ways in which physiology intersects with neighboring disciplines (e.g. biochemistry, anatomy, psychology, zoology)

**Application of Knowledge**
a) show a working an understanding of major methods of inquiry for acquiring new understanding in physiology, including their strengths and limitations.
b) use these approaches and techniques to identify, isolate, and address problems.

**Integration of Knowledge**
a) integrate and synthesize use a broad range of knowledge and skills and apply these to diverse and novel challenges
b) evaluate the strengths and limitations of various approaches and thereby be able to justify the choice of mode of inquiry and of analysis to answering questions and solving problems
c) develop and sustain a reasoned argument
d) appreciate what she doesn't know and what the scientific community doesn't know
e) detect and understand the implications of logical flaws / misdirection in an argument

**Communication Skills**
a) read and understand information presented in various forms (words, graphs, charts, diagrams, tables)
b) listen and ask questions to understand and appreciate the points of view of others – to be sure she understands the argument that is being developed
c) write and speak so others pay attention and understand
d) use relevant scientific, technological, and mathematical concepts, data, and skills to explain or clarify ideas in an audience specific manner in more than 140 characters
e) create and present developed arguments for diverse target audiences in oral, visual, written, and electronic formats – see also (1.a, 1.b, 3.a,3.c, 4.b)
Autonomy and Professional Capacity

a) demonstrate critical, creative, and practical thinking (see note 4).
b) show the foundational knowledge, application and integrative skills to function autonomously as a self-directed learner throughout life.
c) work effectively with others as part of a team, and provide team leadership when appropriate
d) demonstrate personal responsibility, accountability, and skills of inclusion and ethical decision making in complex contexts
e) use the comprehension and skills described herein to distinguish between science and pseudoscience.
f) demonstrate behavior consistent with academic integrity, standards of professional practice, and social responsibility

Notes

1. The subject headings “Foundational Knowledge”, “Application of Knowledge”, “Integration of Knowledge”, “Autonomy and Professional Capacity” are used as defined in Fink’s taxonomy of learning (“A Taxonomy of Significant Learning”, in: Fink LD. Creating significant learning experiences. San Francisco, Jossey-Bass, 2003; 27-59) which is on Docushare.

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3. For the purpose of this document subdisciplines of physiology align with the research groups in BPK – Cardiovascular physiology, neuroscience, neuromechanics, environmental physiology, chronic disease

4. Critical thinking refers to the process of analyzing and evaluating something. Creative thinking occurs when one imagines and creates a new idea, design, or product; thus novelty and "fit with the context" play a key role. Practical thinking occurs when a person is learning how to use and apply something, as when trying to solve a problem or make a decision. The product here is a solution or decision whose effectiveness is paramount. {Fink, pp39-40}. 
Degree Learning Expectations for the Behavioural Neuroscience Major

All expectations should be read to include the initial clause: "A graduate from this program is able to"

**Foundational Knowledge**

a) explain how the nervous system communicates, and how information is coded and stored in the brain
b) explain how the nervous system senses information necessary to interact in a given environment
c) explain the function of different brain regions and how they work together to produce or control behaviour and cognition
d) understand the fundamental concepts underlying disciplines related to behavioural neuroscience, including neuroanatomy, physiology, and psychology

**Application and Integration of Knowledge**

a) demonstrate a working understanding of major methods of inquiry for acquiring new understanding in behavioural neuroscience, including their strengths and limitations
b) integrate foundational knowledge to describe the potential reasons for signs and symptoms associated with a variety of neurological disorders
c) apply foundational knowledge to design ways to maintain or improve brain health and function
d) integrate and synthesize a broad range of knowledge, skills, and scientific approaches and apply these to diverse and novel challenges
e) justify choice of mode of inquiry and analysis to answer questions and solve problems
f) develop and sustain a reasoned argument based on behavioural neuroscience research
g) appreciate what one doesn’t know and what the scientific community doesn’t know

**Communication Skills**

a) read and understand discipline specific information
b) listen, question, and clarify to understand and appreciate points of view of others
c) write, speak, and present information in an engaging and effective manner
d) use relevant scientific, technological, and statistical concepts, data, and skills to explain and clarify ideas to diverse target audiences

**Autonomy and Professional Capacity**

a) demonstrate critical, creative, and practical thinking
b) demonstrate the ability to function autonomously as a self-directed learner throughout life
c) work effectively with others as part of a team and provide team leadership when appropriate
d) demonstrate personal responsibility, accountability, and ethical decision making in complex contexts
Appendix
Degree Learning Expectations for the Behavioural Neuroscience Major

e) demonstrate behavior consistent with academic integrity, standards of professional practice, and social responsibility
f) use the comprehension and skills described herein to distinguish between science and pseudoscience

Honours Program
a) critique current research on methodological and statistical grounds
b) identify gaps in the relevant literature, formulate questions, and a testable hypothesis
c) use learned procedures to evaluate which data are relevant and which are not, and to be able to explain the rational for these decisions
d) design a study to test the hypothesis
e) interpret the study results, draw defendable conclusions and understand their limitations
f) write and defend a thesis in an appropriate scientific format
Graduate degree Program Level Outcomes

A graduate from this program is able to:

MSc
a) demonstrate advanced knowledge in, and a critical awareness of, a specialized area within the fields of Biomedical Physiology and Kinesiology
b) conduct research in novel lines of enquiry to generate and/or test a hypothesis, which demonstrates mastery of a scientific approach

PhD
a) demonstrate a thorough understanding of pertinent literature and recognize and integrate complex ideas and controversies in the field
b) conceptualize, design and undertake independent research using novel ideas and/or approaches to address a series of questions related to a common goal, which result in original contributions to knowledge in the field

MSc and PhD
a) demonstrate initiative, intellectual independence, problem-solving skills, and the ability to apply knowledge
b) communicate and defend their work, as well as critically appraise that of others, in written and oral form
c) identify moral, legal and ethical considerations for how to conduct research appropriately
## Graduate Degree Level Expectations

<table>
<thead>
<tr>
<th>Core Knowledge and Critical Thinking</th>
<th>MSc</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) demonstrate advanced knowledge of pertinent literature in a specialized area within Biomedical Physiology and Kinesiology</td>
<td>a) demonstrate thorough knowledge of literature related to an area within Biomedical Physiology and Kinesiology</td>
<td></td>
</tr>
<tr>
<td>b) recognize debate, and critically appraise current research in the field</td>
<td>b) critically evaluate current literature and integrate complex ideas and controversies in the field</td>
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<tr>
<td>c) evaluate methodological strengths and weaknesses in the literature and understand how this enables/limits interpretation of data</td>
<td>c) identify and understand new and established approaches that are at the forefront of the field</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research Methods and Analyses</th>
<th>MSc</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) demonstrate mastery of quantitative and/or qualitative skills in the collection and/or use of data</td>
<td>a) conceptualize and design approaches to address a series of research questions</td>
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<tr>
<td>b) conduct novel research to generate and/or test a hypothesis</td>
<td>b) undertake independent research using novel ideas and/or approaches to generate and/or test a set of hypotheses or questions related to a common goal</td>
<td></td>
</tr>
<tr>
<td>c) use established or novel ideas and/or approaches to address a new question</td>
<td>c) produce original research, which creates new knowledge that advances the field</td>
<td></td>
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<tr>
<td>d) contribute to the generation of new knowledge in the field</td>
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<tr>
<th>Literacy and Scientific Communication</th>
<th>MSc</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) present a detailed and comprehensive evaluation of a field of literature in written form</td>
<td>a) comprehensively evaluate pertinent literature, addressing complexities and controversies in the field, in written form</td>
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<tr>
<td>b) orally present and defend their critical appraisal of the work of others</td>
<td>b) orally present and defend their critical appraisal of the work of others</td>
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<tr>
<td>c) write accessible descriptions of their research for the purposes of knowledge translation</td>
<td>c) write accessible descriptions of their research for the purposes of knowledge translation</td>
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<tr>
<td>d) convey their research to multiple audiences in oral and written form</td>
<td>d) convey their research to multiple audiences in oral and written form</td>
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</tr>
<tr>
<td>e) present and defend the rationale, approach and interpretation of their own research in written and oral form</td>
<td>e) present and defend the rationale, approach and interpretation of their own research in written and oral form</td>
<td></td>
</tr>
</tbody>
</table>
| 4) Professional and ethical conduct | a) identify and adhere to moral, legal and ethical considerations for how to conduct research appropriately  
b) manage their own research project  
c) engage in professional conduct with their peers and the scientific community  
d) display academic integrity  
e) demonstrate proficiency in teamwork and leadership  
f) demonstrate initiative, intellectual independence and the ability to apply knowledge | a) identify and adhere to moral, legal and ethical considerations for how to conduct research appropriately  
b) demonstrate independence in project conceptualization, design, and management  
c) engage in professional conduct with their peers and the scientific community  
d) display academic integrity  
e) demonstrate autonomy and strong leadership  
f) understand the broader implications of the application of knowledge in their own and others field or discipline |
MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

TEL +1 778 782 3925
FAX +1 778 782 5876
sfu.ca/vpacademic

Simon Fraser University
Strand Hall 3100
8888 University Drive
Burnaby BC
Canada V5A 1S6

RE: Full Program Proposal for the Master of Applied Science in Sustainable Energy Engineering (SCUP 18-29)

DATE: October 17, 2018

TIME

At its October 10, 2018 meeting, SCUP reviewed and approved the full program proposal for the Master of Applied Science in Sustainable Energy Engineering within the Faculty of Applied Sciences, effective Fall 2019.

Motion:

That Senate approve and recommend to the Board of Governors the full program proposal for the Master of Applied Science in Sustainable Energy Engineering within the Faculty of Applied Sciences, effective Fall 2019.

c: K. Oldknow
   E. Fiume
MEMORANDUM

ATTENTION Senate Committee on University Priorities (SCUP)
FROM Jeff Derksen,
Chair of Senate Graduate Studies Committee (SGSC)
RE: Full program proposal for a Master of Applied Science in Sustainable Energy Engineering

DATE September 24, 2018

For approval:

At its meeting of September 11, 2018, SGSC approved full program proposal for a Master of Applied Science in Sustainable Energy Engineering and is recommending it to SCUP for approval, effective Fall 2019.

Motion:
That SCUP approve and recommend to Senate the full program proposal for a Master of Applied Science in Sustainable Energy Engineering within the Faculty of Applied Science.
MEMORANDUM

Attention  Dr. Jeff Derksen  Date  August 24, 2018
Dean, Graduate Studies

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

Re: Full Program Proposal for Sustainable Energy Engineering graduate degrees and Professional Master’s in Mechatronic Product Realization

The faculty of Applied Sciences Graduate Program Committee would like to send two items to the SGSC for consideration. These are:
1) The full program proposal for the Sustainable Energy Engineering MASc and PhD degrees revised as per the feedback provided by your office.
2) The full program proposal for the Professional Master’s in Mechatronic Product Realization revised as per the feedback provided by your office.

FAS GPC has approved both of these submissions via an electronic vote. I request you to place these on the agenda for the next SGSC meeting.
MEMORANDUM

ATTENTION: Faisal Beg, Chair
Faculty of Applied Sciences
Graduate Program Committee

DATE: August 1st, 2018

FROM: Kevin Oldknow, Director
Sustainable Energy Engineering Program

RE: SEE MASc and PhD Full Program Proposals

Please find enclosed the following documents for consideration by the Faculty of Applied Sciences Graduate Program Committee:

1. Sustainable Energy Engineering

   I. MASc Full Program Proposal (Revised)

   II. PhD Full Program Proposal (Revised)

Kevin Oldknow, Ph.D., P.Eng.
Master of Applied Science (MASc) in Sustainable Energy Engineering

Full Program Proposal

August 2018
Faculty of Applied Sciences
PART A: Information required by the Ministry of Advanced Education

EXECUTIVE SUMMARY

Overview of the SFU's history, mission, and academic goals

Proposed credential to be awarded

Location of program

Academic unit(s) offering proposed program

Anticipated program start date

Anticipated completion time

Summary of proposed program

a) Aims, goals and/or objectives of the proposed program

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

c) Linkages between the educational goals and the curriculum

d) Potential areas/sectors of employment for graduates and/or opportunities for further study

e) Delivery methods

f) Program strengths

g) An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable and plans for admissions and transfer within the British Columbia post-secondary education system

h) Related programs in the institution or other British Columbia post-secondary institutions

Contact information

PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

b) Admission requirements

c) Evidence of student interest and labour market demand

d) Eligibility for scholarships, awards, and financial aid

Full Program Proposal
MASc in Sustainable Energy Engineering

e) Program evaluation and academic/administrative oversight .................. 10
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PART A: Information required by the Ministry of Advanced Education

EXECUTIVE SUMMARY

Overview of the SFU's history, mission, and academic goals
As Canada's engaged university, Simon Fraser University is defined by its dynamic integration of innovative education, cutting-edge research and far-reaching community engagement. SFU was founded in 1965 with a mission to bring an interdisciplinary approach to learning, embrace bold initiatives, and engage with communities near and far. Today SFU is consistently ranked amongst Canada's top comprehensive universities and is one of the world's leading teaching and research institutions.

The Sustainable Energy Engineering (SEE) program will align and reinforce SFU's strategic and academic plans, as well as reinforce the Province of British Columbia's commitment to stimulate industry-focused programs that support high demand occupations in the province's technology sector. This will be achieved through the delivery of a program that provides a unique and specific education including foundational engineering principles, design practices, current technologies, economics and policies associated with the global Clean Technology (cleantech) sector.

Students will emerge from the program with the multidisciplinary skills needed to meet the province's growing demand for cleantech professionals, as well as the capacity to become national and international leaders in developing engineering solutions for a sustainable world. It is further expected that the potential for significant positive societal impact will draw a diverse student body, in contrast with traditional engineering programs.

Proposed credential to be awarded
Master of Applied Science (MASc) in Sustainable Energy Engineering.

Location of program
The Sustainable Energy Engineering program will be hosted in a new facility that is being purpose-built to deliver a cutting-edge engineering program with a focus on sustainable energy. Located adjacent to the existing SFU Surrey campus and exemplifying best practices in sustainability design, the building is intended to serve as a living lab for participating students and as a sustainable design showcase for SFU, the City of Surrey and the Province. Its proximity to the SFU Surrey campus, Surrey City Hall, and the developing Clean Technology (cleantech) industry clusters within the South Fraser region, will allow for enhanced collaboration in the provision of a sustainably oriented, industry-aware graduate engineering program.
Academic unit(s) offering proposed program
This program will be offered by the SFU Faculty of Applied Sciences, and will be administered by the Faculty of Applied Sciences directly. A total of 22 faculty and 16 staff are expected to be hired in conjunction with mounting and deployment of the SEE undergraduate and graduate programs, with hiring expected to occur between 2018-2021 for faculty, and 2018-2020 for staff. Teaching and service assignments for faculty members associated with the SEE program will be administered by the Program Director, and staff associated with the SEE program will be managed by the FAS Dean’s Office.

Anticipated program start date
Fall 2019

Anticipated completion time
It is anticipated that the program will typically be completed in two years of full time study.

Summary of proposed program

a) Aims, goals and/or objectives of the proposed program
The objective of the proposed program is to educate engineers who will lead research into the sustainable harvesting, conversion, storage, distribution, utilization, transition, and management of energy and environmental resources.

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution
The proposed program in Sustainable Energy Engineering builds upon the Faculty of Applied Sciences’ commitment to technology-based innovation, and furthers SFU’s interest in supporting advanced research that will contribute to the development of vibrant, healthy and technologically innovative communities. Through industry partnerships, international-level thought leadership and research, and progressive curriculum, this program is positioned to advance Faculty and University level goals in several key areas such as expanding industry collaborations within the South Fraser Region, strengthening ties with the City of Surrey and surrounding municipalities, and expanding the talent pool of advanced researchers in areas related to sustainable energy and clean technology.

The program also aligns with the Province’s commitment to provide increased funding to industry-focused programs that support high demand occupations in the BC technology sector and with the University’s interest in encouraging strategies that, as mentioned within the President’s Goals and Objectives 2015-16 “support continued implementation of BC’s Skills for Jobs Blueprint and the development of an associated strategy to ensure SFU meets its enrolment targets for programs that educate for high demand occupations” such as Engineering and establish SFU as “the leading engaged university defined by its dynamic integration of innovative education, cutting-edge research, and far-reaching community engagement”. 

Full Program Proposal
c) **Linkages between the educational goals and the curriculum.**

The program aims to offer a unique ecosystem for advanced research in sustainable energy engineering by drawing on existing strengths at SFU in general, and FAS in particular. Through training in formal coursework and hands-on research, SEE graduates will be capable of working with integrity to invent, improve, design and deploy sustainable clean energy technologies addressing the clean energy needs for now and the future.

d) **Potential areas/sectors of employment for graduates and/or opportunities for further study.**

Graduates of the Sustainable Energy Engineering MASc program will acquire a diverse range of knowledge and research skills that will enable them to pursue various career opportunities related to energy harvesting, conversion, storage, distribution, and energy-efficient systems and machines in a wide range of sectors, including wind, solar, geothermal, hydro-electric power, fuel cells, gas turbines, biomass, transportation, oil and natural gas as researchers, entrepreneurs, and consultants. These opportunities may be in the fast-growing cleantech sector in BC, or the graduates may find employment in other parts of Canada and the world. Relevant National Occupational Classification (NOC) codes include:

- 2131 Civil Engineers
- 2132 Mechanical Engineers
- 2133 Electrical Engineers
- 2141 Industrial and Manufacturing Engineers
- 2173 Software Engineers

This program will also prepare them for pursuing the Doctor of Philosophy (Ph.D.) degree in Sustainable Energy Engineering and related Engineering disciplines at SFU and at other universities across Canada and internationally.

e) **Delivery methods**

The program will be a combination of face-to-face lecture-based courses, seminar courses, directed-studies, and advanced research courses conducted in state-of-art research labs leading to a graduate thesis.

f) **Program strengths**

Graduates will receive training in advanced research into novel clean energy technologies. They will also be provided opportunities for broadening their education by electives in energy-related economics, environmental science, business and entrepreneurship.
g) An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable and plans for admissions and transfer within the British Columbia post-secondary education system.

Active consultation within the SFU community regarding the SEE initiative (including prospective undergraduate and graduate programs) has been underway since mid-2016. This dialogue will continue moving forward, with particular emphasis as additional graduate programs (e.g. course-based MEng and Professional Master's) are developed with a particular emphasis on pan-university involvement and interdisciplinarity.

External consultation has included dialogue with advisory council members, industry, and professional / regulatory bodies including Engineers and Geoscientists BC (previously the Association of Professional Engineers and Geoscientists of BC). Corresponding letters and statements of support are provided in Appendix 3.

Admissions requirements for the program have been articulated, and will be implemented, such that prior studies at other BC post-secondary institutions (e.g. bachelor's degrees in related areas of engineering) will be readily recognized during the application processes.

h) Related programs in the institution or other British Columbia post-secondary institutions.

The SFU SEE program will be uniquely positioned as the only masters level research-intensive regional program that applies directly to sustainable energy systems and the related cleantech sector. The UBC Master of Engineering Leadership program in Clean Energy Engineering seems to be the most closely related to the proposed MASc degree in the SFU SEE program. However, unlike the two year research-intensive MASc in the SFU SEE program, the UBC degree is a combination of technical (60%) and leadership development (40%) aspects covered over a one-year term. The University of Victoria has an Institute for Integrated Energy Systems that conducts graduate level research but does not offer a MASc degree in energy engineering. It should be noted, however, that the Civil Engineering graduate program at UVic does include course offerings in sustainability and green buildings. BCIT has a School of Energy, but it does not mount any undergraduate or graduate programs directly in the area of energy engineering.

Contact information
Dr. Kevin Oldknow, P.Eng.
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering Program
778.782.9254
koldknow@sfu.ca
PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

The Master of Applied Science (MASc) in SEE is a research-intensive program that has a primary emphasis on the MASc thesis rather than course work.

The target audience for the MASc program in SEE is students with an undergraduate (bachelor's) degree in electrical engineering, computer engineering, mechanical engineering, engineering science, mechatronic systems engineering, or a related area. Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 with a 3.0 cumulative grade point average (B average) from a recognized university, or equivalent.

This program consists of course work (12 units) and a thesis (18 units) for a minimum of 30 units. Students who lack the necessary background knowledge may, at the discretion of the supervisor or the supervisory committee, be asked to complete additional courses beyond the program requirements in order to broaden the students' preparation for undertaking thesis work. Also if necessary, The Western Deans' Agreement will support MASc students in SEE taking elective courses at participating institutions in BC.

Students must complete

SEE 896 (0): MASc Research Seminar*

and three of (with a minimum of two SEE courses)

SEE 820 (3) Materials Design for Energy Systems
SEE 821 (3) Membranes and Filtration
SEE 850 (3) Energy Storage Systems
SEE 891 (3) Directed Studies
SEE 893 (3) Special Topics I
SEE 894 (3) Special Topics II
SEE 895 (3) Special Topics III
MSE 722 (3) Fuel Cell Systems
MSE 780 (3) Manufacturing Systems
MSE 821 (3) Advanced Conduction Heat Transfer
MSE 822 (3) Advanced Convection Heat Transfer
ENSC 801 (3) Linear System Theory
ENSC 802 (3) Stochastic Systems
ENSC 810 (3) Statistical Signal Processing
ENSC 833 (3) Network Protocols and Performance
ENSC 835 (3) Communication Networks
ENSC 854 (3) Integrated Microsensors and Actuators

and one three unit graduate elective course in consultation with the senior supervisor.
and a thesis

SEE 898 (18) MASc Thesis

*Students must enroll in this course every term

b) Admission requirements
Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 with a 3.0 cumulative grade point average (B average) from a recognized university, or equivalent.

c) Evidence of student interest and labour market demand
A survey of 96 cleantech and sustainable energy technology companies in Canada (conducted by The Delphi Group in the Fall of 2016 as part of the development process for the Sustainable Energy Engineering initiative) identified the following cleantech segments as those expected to see the highest global growth over the next decade:

1. Energy storage and battery technology;
2. Clean power generation;
3. Smart grid, transmission, and distribution;
4. Clean transportation technology;
5. Energy efficiency, conservation, and demand-side management;
6. Green building design and construction; and
7. Water and wastewater.

For the market opportunities in British Columbia more specifically, BC-based companies selected (1) green building design and construction, (2) clean transportation technology, and (3) energy efficiency, conservation, and demand-side management as the top growth segments over the next decade. Many see higher growth potential outside of BC for their cleantech solutions in the short-term, although it may not require going far from home given potential increasing demand from other Western provinces such as Alberta and/or West coast states including California, Oregon, and Washington.

Cleantech companies that responded to Delphi’s survey identified a shortage of skilled and qualified engineers available in Canada for supporting the growth of their businesses.

Survey respondents suggested that a program offering a more “broad-based” energy systems focus that includes techno-economics and a specialization in certain areas of environmental or clean technology (such as energy storage and smart grid, a broad range of renewable energy technologies, alternative fuels and technologies, and resource optimization solutions) would add value to the industry and fill a current gap in the market.

d) Eligibility for scholarships, awards, and financial aid
Students will be able to apply for awards funded from the university's operating budget, including entrance scholarships and graduate fellowships. Students will also be eligible for Teaching Assistantships and Research Assistantships. Normally, students in this program will be eligible for financial aid so that students may qualify for a loan if necessary.

e) Program evaluation and academic/administrative oversight
As mandated by Senate, the program will be externally reviewed at seven-year intervals. In addition, oversight will be provided by a SEE Steering Committee (refer to Appendix 4).

f) Main competitors outside BC
Graduate programs outside of B.C. with foci in the space of sustainable energy engineering include those listed below. Common threads amongst the programs (including the proposed SEE program at SFU) include a focus on renewable energy, and placement of energy systems technologies in a broader framework of ecological, economic and regulatory contexts. This is reflective of a growing global focus on graduate education in these areas. Distinctive aspects of the proposed SEE program include focal points for research that map onto the overarching themes of smart cities, clean transportation and sustainable manufacturing, as well as a strong focus on research and thesis work (some of the programs listed above are specifically course focused).

Carleton University: MASc, MA, MEng programs in Sustainable Energy
https://graduate.carleton.ca/cu-programs/sustainable-energy-masters/

University of Exeter: MSc, PhD, MPhil, MSc programs in Renewable Energy
http://emps.exeter.ac.uk/renewable-energy/postgraduate/

Berkeley University of California: Ph.D., M.A., M.S programs in Energy & Resources
http://grad.berkeley.edu/program/energy-resources/

University of Michigan: MEng in Energy Systems
http://energy.umich.edu/students/degree-programs

University of New South Wales, Sydney: MEngSc in Renewable Energy

TU Eindhoven: MSc, PhD in Sustainable Energy Technology
https://www.tue.nl/en/education/tue-graduate-school/graduate-programs/sustainable-energy-technology-graduate-program/

University of Oldenburg, Master/Bachelor and PhD programs in Renewable Energy
https://www.uni-oldenburg.de/en/energycourses/programmes-in-renewable-
MASc in Sustainable Energy Engineering

energy/programmes-masterbachelor/
http://phd-renewable-energy.de/en/course-structure/

Aalborg University: MSc in Energy Engineering
http://www.en.aau.dk/education/master/energy-engineering

University of Calgary: MSc in Sustainable Energy Development
http://haskayne.ucalgary.ca/programs/sedv/about

University of Toronto: MEng, MASc, PhD with Emphasis in Sustainable Energy
http://gradstudies.engineering.utoronto.ca/professional-degrees/emphasis-in-sustainable-energy/

RESOURCES

a) Enrolment Plan
An initial intake of 15 students in the masters level program is expected to grow to a steady state intake of approximately 30 students per year by year 4, with a steady state enrolment of 60 FTE (the projected distribution of graduate students between masters and doctoral levels is consistent with historical averages in FAS programs). These projections are also consistent with the funding levels that have been announced by the Provincial Government's Ministry of Advanced Education, Skills and Training for graduate students in SEE at SFU.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments
The BC government recently announced (January 16, 2018) a total of 440 new student seats for the SEE program including 120 graduate student seats. As the SEE program is mounted, new faculty will be hired for teaching the SEE courses, and for developing the state-of-art laboratories for research in the areas of clean technologies and sustainable energy. The space for the SEE graduate program will be in the newly-built SEE building in Surrey. This is a new program, with new faculty, and new student spaces, and therefore is not expected to impact, reduce, or eliminate any other programs or resources with SFU and the new teaching bandwidth will be supplied by the hiring of new faculty specifically for this program. The Faculty of Applied Sciences plans to implement a graduated hiring plan of 22 new faculty and 16 new (8 administrative and 8 technical, respectively) staff in conjunction with mounting and deployment of SEE undergraduate and graduate programs. Following is the approximate timeline for expected faculty hires:

2018/19 Fiscal year: 6 new faculty positions
2019/20 Fiscal year: 8 new faculty positions
2020/21 Fiscal year: 4 new faculty positions
2021/22 Fiscal year: 4 new faculty positions
c) Faculty member’s teaching/supervision
In order to provide the expertise needed to cover required teaching areas, it is anticipated that incoming faculty will be balanced across the broad areas of thermo-fluids, electrical engineering and power systems, bio-process and renewable energy systems, advanced materials, mechanical design and manufacturing. In order to support and supervise graduate research in harmony with anticipated SEE research foci, it is further expected that faculty members will have research agendas relating to smart cities, clean transportation and sustainable manufacturing.

d) Proposed tuition and other program fees including a justification
Tuition will be charged on a per-term basis, consistent with SFU’s schedule of fees for regular (research based) graduate programs.
MASc in Sustainable Energy Engineering

PART C: Appendices

Appendix 1 Calendar entry

Appendix 2 New courses

Appendix 3 Letters of support

Appendix 4 Details of program steering committee

Appendix 5 Abbreviated curriculum vitae for faculty
Sustainable Energy Engineering
Master of Applied Science

Description of Program
The Master of Applied Science (MASc) in Sustainable Energy Engineering (SEE), offered through the Faculty of Applied Sciences, is a research-intensive program that has a primary emphasis on the MASc thesis. The program aims to offer a unique ecosystem for advanced research in sustainable energy engineering. Through training in formal coursework and hands-on research, SEE graduates will be capable of working with integrity to invent, improve, design and deploy sustainable clean energy technologies addressing the clean energy needs for now and the future. Candidates will develop a strong aptitude for research and exceptional quantitative, analytical, and design skills in areas such as sustainable harvesting, conversion, storage, distribution, utilization, transition, and management of energy and environmental resources.

Admission Requirements
Admission is competitive. Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 in the SFU Calendar, and have the following:

- An undergraduate (bachelor's) degree in electrical engineering, computer engineering, mechanical engineering, engineering science, mechatronic systems engineering or a related field;

- Submitted evidence of capability to undertake substantial original research;

- Identified a faculty member as a senior supervisor.

Program Requirements
This program consists of course work (12 units) and a thesis (18 units) for a minimum of 30 units. Students who lack the necessary background knowledge may, at the discretion of the supervisor or the supervisory committee, be asked to complete additional courses beyond the program requirements in order to broaden the students’ preparation for undertaking thesis work.

Students must complete
SEE 896 (0): MASc Research Seminar*

and three of (with a minimum of two SEE courses)
SEE 820 (3) Materials Design for Energy Systems
SEE 821 (3) Membranes and Filtration
SEE 850 (3) Energy Storage Systems
SEE 891 (3) Directed Studies
SEE 893 (3) Special Topics I
SEE 894 (3) Special Topics II
SEE 895 (3) Special Topics III
MSE 722 - Fuel Cell Systems (3)
MSE 780 - Manufacturing Systems (3)
MSE 821 - Advanced Conduction Heat Transfer (3)
MSE 822 - Advanced Convection Heat Transfer (3)
ENSC 801 - Linear System Theory (3)
ENSC 802 - Stochastic Systems (3)
ENSC 810 - Statistical Signal Processing (3)
ENSC 833 - Network Protocols and Performance (3)
ENSC 835 - Communication Networks (3)
ENSC 854 - Integrated Microsensors and Actuators (3)

and one three unit graduate elective course in consultation with the senior supervisor
and a thesis
SEE 898 – MASc Thesis (18)

*Students must enroll in this course every term

Program Length
Students are expected to complete the program requirements within six terms.

Academic Requirements within the Graduate General Regulations
All graduate students must satisfy the academic requirements that are specified in the graduate general regulations, as well as the specific requirements for the program in which they are enrolled.
Sustainable Energy Engineering Program

Appendix 2: New Courses

August 2018
Faculty of Applied Sciences
New Courses

- SEE 820 (3) Materials Design for Energy Systems
- SEE 821 (3) Membranes and Filtration
- SEE 850 (3) Energy Storage Systems
- SEE 891 (3) Directed Studies
- SEE 893 (3) Special Topics I
- SEE 894 (3) Special Topics II
- SEE 895 (3) Special Topics III
- SEE 896 (0) MASc Research Seminar
- SEE 898 (18) MASc Thesis
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. FSYC)</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title (max. 100 characters)</td>
<td>Materials Design for Energy Systems</td>
</tr>
<tr>
<td>Short title (for enrollment/transcript - max. 30 characters)</td>
<td>DSSQHFSys EDSTQSystS</td>
</tr>
<tr>
<td>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)</td>
<td>Modern engineering materials design for energy system applications. Predictive modelling and design implications applied to energy systems. Advanced theoretical and experimental investigations will be discussed to understand the methodologies for design of materials and machinery to be applied to the energy conversion.</td>
</tr>
<tr>
<td>Rationale for introduction of this course</td>
<td>This course represents a core graduate level technical offering in Sustainable Energy Engineering, in conjunction with the proposed SEE MASc and PhD programmes.</td>
</tr>
<tr>
<td>Term of initial offering (eg. Fall 2019)</td>
<td>Fall 2019</td>
</tr>
<tr>
<td>Course delivery (eg. 3 hrs/week for 13 weeks)</td>
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<tr>
<td>Prerequisite and/or Corequisite</td>
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</tr>
<tr>
<td>Criminal record check required?</td>
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<td>Additional course fees?</td>
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</tr>
<tr>
<td>Campus where course will be taught</td>
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<td>Lecture</td>
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<tr>
<td>Seminar</td>
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* 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
Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON
Academic Unit / Program
Faculty of Applied Sciences
Name (typically, Graduate Program Chair)
Kevin Oldknow
Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

<table>
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FACULTY APPROVAL
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Overlap check done? [ ] Yes

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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

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<td></td>
<td>SEP 24 2018</td>
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</table>

Page 2 of 2 Revised December 2017
Sustainable Energy Engineering

SEE 820 (3) Materials Design for Energy Systems

Units: 3

Course Description

Engineering material design including composite materials has been increasingly used in modern energy applications such as battery, fuel cell, and oil & gas industries. This course aims to give an advanced understanding of modern engineering material design for energy system applications and an appreciation of predictive modelling and design implications when designed materials are applied to energy systems. So this course gives students a graduate-level introduction to the materials engineering that underpins the design of energy systems. Advanced theoretical and experimental investigations will be discussed to understand the methodologies for design of materials and machinery to be applied to the energy conversion.

Pre-requisites

Recommended: SEE 222 (Engineering Materials for Energy Systems)

Resources / References

Handbook of Battery Materials, 2011 Wiley

Plus additional readings given by instructor

Intended Learning Outcomes

1. Students will learn to apply advanced science such as the materials science and engineering that underpins the design of energy systems.
2. Students will learn to integrate understanding of the scientific and engineering methodologies for design of materials and machinery to be applied to the energy conversion.
3. Students will understand to apply and integrate knowledge from each of the material engineering elements of the applications to solve materials selection and design problems.
4. Students will possess the skills and techniques necessary for modern materials engineering practice in energy systems.
5. Students will be knowledgeable of contemporary issues relevant to sustainable energy engineering by optimal material selection.
Subjects & Topics
1. Design and Fabrication of Electrochemical Energy Storage
2. Design Materials for Battery Systems
3. Design Polymer Electrolyte Materials for Battery and Super-capacitors
4. Failure Analysis of Fuel Cell Materials
5. Material Designs for Solar Energy Conversion
6. Material Design for Thermoelectric System

Course Format
- 3 hours/week of lectures
- Problem sets & tutorials – material design assignments
- Real world project - interpret a real world's engineering material selection problem in the context of energy engineering as a project and write a report.
- Mid-term Exam
- Final Exam

Grading
- Problem sets (15%)
- Project report (20%)
- Midterm (25%)
- Final exam (40%)
## New Graduate Course Proposal

**Course Subject (eg. PSYC)** SEE  
**Number (eg. 810)** 821  
**Units (eg. 4)** 3

### Course title (max. 100 characters)

**Membranes and Filtration**

### Short title (for enrollment/transcript - max. 30 characters)

Membranes and Filtration

### 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)

Water usage and global water shortages; principles of membrane separation including microfiltration, ultrafiltration, nanofiltration and reverse osmosis; physico-chemical criteria for separations and membrane materials; basic mass transport in mixed solute systems; polarization and fouling; prediction of membrane performance; operational issues, limitations, energy requirements and system configurations.

### Rationale for introduction of this course

This course represents a core graduate level technical offering in Sustainable Energy Engineering, in conjunction with the proposed SEE MASc and PhD programmes.

### Term of initial offering (eg. Fall 2019)

**Fall 2019**

### Course delivery (eg. 3 hrs/week for 13 weeks)

3 hrs/week for 13 weeks

### Frequency of offerings/year

1 time/year

### Estimated enrollment per offering

20

### Equivalent courses (courses that replicate the content of this course to such an extent that students should not receive credit for both courses)

Recommended: SEE 224 and SEE 225. Co-requisite: SEE 896 or SEE 897.

### Prerequisite and/or Corequisite

Additional course fees? □ Yes □ No

Criminal record check required? □ Yes □ No

Campus where course will be taught

- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

Course Components *

- Lecture
- Seminar
- Lab
- Independent
- Capstone

Grading Basis

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

Repeat for credit? □ Yes □ No

Total repeats allowed? ____________

Repeat within a term? □ Yes □ No

Required course? □ Yes □ No

Final exam required? □ Yes □ No

Capstone course? □ Yes □ No

Combined with a undergrad course? □ Yes □ No

* 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

Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course

None

CONTACT PERSON

Academic Unit / Program
Faculty of Applied Sciences

Name (typically, Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Kevin Oldknow
Signature
Date Aug 7th, 2018

FACULTY APPROVAL

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

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
Signature
Date 08/01/18

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
Jeff Derksen
Signature
Date SEP 24 2018
Course Description

Separation and filtration are important and energy intensive processes used in industry as well as in the supply of clean water. The course covers: water usage and global water shortages; principles of membrane separation including microfiltration, ultrafiltration, nanofiltration and reverse osmosis; physico-chemical criteria for separations and membrane materials; basic mass transport in mixed solute systems; polarization and fouling; prediction of membrane performance; operational issues, limitations, energy requirements and system configurations.

Pre-requisites

Basic knowledge of transport phenomena and thermodynamics

Recommended: SEE 224 (Thermodynamics for Energy Engineering) and SEE 225 (Fluid Mechanics)

Resources / References

Membrane Technology and Applications, Third Edition
Richard W. Baker
John Wiley & Sons, 2012
Print ISBN: 9780470743720
Online ISBN: 9781118359686

Lawrence K. Wang, Jiaping Paul Chen, and Yung-Tse Hung (Editors)
Humana Press, 2010
PRINT ISBN: 9781588299406
EBOOK ISBN: 9781597452786

Principles of Water Treatment
Kerry J. Howe, David W. Hand, John C. Crittenden, R. Rhodes Trussell, George Tchobanoglous
John Wiley & Sons, 2012
PRINT ISBN: 9780470405383
EBOOK ISBN: 9781118309674
Intended Learning Outcomes

1. Identify filtration requirements for different streams.
2. Describe different types of membranes and filtration materials and systems.
3. Understand the physico-chemical processes and limitations in membrane separation and filtration processes.
4. Apply knowledge and predictive models to compare and assess performance in terms of cost, efficiency, energy requirements and lifetimes/fouling for various applications.

Subjects & Topics

1. Introduction: global water needs and resources; membrane processes; advantages, limitations and range of applications
2. Fundamentals: function of membranes; membrane processes; transport mechanism
3. Overview of materials and structures of synthetic membranes
4. Fluxes and driving forces in membrane separation processes: mass transport; membrane separation capability; chemical and electrochemical equilibrium in membrane processes; osmotic equilibrium, osmotic pressure, osmosis, and reverse osmosis.
5. Membrane processes: microfiltration; ultrafiltration; reverse osmosis; gas separation
6. System considerations: system design; fouling; energy requirements.

Course Format

- 3 hours/week of lectures
- Term paper: students will perform a literature review of a pre-approved application area of membrane and filtration processes with a focus on a critical assessment including one or more of: design, performance, techno-economics.

Grading

- Midterm examination: 20%
- Final Examination: 50%
- Term paper: 30%
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
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<tbody>
<tr>
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<tr>
<td>Units (eg. 4)</td>
<td>3</td>
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</tbody>
</table>

**Course title (max. 100 characters)**

**Energy Storage Systems**

**Short title (for enrollment/transcript - max. 30 characters)**

**Energy Storage Systems**

**Course description for SFU Calendar**
Electrochemical, mechanical and thermal energy storage techniques; integration for stationary and mobile applications; design tradeoffs to understand environmental impacts, cost, reliability, and efficiency.

**Rationale for introduction of this course**
This course represents a core graduate level technical offering in Sustainable Energy Engineering, in conjunction with the proposed SEE MASc and PhD programmes.

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**Equivalent courses**
Courses that replicate the content of this course to such an extent that students should not receive credit for both courses.

**Prerequisite and/or Co-requisite**
Recommended: SEE 224 and SEE 230. Co-requisite: SEE 896 or SEE 897.

**Criminal record check required?**
Yes if yes is selected, add this as a prerequisite

**Additional course fees?**
Yes [No

**Campus where course will be taught**
Burnaby [Surrey [Vancouver [Great Northern Way [Off campus

**Course Components**
- Lecture [Seminar [Lab [Independent [Capstone

**Grading Basis**
- Letter grades [Satisfactory/ Unsatisfactory [In Progress / Complete

**Repeat for credit?**
Yes [No

**Total repeats allowed?**

**Repeat within a term?**
Yes [No

**Required course?**
Yes [No

**Final exam required?**
Yes [No

**Capstone course?**
Yes [No

**Combination with a undergraduate course?**
Yes [No

*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.

Faculties/Instructors who will normally teach this course

Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course

None

CONTACT PERSON

Academic Unit / Program
Faculty of Applied Sciences

Name (typically, Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

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Overlap check done? □ yes □ no

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<td>M. F. Beg</td>
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Sustainable Energy Engineering

SEE 850 (3) Energy Storage Systems

Units: 3

Course Description

The growth in renewable energy generation together with the expanding electrification of transport require energy storage solutions to meet a range of challenges including variability and mobility. Topics covered include: electrochemical, mechanical and thermal energy storage techniques; integration for stationary and mobile applications; design tradeoffs to understand environmental impacts, cost, reliability, and efficiency.

Pre-requisites

Recommended: SEE 224 (Thermodynamics for Energy Engineering) and SEE 230 (Electrical Circuits)

Resources / References

Energy Storage-Fundamentals, Materials and Applications
Robert Huggins
Springer, Cham, 2016
Print ISBN: 978-3-319-21238-8
Online ISBN: 978-3-319-21239-5

Komarnicki P., Lombardi P., Styczynski Z.
Springer, Berlin, 2017
Print ISBN: 978-3-662-53274-4
Online ISBN: 978-3-662-53275-1

Thermal Energy Storage Using Phase Change Materials
Amy S. Fleischer
Springer, Cham, 2015
Print ISBN: 978-3-319-20921-0
Online ISBN: 978-3-319-20922-7

Intended Learning Outcomes

1. Compare and contrast methods of energy storage management in terms of cost, size, weight, reliability, efficiency and lifetimes.

2. Describe the energy storage need of stationary and mobile systems, both present and future.
3. Define the advantages and disadvantages of storage integration in various energy systems and settings, e.g. residential, remote community, public transportation, microgrids.

4. Analyze the impact of energy storage on system performance, system efficiency, and the environment.

Subjects & Topics
1. Intro to energy storage
2. Energy storage criteria: energy; power; size; economics
3. Electrochemical energy storage: batteries; fuel cells; flow batteries; ultracapacitors,
4. Mechanical energy storage: pumped hydro; compressed gas; flywheel
5. Thermal energy storage: sensible heat, latent heat, and thermochemical storage
6. Other storage option: hydrogen; power to gas; smart grids
7. System considerations; environmental impacts.

Course Format
- 3 hours/week of lectures, discussions, presentations over 13 week term.
- Students will perform a cases study to apply and integrate the concepts.

Grading
- Case study including presentation and technical report: 50%
- Midterm examination: 15%
- Final Examination: 35%
## New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
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<th>891</th>
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</table>

### Directed Studies

- **Course title (max. 100 characters)**: Directed Studies
- **Short title (for enrollment/transcript - max. 30 characters)**: Directed Studies
- **Course description for SFU Calendar**: Directed Study in Sustainable Energy Engineering

### Rationale for introduction of this course

This course will provide the mechanism for graduate students to register for a directed study in partial fulfillment of the requirements toward their degree.

### Term of initial offering (eg. Fall 2019)

- **Fall 2019**

### Course delivery (eg. 3 hrs/week for 13 weeks)

- **3 hrs/week for 13 weeks**

### 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

- **Co-requisite**: SEE 896 or SEE 897

### Criminal record check required?

- **Yes**

### Additional course fees?

- **Yes**

### Campus where course will be taught

- **Burnaby**
- **Surrey**
- **Vancouver**
- **Great Northern Way**
- **Off campus**

### Course Components

- **Lecture**
- **Seminar**
- **Lab**
- **Independent**
- **Capstone**

### Grading Basis

- **Letter grades**
- **Satisfactory/ Unsatisfactory**
- **In Progress / Complete**

### Repeat for credit?

- **Yes**

### Required course?

- **Yes**

### Combined with a undergrad course?

- **Yes**

### Capstone course?

- **Yes**

### Additional course fees?

- **Yes**

* 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.

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<td>Kevin Oldknow</td>
<td><a href="mailto:koldknow@sfu.ca">koldknow@sfu.ca</a></td>
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## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign.

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## FACULTY APPROVAL

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- **Overlap check done?** YES

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**Administrative Section (for DGS office only)**

- Library Check: SEP 06, 2018
- Course Attribute:
- Course Attribute Value:
- Instruction Mode:
- Attendance Type:
# Special Topics I

**Course title (max. 100 characters)**

Special Topics in Sustainable Energy Engineering

**Course description for SFU Calendar**

Special Topics in Sustainable Energy Engineering

**Rationale for introduction of this course**

At the SEE M.A.Sc. and Ph.D. programs are mounted and corresponding faculty hired, graduate courses will initially be offered as special topics and subsequently regularized.

**Term of initial offering (eg. Fall 2019)**

Fall 2019

**Course delivery (eg. 3 hrs/week for 13 weeks)**

3 hrs/week for 13 weeks

**Frequency of offerings/year**

3 times/year

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

Co-requisite: SEE 896 or SEE 897

**Additional course fees?**

Yes [X] No

**Criminal record check required?**

Yes [X] No

**Campus where course will be taught**


**Course Components**

- Lecture [X] Seminar [X] Lab [X] Independent [X] Capstone [X]

**Grading Basis**

- Letter grades [X] Satisfactory/ Unsatisfactory [X] In Progress / Complete [X]

**Repeat for credit?**

Yes [X] No

**Total repeats allowed?**

9

**Repeat within a term?**

Yes [X] No

**Required course?**

Yes [X] No

**Final exam required?**

Yes [X] No

**Capstone course?**

Yes [X] No

**Combined with a undergrad course?**

Yes [X] No

If yes, identify which undergraduate course and the additional course requirements for graduate students:

* See important definitions on the curriculum website.

Page 1 of 2 Revised December 2017
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
Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON

Academic Unit / Program
Faculty of Applied Sciences

Name (typically, Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee

Signature

Date

Department Chair

Signature

Date

FACULTY APPROVAL

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Overlap check done? Yes

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Faculty Graduate Studies Committee

Signature

Date

M. E. Beg

08/07/18

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

Jeff Derksen

Signature

Date

SEP 24 2018

Page 2 of 2 Revised December 2017
### New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. FSYC)</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>894</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
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</table>

#### Special Topics II

<table>
<thead>
<tr>
<th>Course title (max. 100 characters)</th>
<th>Special Topics II</th>
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</thead>
</table>

**Short title (for enrollment/transcript - max. 30 characters)**

<table>
<thead>
<tr>
<th>Special Topics II</th>
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</thead>
</table>

**Course description for SFU Calendar**

- "The purpose of this course is..."
- "If the grading basis is satisfactory/unsatisfactory include this in the description"

Special Topics in Sustainable Energy Engineering

#### Rationale for introduction of this course

At the SEE M.A.Sc. and Ph.D. programs are mounted and corresponding faculty hired, graduate courses will initially be offered as special topics and subsequently regularized.

#### Term of initial offering (eg. Fall 2019)

<table>
<thead>
<tr>
<th>Fall 2019</th>
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<tr>
<th>Course delivery (eg. 3 hrs/week for 13 weeks)</th>
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<tbody>
<tr>
<td>3 hrs/week for 13 weeks</td>
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</table>

<table>
<thead>
<tr>
<th>Frequency of offerings/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 times/year</td>
</tr>
</tbody>
</table>

#### Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

- Fall 2019

#### Prerequisite and/or Corequisite

- Co-requisite: SEE 896 or SEE 897

#### Criminal record check required?

- Yes

- if yes is selected, add this as prerequisite

- Additional course fees?

- Yes

#### Campus where course will be taught

- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

#### Course Components

- Lecture
- Seminar
- Lab
- Independent
- Capstone

#### Grading Basis

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

#### Repeat for credit?

- Yes
- No

- Total repeats allowed?

- Repeat within a term?

- Yes
- No

#### Required course?

- Yes
- No

- Final exam required?

- Yes
- No

- Capstone course?

- Yes
- No

#### Combined with a undergrad course?

- Yes
- No

* 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

Faculty instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty member(s), space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON

Academic Unit / Program
Faculty of Applied Sciences

Name (typically Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL
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

Overlap check done? [X] 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
Signature
Date

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
Jeff Derksen
Signature
Date

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

Page 2 of 2 Revised December 2017
**New Graduate Course Proposal**

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
<th>Number (eg. 810)</th>
<th>895</th>
<th>Units (eg. 4)</th>
<th>3</th>
</tr>
</thead>
</table>

**Course title (max. 100 characters)**

**Special Topics III**

**Short title (for enrollment/transcript - max. 30 characters)**

**Special Topics III**

**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)

Special Topics in Sustainable Energy Engineering

**Rationale for introduction of this course**

At the SEE M.A.Sc. and Ph.D. programs are mounted and corresponding faculty hired, graduate courses will initially be offered as special topics and subsequently regularized.

**Term of initial offering (eg. Fall 2019)**

Fall 2019

**Course delivery (eg. 3 hrs/week for 13 weeks)**

3 hrs/week for 13 weeks

**Frequency of offerings/year**

3 times/year

**Estimated enrollment per offering**

20

**Equivalent courses (courses that replications the content of this course to such an extent that students should not receive credit for both courses)**

**Prerequisite and/or Corequisite**

Co-requisite: SEE 896 or SEE 897

**Criminal record check required?**

☐ Yes if yes is selected, add this as prerequisite

**Additional course fees?**

☐ Yes ☐ No

**Campus where course will be taught**

Burnaby ☑ Surrey ☑ Vancouver ☐ Great Northern Way ☐ Off campus

**Course Components**

☐ Lecture ☑ Seminar ☐ Lab ☐ Independent ☐ Capstone

**Grading Basis**

☑ Letter grades ☐ Satisfactory/ Unsatisfactory ☐ In Progress / Complete

**Repeat for credit?**

☐ Yes ☑ No

**Total repeats allowed?**

9

**Repeat within a term?**

☐ Yes ☑ No

**Required course?**

☐ Yes ☑ No

**Final exam required?**

☑ Yes ☐ No

**Capstone course?**

☐ Yes ☑ No

**Combined with a undergraduate course?**

☐ Yes ☑ No

If yes, identify which undergraduate course and the additional course requirements for graduate students:

* See important definitions on the curriculum website.

Page 1 of 2 Revised December 2017
### RESOURCES

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

<table>
<thead>
<tr>
<th>Faculty member(s) who will normally teach this course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional faculty members, space, and/or specialized equipment required in order to offer this course</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

### CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty of Applied Sciences</td>
<td>Kevin Oldknow</td>
<td><a href="mailto:koldknow@sfu.ca">koldknow@sfu.ca</a></td>
</tr>
</tbody>
</table>

### ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign.

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Chair</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Kevin Oldknow</td>
<td></td>
<td>16/5 7/18</td>
</tr>
</tbody>
</table>

### FACULTY APPROVAL

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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. E. Beg</td>
<td></td>
<td>08/07/18</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 2 4 2018</td>
</tr>
</tbody>
</table>
## Course Proposal

### Course Information
- **Subject**: SEE
- **Number**: 896
- **Units**: 0

### Course Title
**MASc Research Seminar**

### Course Description
**Short title**: MASc Research Seminar

**Course description for SFU Calendar**: Presentation and discussion of research topics and progress in seminar and publication formats. MASc students must enroll in SEE 896 during every term during which they are registered, until all program requirements have been met.

### Rationale for Introduction
This course is intended to develop presentation, writing and feedback skills, and to give students in the program an opportunity to build a sense of community and disseminate their work to fellow students and faculty members on a regular basis. Guest seminars will also expose students to key societal, academic and industrial topics salient to a graduate education in Sustainable Energy Engineering. Students will receive a letter grade in each term for the duration of their studies.

### Term of Initial Offering
- **Fall 2019**

### Frequency of Offerings/Year
- **3 times/year**

### Estimated Enrollment per Offering
- **30**

### Rationale for Introduction
This course is intended to develop presentation, writing and feedback skills, and to give students in the program an opportunity to build a sense of community and disseminate their work to fellow students and faculty members on a regular basis. Guest seminars will also expose students to key societal, academic and industrial topics salient to a graduate education in Sustainable Energy Engineering. Students will receive a letter grade in each term for the duration of their studies.

### Course Components
- **Grading Basis**: Letter grades
- **Repeat for credit?**: Yes
- **Total repeats allowed?**: 15

### Additional Information
- **Prerequisite and/or Corequisite**: See important definitions on the curriculum website.

---

*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

Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON
Academic Unit / Program
Faculty of Applied Sciences
Name (typically, Graduate Program Chair)
Kevin Oldknow
Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee  Signature  Date

Department Chair  Signature  Date
Kevin Oldknow  

FACULTY APPROVAL
The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-lis@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  Signature  Date
M.E. Berg  

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  Signature  Date
Jeff Derksen  SEP 24 2018
Sustainable Energy Engineering

SEE 896 (0) M.A.Sc. Research Seminar

Credits: 0

Course Description

Presentation and discussion of research topics and progress in seminar and publication formats. MAsc students must enroll in SEE 896 during every term during which they are registered, for the duration of their program (i.e. until the student has met all program requirements).

Intended Learning Outcomes

1. Develop and present a research presentation, provide an effective description of the student's research topic and progress thus far.
2. Provide constructive, analytical and empowering feedback to peers on presentations.
3. Prepare a written description of the student's research topic and progress thus far, in article format and using an appropriate writing style.
4. Provide constructive, analytical and empowering feedback to peers on writing samples.

Subjects and Topics

1. Writing processes, form, format
2. Academic/technical writing conventions
3. Critical and creative thinking
4. Referencing conventions and research strategies
5. Writing styles
6. Graphics and punctuation
7. Oral presentations
8. Presentation slide development
9. Providing constructive, analytical and empowering feedback
10. Teamwork skills and professionalism/responsibility

Course Format

- The class will meet regularly during the semester (nominally three hours per week for 13 weeks). These sessions will be divided into regularly scheduled seminar days, and writing and presentation workshops.
• On seminar days, students will make seminar-style presentations to colleagues, faculty and staff members. Each student can expect to deliver one presentation per term, based on a schedule that is announced at the beginning of the term. When not themselves presenting, students are expected to attend their peers' presentations and prepare constructive, analytical and empowering feedback (using a form provided). Guest speakers will be invited on occasion to discuss topics relating to Sustainable Energy Engineering.

• On writing and presentation workshop days, guidance and instruction will be provided covering the topic areas listed above. Student will additionally work on revisions to their written assignments and provide feedback to peers on samples of their writing.

Grading Scheme:

The following grading scheme will be used to establish a grade for each student at the end of each term.

• Research Paper: 35%
• Feedback given to peers on their written work: 15%
• Presentation: 35%
• Feedback given to peers on their presentations: 15%
# New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
<th>Number (eg. 810)</th>
<th>898</th>
<th>Units (eg. 4)</th>
<th>18</th>
</tr>
</thead>
</table>

## MASc Thesis

### Course title (max. 100 characters)
**MASc Thesis**

### Short title (for enrollment/transcript - max. 30 characters)
**MASc Thesis**

### 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)

**MASc Thesis**

### Rationale for introduction of this course

### Term of initial offering (eg. Fall 2019)
**Fall 2019**

### Course delivery (eg. 3 hrs/week for 13 weeks)
**n/a**

### Frequency of offerings/year
**Spring, Summer, Fall**

### Estimated enrollment per offering
**30**

### 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

#### Co-requisite: SEE 896 (0) Research Seminar

### Criminal record check required?
- Yes
- *if yes is selected, add this as prerequisite*

### Additional course fees?
- Yes
- *No*

### Campus where course will be taught
- **Burnaby**
- **Surrey**
- **Vancouver**
- **Great Northern Way**
- **Off campus**

### Course Components
- Lecture
- Seminar
- Lab
- Independent
- Capstone

### Grading Basis
- Letter grades
- Satisfactory/Unsatisfactory
- In Progress/Complete

### Repeat for credit?
- Yes
- No

### Total repeats allowed
**9**

### Repeat within a term?
- Yes
- No

### Required course?
- Yes
- No

### Final exam required?
- Yes
- No

### Capstone course?
- Yes
- No

### Combined with a undergrad course?
- Yes
- 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

Faculty/instructors will be hired prior to the first offering of the course.

Additional faculty members, space, and/or specialized equipment required in order to offer this course

None

CONTACT PERSON

Academic Unit / Program | Name (typically, Graduate Program Chair) | Email
---|---|---
Faculty of Applied Sciences | Kevin Oldknow | koldknow@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee | Signature | Date
---|---|---
Department Chair | Kevin Oldknow | [signature] | Aug 7, 2018

FACULTY APPROVAL
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

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 | Signature | Date
---|---|---
M-F R | [signature] | 08/07/18

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 | Signature | Date
---|---|---
Jeff Derksen | [signature] | SEP 24 2018
Sustainable Energy Engineering Program

Appendix 3: Letters of Support

University of British Columbia Faculty of Applied Science
University of Victoria Institute for Integrated Energy Systems
Surrey Board of Trade
Simba Technologies
Ballard Power Systems
Association of Professional Engineers & Geoscientists of BC
Downtown Surrey Business Improvement Association
Alpha Technologies
Powertech Labs
City of Surrey Mayor

August 2018
Faculty of Applied Sciences
June 13, 2018

Professor Eugene Fiume  
Dean, Faculty of Applied Science  
Simon Fraser University  
8888 University Drive  
Burnaby, BC V5A 1S6  

Dear Eugene,

As you know, British Columbia currently graduates less than half the number of Masters- and PhD-level engineers as compared to our peer provinces, Ontario and Quebec. The opportunity to increase the number of graduate students in engineering programs across all of British Columbia has been a shared goal of all our institutions, and is critical to the future of the Province. Thus, I am writing to express my support for the proposed graduate programs in Sustainable Energy Engineering (SEE) at Simon Fraser University.

By building on SFU’s existing collaborations with industry and local government, and by leveraging SFU’s strengths in energy systems, mechatronics, wireless communications, and big data analytics, the proposed SEE programs will provide students with research and employment opportunities in areas such as smart cities and zero emissions buildings, clean transportation, and sustainable manufacturing. With specialized knowledge and research skills that are directly relevant to the BC cleantech industry, SEE students will enrich the talent pool for one of the fastest-growing sectors of the BC economy.

On behalf of the University of British Columbia’s Faculty of Applied Science—which itself provides strong graduate training in clean technology, smart cities, and sustainable transportation—I look forward to welcoming the proposed SEE programs into the engineering educational landscape and to even greater collaboration between our institutions. Indeed, it is only by working together that we can help BC realize its potential to be a global leader in cleantech innovation.

Once again, I enthusiastically support the proposed graduate programs in Sustainable Energy Engineering at SFU and wish you success in implementing them.

Sincerely,

James Olson, PhD, P.Eng., FCAE  
Dean, Faculty of Applied Science
June 10, 2018

Dr. Kevin Oldknow, P.Eng.
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering Program
Simon Fraser University

Re: Proposed Sustainable Energy Engineering program

Dear Dr. Oldknow,

The proposed graduate program in Sustainable Energy Engineering is a welcome addition to the training and education of highly qualified personnel for British Columbia and Canada. This program will produce engineering graduates with advanced knowledge and specialized research skills in clean energy systems, combining in-depth knowledge of energy technologies with a broad understanding of the techno-economic and social aspects of energy systems. These are the types of graduates in demand by organizations in both the public and private energy sectors locally and globally engaged in the growing green economy. This program will breed specialists and research engineers with strong grounding in foundational topics in energy engineering, and with the ability to integrate the social, environmental and economic aspects of sustainability in research aimed at developing new solutions. Holistic energy systems training has been limited so far to a few small graduate programs around the world, and additional training capacity is urgently needed within BC, Canada and globally to meet the challenges of deploying sustainable energy solutions adapted to diverse geographic, socio-economic and policy environments.

The MASc and PhD programs strengths include partnerships and expanding collaboration with the cleantech industry cluster in the South Fraser Region; the unique ties with the City of Surrey and its progressive sustainability agenda; and the planned recruitment of faculty with research foci in key areas of smart cities, clean transportation and sustainable manufacturing, complemented by two high visibility research chairs (Canada Research Chair in Sustainable Energy Systems Modelling and Industrial Research Chair in Energy Systems for Smart Cities).

With the continuing progress in the development and cost reduction of “clean”, “green” and renewable energy technologies and the global drive to meet challenging emissions and climate change targets, new opportunities are arising in the transportation, building, and process and manufacturing sectors. The ability to achieve these target and capitalize on the opportunities will depend to a large extent on the availability of specialist combining research skills to chart innovative and economically viable solutions and the knowledge and skill sets required to work in interdisciplinary teams that can promote and facilitate adoption of these solutions by Society. The SEE graduate program is aimed at producing such specialists, and will represent a valuable addition to the existing engineering graduate programs to support innovation and sustainability in British Columbia and across Canada.

Sincerely,

Ned Djilali, PhD PEng FCAE FRSC
Canada Research Chair and Professor of Mechanical Engineering
This project is needed to meet the growing enrollment demand from the fast-growing university-aged population in the fast-growing university-aged population in the Fraser Valley. BC has the highest labour market demand for engineers in Canada but seriously lags behind peer provinces in the percentage of engineering graduates per capita. The technology sector growth has been suppressed due to a lack of engineering talent according to the BC Technology Industries Association.

This project will accommodate growth and labour market demand driven capacity created by the need for sustainable energy solutions in industries, such as clean-tech, construction/building, natural resources, transportation, utilities, and information.

SFU Surrey is the only research university in the Fraser Valley region. The project provides the opportunity for inter-disciplinary collaboration for which SFU and SFU Surrey have a long tradition. The programs offered in this building will provide the training and education required to meet BC's labour market needs and maintain a competitive economy.

The expansion of SFU Surrey's engineering and academic programs will support the institution's vision for the expansion of innovative education, cutting-edge research, and community engagement. SFU Surrey has been a living example of what it means to be an "S"-shaped university.

A new SFU building in Surrey will also support expansion of the province within the City of Surrey's revitalized downtown and its proposal for community partnerships through use of the old and historic theatres.

The SBOT acknowledges the importance of SFU's work to make a difference in the community and supports their application to a new Engineering Building to accommodate a new Engineering building to expand SFU's ability to educate and train engineers in various fields.
May 3, 2016

To whom it may concern:

Re: SFU Proposed Sustainable Energy and Environmental Engineering Program

I am writing this letter in conjunction with Amyn Rajan, CEO of Simba Technologies, to show our support for the expansion of SFU’s Surrey campus. This proposed expansion would see the installation of a new engineering building to increase student training spaces, as well as research, development and design labs.

Simba Technologies is a Vancouver software company that provides advanced analytical data access through its software, support and professional services. We partner with leading software companies around the globe to ensure we develop robust, commercial-grade analytics software solutions.

As a member of the local high-tech profession, we are a strong advocate for improving education in British Columbia. Amyn and Simba Technologies have donated more than $1 million to support student scholarships around the province aimed at improving diversity, and ensuring research and development remain at world-class levels in B.C.

We believe SFU’s proposed Sustainable Energy and Environmental Engineering Program (SE3P) would train the next-generation of engineers who incorporate a new spirit of innovation into their work.

It is our understanding the new building in Surrey would enable 320 new undergraduate student spaces and 120 graduate student spaces in the SE3P program. It would also allow the School of Mechatronic Systems Engineering to expand their research program into a custom-built space in the new building and provide new design studios to support its Technology Entrepreneurship@SFU program.

B.C. needs to offer cutting-edge technology engineering education to stay ahead of advances and to compete on the world stage.

Currently, Simba is in an accelerated growth period and in a little more than a year we have doubled our staff complement from 75, to over 150 employees. The only limitation to our growth, and our ability to further entrench the world-wide data connectivity marketplace to British Columbia and Canada, is our access to skilled, educated and qualified employees. We rely heavily on SFU to help meet our recruitment demands.

This project will meet the increasing enrollment demand from the fast-growing university-aged population in the south Fraser Valley and for engineers. B.C. has one of the highest labour market demand for engineers in Canada but seriously lags behind peer provinces in the percentage of engineering graduates per capita.

As a member of the technology sector in Vancouver, we can speak to how growth in our company has been suppressed due to a lack of talent. A project of this magnitude can help alleviate the issues that B.C. is facing in terms of talent shortages.
If you wish to hear directly from me, I would be more than pleased to speak to you directly about the possible impacts of SFU’s Surrey campus expansion.

Sincerely,

[Signature]
Kelly Rainsforth
Director Human Resources

[Signature]
Amyn Rajan
CEO
May 4, 2016

To whom it may concern,

I am writing to express my strong support for the proposed expansion of SFU’s Surrey campus with a new engineering building which will house expanded research facilities and student training spaces.

As a member of Industry working in fuel cell production, Ballard has collaborated with SFU’s School of Mechatronic Systems Engineering for eight years. Our areas of collaboration include research involving polymer electrolyte membrane (PEM) fuel cells used to run transportation vehicles and other motive applications, such as heavy-duty transit buses and fork lifts, as well as to power stationary systems. SFU and Ballard have received multi-year funding through the NSERC Automotive Partnership Canada program and this collaboration has enabled us to do Innovative research together with faculty members and highly trained graduate students. We also hire SFU co-op students and post-doctoral fellows and provide training to them in fuel cell research and development. Overall, our collaboration with SFU involves more than four faculty members, and several dozen graduate students and undergraduate students.

This partnership is extremely valuable to Ballard as it enables us to tap into significant expertise and innovative and novel ideas at the university to broaden our capabilities. For instance, through close collaboration with Ballard, SFU has developed a unique understanding of an important lifecycle mechanism for PEM fuel cell operation, which will support an improved ability to design fuel cells to achieve outstanding durability. This will directly support achieving full commercial competitiveness with incumbent technologies for fuel cell powered buses in the near- to mid-term.

We see tremendous benefit in expanding SFU’s Surrey campus and introducing a program dedicated to sustainable energy and environmental engineering. This type of Innovative program would serve companies such as Ballard very well in terms of developing a greater pool of talent to draw upon in the alternative industry sector. We have already hired engineers from SFU, drawn mostly from our collaborative efforts. We have an ongoing need for skilled fuel cell/clean energy engineers and find it difficult to find those with the appropriate background. An expansion of the SFU engineering program will support our future needs in this area.

The new building will support a new sustainable energy and environmental engineering program, allow for an additional 120 graduate students and house mechatronics research being done today in Surrey’s Central City mall building. It will also enable the hiring of more than 18 research faculty to expand the research capacity in the energy, hydrogen, clean-tech, electricity, and LNG sectors.

I am in full support of this expansion and believe it could bring tremendous benefit to engineering training and help to propel B.C. to a leadership position in research and development in the alternative energy sector. At Ballard we operate in a highly competitive sector and need to stay on the leading edge of our market – education and training is a key component to this and we believe the direction that SFU is taking with its new program is exactly what is needed at this time.

Sincerely,

Dr. Kevin Colbow
Vice President, Technology & Product Development

Tel.: 604-412-3187
Email: kevin.colbow@ballard.com
May 4, 2016

Dr. Joanne Curry  
Vice-President, External Relations  
Simon Fraser University  
Strand Hall  
8888 University Drive  
Burnaby, B.C. V5A 1S6  

Re: Proposed New Building for Sustainable Energy and Environmental Engineering Program  

Dear Dr. Curry,  

I am pleased to provide my support in principle for the proposed expansion of SFU’s Surrey campus to house the proposed new Sustainable Energy and Environmental engineering program ("SE3P"), aimed at meeting an important need in the province – that of educating future engineers capable of developing new technologies to help to meet Canada’s goals for a green economy.

I understand that once fully operational, the proposed new engineering program will add 320 undergraduate student spaces and 120 graduate spaces at SFU’s Surrey campus; and that the new five-floor engineering building will include custom-built space for research and state-of-the-art engineering training to house a the SE3P program.

It is important to the Association that all those who wish to become academically qualified to practice engineering in British Columbia have access to quality learning spaces. It is my understanding that the proposed new facilities will do just that for the SE3P program.

My experience has been that SFU has an excellent record of meeting Engineers Canada’s accreditation standards for undergraduate programs in its current Engineering Science and Mechatronic Systems Engineering programs. I look forward to the development of the proposed new SE3P undergraduate program and to SFU’s working towards the accreditation of program by Engineers Canada’s Accreditation Board.

Sincerely yours,

Gillian Pichler, P. Eng.  
Director, Registration  
Association of Professional Engineers & Geoscientists of BC

cc:  Ann English, P.Eng. Chief Executive Officer and Registrar, APEGBC  
     Tony Chong, P.Eng. Chief Regulatory Officer and Deputy Registrar, APEGBC
May 4, 2016

Support for a new Sustainable Energy and Environmental Engineering Building in Surrey Simon Fraser University (SFU) Campus

This submission is made on behalf of the Downtown Surrey Business Improvement Association.

The Downtown Surrey Business Improvement Association operates within Surrey City Centre and is comprised of 1300 businesses and property owners representing total property taxes paid of over $14 million. Our territory encompasses 60 blocks centered on King George Boulevard from 96 Avenue with additional businesses to the south surrounding Surrey Memorial Hospital, to 112 Avenue in the north. Our mission is to facilitate business improvement, community economic development, business revitalization and enhancement in what is designed and intended to be the downtown core of the City of Surrey. Our goal is to assist in building a vibrant, safe, and liveable downtown where people can invest, work, live, learn and play. Surrey City Centre is growing and evolving and we are proud to be part of this exciting change.

In the core of our Downtown, is the Surrey Simon Fraser University Campus, a leader in engaged learning, research and innovation. The demographic case for the new Sustainable Energy and Environmental Engineering Building in Surrey; South of the Fraser is well documented. There is an urgent requirement for expansion in a region that is home to over 19% of British Columbia’s population and BC’s largest school district. Simon Fraser University Surrey has surpassed its enrollment targets and the entrance grades required are continuing to rise. One of the main goals was to increase Surrey’s lower transition rates and this has been accomplished with a 10% increase in Surrey School District students moving on to post-secondary education. However, we are concerned that the lack of university spaces and availability is beginning to have a negative impact on the aspirations of BC’s future workforce who are unable to enter the program of their choice. Referring to the Conference Board of Canada, British Columbia is losing up to $4.7B in GDP and 616M in tax revenues annually because too few residents have the education and skills needed for businesses to innovate and grow.

In addition to meeting future labour market needs, the City Centre businesses believe that the growth of Surrey’s campus would act as a catalyst for economic development and would be excellent investment for our downtown core. Simon Fraser University’s establishment in 2002 has helped to define Surrey’s City Centre and fueled new growth. Further expansion in engineering, health programs and research will draw other research and community partners to the area and involve commercialization of space; will support local industries and new companies by providing access to student entrepreneurs, graduates and faculty expertise in areas of high labour market demand; and the region will benefit from spin-off companies. It will have a direct economic impact on our area coupled with the potential to advance
Canada’s climate change and sustainability goals. The foundation on innovation and entrepreneurship, in today’s world is education.

Many studies have cited that entrepreneurial students attending university develop into very successful businesspeople, which has been the documented case at Simon Fraser University. The university entrepreneur often will foster the relationships and develop their future companies within that specific community. The give back and role of growth they facilitate within the community is multi-faceted. They broaden the tax base with their spin off companies, employ local residents, serve as coaches, judge business plan competitions and serve on advisory boards for small business owners and work with local high school students on special initiatives. The SFU Surrey expansion plan is the bridge of innovation and entrepreneurship facilitating the possibilities for our future start-ups south of the Fraser.

Overall, this creates a win for education, a win for business and a big win for our youth and leaders of tomorrow; which in turn, benefits all the communities south of the Fraser.

Yours truly,
Downtown Surrey Business Improvement Association

Elizabeth Model
CEO
elizabeth@downtownsurreybia.com
Feb 3, 2017

To Whom It May Concern:

Re: Support for Expansion of SFU's Surrey Campus to introduce a new Sustainable Energy Engineering (SEE) Building

I am pleased to write this letter on behalf of Alpha Technologies Ltd., Burnaby, BC to confirm our support for the expansion of a sustainable Energy Engineering Building immediately adjacent to SFU’s existing Surrey Campus.

Alpha Technologies Ltd., a member of The Alpha Group, is an established leader in the design, manufacture, service and installation of powering solutions for the Telecom, CATV, Traffic, Security, Industrial, and Renewable Energy industries. Alpha builds on over 40 years of experience to develop solutions that resolve customers’ unique powering challenges around the world. With over 500 employees, Alpha is one of the top high-tech employers in the province of British Columbia.

The Kaiser Foundation for Higher Education is a philanthropic organization created by Alpha Technologies' founder Mr. Fred Kaiser to support higher education in the areas of Power Electronics and Sustainable Energy technologies. The Fred Kaiser Foundation for Higher Education, has made several strategic investments in B.C. education through substantial donations to UBC, SFU, and BCIT. The goal of the Foundation is to advance the development of knowledge and talent in the focus fields of study to prepare the next generation for the knowledge-based economy and a sustainable global environment.

Alpha Technologies is committed to being a strong partner to the SFU research team, and has a track record of collaborating successfully with academic research programs. The area of renewable power and smart energy has experienced an exponential growth for the last decade and presents a significant economic opportunity for Canada. Our industry requires a steady stream of job-ready and well-trained engineers and entrepreneurs, who can ideally be productive on the first day of their employment. SFU’s proposed undergraduate and graduate programs have the potential to train tomorrow’s engineers to become national and international leaders in developing engineering solutions for a sustainable world. Once the program is at full capacity, the SEE program is expected to accommodate more than 300 full-time equivalent undergraduate students.

I firmly believe that the SEE program will accommodate growth and demand for skilled labour in pursuing technical careers in areas such as alternative energy systems, energy storage, smart cities, clean transportation and sustainable manufacturing.
Cutting-edge engineering education is the key in allowing BC based companies to compete with the best in the world. As a member of the technology sector in Vancouver, I can speak to how growth in my own company has been hampered due to a lack of local talent. Alpha Technologies has recruited power conversion engineers from around the world due to the limited number of students that are graduating from local BC universities. A program of this magnitude can help alleviate some of the issues that B.C. is facing in terms of talent shortages. I would be more than pleased to speak directly to you about the possible impacts of SFU’s Surrey campus expansion.

Sincerely,

Victor Goncalves, P.Eng, FEC
Chief Technology Officer
Alpha Technologies, Ltd.
February 7, 2017

To whom it may concern

Powertech is pleased to support SFU’s Surrey campus expansion that will accommodate new student training spaces and custom-built research and development space.

Powertech Labs, BC Hydro’s clean energy subsidiary, is one of the largest testing and research laboratories in North America, situated in Surrey, British Columbia. Our 11-acre facility offers 15 different primary testing labs for a one-stop-shop approach to managing utility generation, transmission and distribution power systems. Our clients include utilities and energy companies from around the world. Through our physical labs, we house a broad range of scientists, engineers, and technical specialists; we are a magnet for all market participants many of whom actually spend time with our staff in our laboratories as their products are being tested.

Our collaboration with Simon Fraser University began with a Letter of Intent signed with SFU, and the City of Surrey in 2010 to advance sustainability through clean energy initiatives. Since that time, Powertech is pleased to collaborate with SFU’s School of Mechatronics and to have established shared space in our Surrey Campus for fuel cell researchers from SFU allowing them to first-hand see how our researchers are developing leading technologies to reduce environmental footprint and improve system performance. We are also working closely with SFU and the City of Surrey to establish a jointly sponsored chair in Smart Energy Systems.

We are fully aware that for a university’s engineering programs to meet special requirements there is a need to maintain a high level of research capabilities. Currently, not all research and development labs at SFU’s Surrey campus are able to accommodate equipment needs, such as fume hoods and wet lab space. With this new building, SFU could take a leading position in training Canada’s future sustainability engineers.

There is a great demand for engineers who are well-versed in incorporating sustainability into their engineering and design solutions and we find that we usually will have to go outside the province if not outside Canada to find the right skills. It would benefit Powertech and many others in the sector if B.C. was able to expand engineering education, particularly in the sustainability area.

SFU’s proposed Sustainable Energy Engineering (SEE) Program would be a strategic win for both SFU and Powertech Labs. It will train next-generation of engineers who are able to work with today’s challenges and enabling local economic development across BC and Canada.

Powertech fully supports the expansion in Surrey and we hope that our important educational partner (and neighbor) sees this new building and program come to fruition in the coming years.

Yours truly,

Raymond Lings
President & CEO
Powertech Labs
June 19, 2018

Andrew Fetter
President and Vice-Chancellor
Simon Fraser University
8888 University Drive
Burnaby, BC
V5A 1S6

Dear Dr. Fetter:

On behalf of Surrey City Council, I am pleased to provide this letter of support for Simon Fraser University’s (SFU) new Sustainable Energy Engineering (SEE) program. This program, a first of its kind in Western Canada, aligns strongly with the City’s objective to empower our youth as global, clean technology leaders through collaboration, entrepreneurship and innovation.

Surrey is one of the fastest growing cities in Canada and our young and talented population require advanced skills and training through graduate programs in order to fill industry skills gaps. University graduate level research will enable the City of Surrey to foster leaders in sustainable energy systems and clean technology increasing economic competitiveness across the region. The SEE program will serve to strengthen both the City’s and SFU’s common objective of promoting vibrant, healthy communities.

SFU remains a key partner for Surrey, and our two organizations have a longstanding history of partnerships since SFU’s arrival in City Centre over 10 years ago. We are proud to have invested in an Industrial Research Chair with SFU for clean energy in smart cities and are excited to see SFU pursuing a smart cities track as part of the SEE program.

I am delighted to support Simon Fraser University’s Sustainable Energy Engineering program as a unique initiative that will encourage entrepreneurial development, attract investment, and create jobs in our City. Thank you in advance for your thoughtful consideration of this opportunity.

Sincerely,

[Signature]

Linda Hepner
Mayor
City of Surrey
Sustainable Energy Engineering Program

Appendix 4: Program Steering Committee

August 2018
Faculty of Applied Sciences
Program Steering Committee

As the Sustainable Energy Engineering initiative (including undergraduate and graduate programs) is mounted at SFU, a Steering Committee and an Advisory Committee will be established.

Governance of the Sustainable Energy Engineering undergraduate and graduate programs will rest in the Program Director and Steering Committee, which will comprise full-time faculty members of SFU. The Chair of the Steering Committee will normally be the Director. In addition to the Chair, five faculty members will initially (prior to program launch) be appointed to the Steering Committee by the Dean of Applied Sciences upon the advice of the Director of the Program and other interested parties, and with due regard to the mix of disciplinary perspectives needed to maintain and develop the program. During the first three years of Program operation this will increase to a total of seven faculty members in addition to the Chair. Once the Steering Committee has reached its full complement of eight faculty members (including the Chair), the distribution of these members will be as follows:

a. At least two research faculty members (Assistant Professor, Associate Professor or Professor)
b. At least two teaching faculty members (Lecturer, Senior Lecturer or University Lecturer)
c. At least one female faculty member

The Advisory Committee will include external representatives and various invited members from academia, industry and the community, and will provide advice to the Director and Steering Committee in areas including research foci, faculty hiring priorities and the development of new academic programming such as course-based and professional masters programs.

For the purpose of developing this Full Program Proposal, an ad-hoc Advisory Committee was formed with the following membership; abbreviated CVs are provided on the following pages. The Committee participated actively in program design and revisions.

Dr. Majid Bahrami, P.Eng.
Professor, School of Mechatronic Systems Engineering, Simon Fraser University
Canada Research Chair in Alternative Energy Conversion Systems

Dr. Faisal Beg, P.Eng.
Professor, School of Engineering Science, Simon Fraser University
Associate Dean, Faculty of Applied Sciences, Simon Fraser University

Dr. Ned Djilali, P.Eng. (chair)
Professor, Department of Mechanical Engineering, University of Victoria
Canada Research Chair in Energy System Design and Computational Modelling
Dr. Michael Eikerling  
Professor and Graduate Program Chair, Department of Chemistry, Simon Fraser University  
Joint Affiliation with the NRC Institute for Fuel Cell Innovation

Dr. Woo Soo Kim, P.Eng.  
Associate Professor, School of Mechatronic Systems Engineering, Simon Fraser University

Dr. Mehrdad Moallem, P.Eng.  
Professor and Graduate Program Chair, School of Mechatronic Systems Engineering
Abbreviated Curriculum Vitae of Professor Majid Bahrami

Professor, P.Eng., CRC, Fellow ASME, member ECS, AIAA
School of Mechatronic Systems Engineering
Faculty of Applied Science
Simon Fraser University

http://www.sfu.ca/~mbahrami/

Education

- PhD, Mechanical Eng., University of Waterloo, Canada 2000-2004

Work Experience

- Professor, Simon Fraser University, Mechatronic Systems Engineering 2015
- Co-founder and CEO, Watergenics Inc., Vancouver, Canada 2015-2018
- Canada Research Chair, Alternative Energy Conversion Systems, Simon Fraser University, Canada 2014-2019
- Co-founder and CTO, Matergenics Engineering, Vancouver, Canada 2013-2015
- Associate Professor, Simon Fraser University, Canada 2011-2015
- Assistant Professor, Simon Fraser University, Canada 2008-2011
- Adjunct Professor, University of Victoria, Mechanical Engineering, Canada 2008-2011
- Assistant Professor, University of Victoria, Mechanical Engineering, Canada 2006-2008
- Postdoctoral Fellow, University of Waterloo, Mechanical Engineering, Canada 2004-2006
- Research Assistant, University of Waterloo, Mechanical Engineering, Canada 2000-2004
- Thermal Engineer, Keeprite Refrigeration, Ontario, Canada 1999-2000
- Thermal Engineer, Tavhieh (Formerly Chrysler) HVAC Systems, Tehran, Iran 1995-2000
- Instructor/Lecturer (part-time), Satari University, Tehran, Iran 1995-1997

Research Keywords: Sustainable air conditioning systems, heat transfer, fluid flow, sorption technology, atmospheric water harvesting, energy recovery systems, graphite heat exchangers, thermal energy storage, thermal management of lithium-ion batteries, transport phenomena in porous media and micro/nano-structured materials, PEM fuel cells, microelectronics cooling, membrane systems, microfluidics, super-insulators, analytical modeling, experimental validation.

### Research Projects and Funding

(Selected partial list; total funds awarded + $12M)

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Funding Agency</th>
<th>Amount</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive Cooling Solution for Higher Power Battery Charger</td>
<td>NSERC, BC Ministry of Energy and Mines</td>
<td>$76,000</td>
<td>2016-2020</td>
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<tr>
<td>Materials for Enhanced Energy Technologies</td>
<td>NSERC CREATE</td>
<td>$275,000</td>
<td>2015-2021</td>
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<tr>
<td>NSERC Energy Storage Technology Network</td>
<td>NSERC SPG-N</td>
<td>$40,000/yr</td>
<td>2015-2020</td>
</tr>
<tr>
<td>Green Cooling Solutions for High Power Electronics</td>
<td>NSERC CRD &amp; Alpha</td>
<td>$65,000/yr</td>
<td>2013-2018</td>
</tr>
<tr>
<td>Green Sustainable Air Conditioning and Refrigeration Systems for Service Vehicles</td>
<td>Automotive Partnership Canada</td>
<td>$592,475</td>
<td>2012-2016</td>
</tr>
<tr>
<td>Bulk and Interfacial Transport Properties of Porous Fuel Cell Materials</td>
<td>NSERC CRD &amp; AFCC</td>
<td>$150,000</td>
<td>2014-2019</td>
</tr>
</tbody>
</table>

### Academic Supervision, Service

- Trained more than 120 highly qualified personnel (HQP) who have gone on to successful careers in academia and industry including three professors
- Developed leading a multi-national research initiative supported by the Canadian Queen Elizabeth II Diamond Jubilee Scholarships - Advanced Scholars on sustainable energy, potable water, and crops for doctoral and postdoctoral scholars from developing low-income countries
- Development of 6 undergraduate, 4 graduate courses, 3 teaching laboratories
- Served on numerous academic committees, organized several conference sessions
- Served on NSERC Discovery Grant review panel, Qatar National Fund, and Belgium IWT

### Publications, Awards, Outreach

- Established the world-class Laboratory for Alternative Energy Conversion (LAEC) and has attracted >$12M of research funding as a principal investigator (2010 - 2018)
- Published 6 patents, 139 peer-reviewed articles in prestigious journals, 152 conference papers/presentations at highly ranked venues, with h-index of 32 and his i10-index of 78 (Google Scholar, April 2018)
- Fellow of the American Society of Mechanical Engineers (ASME) 2016
- Won the 2017 Mohammed bin Rashid al Maktoum Global Water Award, the UAE Water Foundation for innovative research and development in sustainable water technology
- Received Canada “Clean50” Awards two consecutive years, 2016 and 2017
- Given numerous public, invited talks and interviews on national and international radio/TV, including CBC, Global News, CNN
Mirza Faisal Beg
B-Tech. (Honors), MS, Ph.D., P.Eng.
Professor, School of Engineering Science
Simon Fraser University, Burnaby, BC Canada
http://www.ensc.sfu.ca/~mfbeg

Positions and Employment
2015 - Associate Dean, Research and Graduate studies, Faculty of Applied Science, Simon Fraser University
2014 - Professor, School of Engineering Science, Simon Fraser University
2013 - Associate Member, Division of Neurology, Faculty of Medicine, University of British Columbia
2009 - 2014 Associate Professor (with tenure), Engineering Science, Simon Fraser Univ.
2008 - Adjunct Professor, School of Applied Mathematics, Simon Fraser University
2008 - Adjunct Professor, School of Biomedical Physiology and Kinesiology, Simon Fraser University
2003 - 2009 Assistant Professor, School of Engineering Science, Simon Fraser University

Education and Training

The Johns Hopkins University School of Medicine
Doctoral program in Biomedical Engineering
• Thesis: Computational Anatomy - Metrics on Flows of Diffeomorphisms for Image and Landmark Matching
• Mentor: Professor Michael I. Miller

Master of Science (1994 – 1997)
Boston University, School of Biomedical Engineering
Graduate program in Biomedical Engineering
• Thesis: Effects of aging on motor unit firing behavior
• Mentor: Professor Carlo J. De Luca

Bachelor of Technology (with Honors) (1989 – 1993)
Indian Institute of Technology, Kharagpur, Department of Electrical Engineering
Undergraduate option in Instrumentation Engineering
• Thesis: H-infinity based proportional, integral and derivative controllers for feedback control
• Mentor: Professor Kanti B. Dutta

Awards and Honors

2015 'Excellence in Research' Award, Faculty of Applied Science, Simon Fraser University (given to one Professor in the faculty of approximately 110)
2012 Meritorious Achievement award, Association of Professional Engineers and Geoscientists of British Columbia (given to one Engineer in the province of BC each year)
2011 'Excellence in Teaching' Award, Faculty of Applied Science, Simon Fraser University (given to one Professor in the faculty of approximately 110)

2008 - 2014 Career Investigator, Michael Smith Foundation for Health Research, BC

Research Funding

The primary sources of my funding have been NSERC (discovery grants), CHRP (collaborative health research program, NSERC and CIHR), Michael Smith Foundation of Health Research (MSFHR), Alzheimer Association of Canada and Pacific Alzheimer Research Foundation of British Columbia.

Project Title: OCTSurfer - Advanced Imaging and Integrated Image Analysis Platform for 3D Optical Coherence Tomography Images of the Eye
Funding: CHRP Type: External
Annual: 275k Total: 850k
Involvement: Principal Investigator

Project Title: Novel Retinal Biomarkers for Alzheimer's Disease
Funding: Brain Canada - MIRI Type: External
Annual: 500k Total: 1500k
Involvement: Principal Investigator

Project Title: CBRAIN: Canadian Brain Research And Informatics Platform
Funding: Brain Canada – Platform Grant Type: External
Annual: 1000k Total: 3000k
Involvement: Co-PI with Principal Investigator Dr. Alan Evans (McGill University)

Project Title: Brains behind the Eyes: Interpreting medical images
Funding: National Science & Engineering Research Council (NSERC) Type: External
Annual: 40k Total: 120k

Project Title: Brains behind the Eyes: Interpreting medical images
Funding: National Science & Engineering Research Council (NSERC) Type: External
Annual: 50k Total: 250k


Prof. Nedjib (Ned) Djilali, FCAE, FRSC
Department of Mechanical Engineering & Institute for Integrated Energy Systems
University of Victoria
www.uvic.ca/estp

Education/Training

Doctorate, Mechanical Engineering (Fluid Mechanics), University of British Columbia, 1987
Master's, Aerodynamics, Fluid and Structural Mechanics, Imperial College of Science, Technology and Medicine, 1979
Bachelor, Aeronautical Engineering, University of Hertfordshire, 1977

Employment/Affiliations

Professor, Mechanical Engineering, UVic, 1999-present
Canada Research Chair, Advanced Energy Systems Design & Computational Modeling, Tier 1, UVic, 2005-2019
Adjunct Professor, Mechatronics Engineering, SFU, part-time, non-tenure track, 2010-2016
Interim Director, Pacific Institute for Climate Solutions (PICS), UVic, 2008-2009
Executive Director, Institute for Integrated Energy Systems, UVic, 2002-2007
Professor in Residence, Angstrom Power Inc., 2004-2005
Associate Dean, Engineering, UVic, 2000-2002
Associate Professor, Mechanical Engineering, UVic, 1994-1999
Assistant Professor, Mechanical Engineering, UVic, 1991-1994
Staff Specialist, Advanced Aerodynamics Department, Bombardier Aerospace, Montreal, 1989-1990
Post-Doctoral Fellow & Research Associate, Mechanical Engineering, UBC, 1987-1989

Bio

Dr. Djilali's research focuses on transport phenomena (fluid flow, heat, mass and charge transport) and energy systems integration and analysis. The applications of this research have ranged from aerodynamics and zero-emission cars, to electrochemical energy conversion and water purification. He has established an internationally recognized laboratory in the areas of fuel cell technology and energy systems integration. Many graduates trained in his lab have become leaders in academia and industry.

As Director of the Institute for Integrated Energy Systems (2001-07), he spearheaded a significant expansion of sustainable energy research activities by engaging industrial partners and researchers from many disciplines to investigate issues around integration of fuel cells, hydrogen and renewable energy. Dr. Djilali was closely involved in the development of the BC Hydrogen & Fuel Cell Industry Strategy and co-authored a report for the Premier's Technology Council; he served on the NRC Fuel Cell Program Advisory Board and on the Hydrogen Highway Steering Committee; he has testified in front of a standing committee of the Senate of Canada and lectured on Parliament Hill on sustainable energy systems. He also played a lead role in the Wind Energy Strategic Network (WESNET) and in the NSERC H2CAN Strategic Research Network. As Interim Director (2009) and Chair of the Program Committee, he led the Pacific Institute for Climate Solutions (PICS) during its inception phase and continued subsequently to play an active role in promoting interdisciplinary research across science, technology, economics and social sciences to inform policy development.

Awards (Selected)

- Outstanding Engineering Teacher Award (1992 and 1993), Engineering Institute of Canada (Vancouver Island Chapter)
- High Level Research Fellowship (1998), Ministry of Education, Research & Technology, France
Ned Djilali — Short CV

- Ludwig Mond Prize (1998), Institution of Mechanical Engineers (UK)
- Fellow, Canadian Society for Mechanical Engineering (2003)
- Fellow, Canadian Academy of Engineering (2010)
- Honorary Professorship, Tianjin University (2013)
- Fellow, Royal Society of Canada (2013)
- Jules Stachiewicz Medal, Canadian Society for Mechanical Engineering (CSME) (2017)
- David H. Turpin Gold Medal, University of Victoria (2018)

Publications/Patents

<table>
<thead>
<tr>
<th>Book Chapters</th>
<th>Journal Papers</th>
<th>Keynote/Plenary Lectures</th>
<th>Conference Papers/Abst.</th>
<th>Patents</th>
<th>Reports</th>
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<td>215</td>
<td>14</td>
<td>64</td>
</tr>
</tbody>
</table>

Google Scholar: ~11,000 citations; H-index = 55

Research Funding (last 4 years):
1. NSERC CREATE, Materials for enhanced energy technologies. PI: R Gordon. $11,650,000, 2015-2021.
5. CRC, Advanced energy systems design and computational modeling. $1,400,000, 2012-2019.
8. NSERC Discovery, Transport phenomena in fuel cells. $350,000, 2011-2016; $290,000, 2016-2021

Collaboration
Dr. Djilali has established industrial collaborations with the following companies: Automotive Fuel Cell Coop. (AFCC), Atomic Energy Canada (AECL), Angstrom Power Inc., ASL Environmental Sciences, Ballard Power Systems Inc., CFDR, Greenlight Power Technologies and Toyota Motor Corp.

Dr. Djilali current academic collaborations include: SFU; UBC, Pacific Northwest National Lab (US), Tianjin University (China), Chongqing University (China), International Institute for Applied Systems Analysis (Austria)
**CURRICULUM VITAE**

**Prof. Dr. Michael H. Eikerling**

**March 2018**

### PERSONAL DATA

**DATE AND PLACE OF BIRTH:** January 23, 1969, in Paderborn, Germany  
**CITIZENSHIP:** German citizen; permanent resident of Canada

### HOME AFFILIATION

Department of Chemistry at Simon Fraser University  
8888 University Drive, Burnaby, BC, V5A 1S6, Canada  
ph.: +1 778 782 4463  
email: meikerl@sfu.ca

### DEGREES

**Doctorate (Ph.D.)** in Theoretical Chemical Physics, TU München, Germany  
*Supervisors:* Prof. Dr. U. Stimming and Prof. Dr. A. Kornyshev  
1999

**Physik-Diplom in Theoretical Solid State Physics,** RWTH Aachen, Germany  
*Supervisor:* Prof. Dr. H. Capellmann  
1995

### ACADEMIC RESEARCH AND EMPLOYMENT HISTORY

<table>
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<th>Department/Location</th>
<th>Position</th>
<th>Start Date</th>
<th>End Date</th>
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<tbody>
<tr>
<td>Department of Chemistry, SFU</td>
<td>Professor</td>
<td>09/2012</td>
<td>present</td>
</tr>
<tr>
<td>Department of Physics, SFU</td>
<td>Associate Member</td>
<td>07/2004</td>
<td>present</td>
</tr>
<tr>
<td>Inst. für Theor. Physik II, HHU Düsseldorf</td>
<td>Visiting Professor</td>
<td>09/2016</td>
<td>08/2017</td>
</tr>
<tr>
<td>NRC Institute, Vancouver</td>
<td>Secondment (50%)</td>
<td>05/2003</td>
<td>08/2013</td>
</tr>
<tr>
<td>Department of Chemistry, SFU</td>
<td>Associate Professor (tenure)</td>
<td>09/2009</td>
<td>08/2012</td>
</tr>
<tr>
<td>Department of Chemistry, SFU</td>
<td>Assistant Professor</td>
<td>05/2003</td>
<td>08/2009</td>
</tr>
<tr>
<td>Department of Physics, TU München</td>
<td>Research Associate</td>
<td>02/2002</td>
<td>04/2003</td>
</tr>
<tr>
<td>MST-11, Los Alamos National Laboratory</td>
<td>Postdoctoral Fellow</td>
<td>09/2000</td>
<td>01/2002</td>
</tr>
</tbody>
</table>

### MAIN AREAS OF EXPERTISE:

- Theoretical chemical physics and physical electrochemistry  
- Theoretical and computational electrocatalysis  
- Modeling and simulation of heterogeneous media: soft matter, interfaces, and nanomaterials  
- Electrochemical energy science

### PUBLICATIONS:

- Journal articles: 116 published, 6 accepted/in press, 3 under review  
- Book chapters: 7 published, 1 in press  
- Citations (Web of Science): > 3500 (without self-citations), h-index = 35  
- 8 articles cited > 100 times, 5 articles cited > 200 times

### CONFERENCE CONTRIBUTIONS AND SEMINARS:

- > 75 invited (16 keynote, 5 plenary); 21 contributed; > 50 seminars (acad. institutions or industry)

### SUPERVISION:

- 19 postdocs (14 completed), 16 Ph.D. students (8 completed), 4 M.Sc. students (3 completed)

### RESEARCH FUNDING:

- Secured for my research: $5M (individual: $2M, collaboration: $3); total secured: $18M
SELECTED COLLABORATION PROGRAMS AND PARTNERSHIPS

- NSERC Automotive Partnership Canada (APC) network on Catalysis Research for Polymer Electrolyte Fuel Cell (CaRPE-FC, 2012-2017): theme leader for electrocatalysis and nanomaterials design; lead scientist for physical theory and materials modeling; member of steering committees.
- Automotive Fuel Cell Cooperation Corp.: molecular modeling of self-organization in electrochemical materials; method development, parametric studies, and implementation of data management tools.
- Greenlight Innovation, Inc.: development and implementation of modeling-based tools for intelligent diagnostics of renewable energy systems; 1 patent filed.
- Ballard Power Systems, Inc.; Nissan Motor Corp.; Cool-It Hiway Services, Inc.: development and implementation of particle-based physical-statistical models of electrode degradation.

MAJOR ADMINISTRATIVE ROLES

- Chair of Departmental Graduate Studies Committee since 1/2018
- Chair of Departmental Graduate Studies Committee 5/2015 – 8/2016
- Appointed Member of the International Advisory Board of the European Fuel Cell Forum (EFCF) since 2017
- Member of Technical Steering Committee of Hydrogen South Africa (HySA) catalysis since 2013
- Member of Scientific Steering Committee and Technology Analysis Committee of pan-Canadian fuel cell network (CaRPE-FC) 2012-2017
- Chair of Physical Electrochemistry Division of the International Society of Electrochemistry 2013-2016
- Chair of Canada Section of the Electrochemical Society 2014-2016

AWARDS AND PRIZES

- 2017 Alexander Kuznetsov Prize for Theoretical Electrochemistry of the ISE 2017
- Award from Norwegian Centre for International Cooperation 2012

EDITORIAL ROLES

- Editorial Board Member of journal “Electroacatalysis”, Springer.
- Editorial Board Member of journal “Scientific Reports”, NPG.

ORGANIZATION OF CONFERENCES, SYMPOSIA, AND WORKSHOPS (MAJOR EVENTS)

- Lead-organizer of symposium Advances in Theory and Modeling of Electrochemical Systems, 68th AGM of the ISE, Providence, RI 8/2017
- Lead-organizer of symposium on Interfacial Electrochemistry and Electrocatalysis from Molecular Perspective at Pacificchem, Honolulu, HI 12/2015
Dr. WOO SOO KIM, P.Eng

Associate Professor in the School of Mechatronic Systems Engineering,
Simon Fraser University

Employment History

2016 Sept. - Current  Associate Professor, School of Mechatronic Systems Engineering, Faculty of Applied Sciences, Simon Fraser University.

2018 Jan. – 2018 Mar.  Visiting Professor, EMPA- Swiss Federal Laboratory of Materials Engineering in ETH Domain, Zurich in Switzerland

2017 May – 2017 Oct.  Visiting Professor & Brain Pool Fellow, Department of Material Science and Engineering, Seoul National University in South Korea

2010 Sept. – 2016 Aug.  Assistant Professor, School of Mechatronic Systems Engineering, Faculty of Applied Sciences, Simon Fraser University.

2009 Jan. - 2010 Aug.  Senior Research Staff Scientist, Xerox Research Centre of Canada, Toronto in Canada


Educational Background

2009 PostDoc  Massachusetts Institute of Technology (MIT), Department of Materials Science and Engineering, USA “Silver Nanoparticle Self-Assembly for Plasmonic Applications.”

2006 Ph.D.  Korea Advanced Institute of Science and Technology (KAIST), Department of Materials Science and Engineering, South Korea “Nano Imprint Lithography with Surface Functionalized Sol-gel Hybrid Polymer toward Mechanically Durable Stamp Applications.”

2003 M.Sc.  Korea Advanced Institute of Science and Technology (KAIST), Department of Materials Science and Engineering, South Korea “Soft Lithography of Sol-gel Hybrid Polymers for Photonic Applications.”

2001 B.Sc.  Yonsei University, Department of Materials Engineering, South Korea

Awards, Honors and Scholarships

2016  Title: International Short Visit Award 2018, Award: $12,000, Type: Research, Organization: Swiss National Science Foundation

2010  Title: Brain Pool Fellowship: $25,000, Type: Research, Organization: National Research Foundation of South Korea

2016  Title: Hanwha Advanced Material Award 2016, Award: $13,000, Type: Research, Organization: Hanwha Corporation’s New Faculty Award

2010  Title: Wendy McDonald Endowed Research Fellow Award: $5,000, Type: Research, Organization: Simon Fraser University

2009  Title: The first prize of Quadrant Award 2007: €15,000, Type: Research, Organization: ETH Zurich, Details: International PhD thesis competition in Polymeric and Composite Materials and Manufacturing Field held in ETH Zurich in Switzerland
Research Objectives
Over the past eight years as a Principle Investigator in Simon Fraser University, I have established a strong and flourishing research program in Additive Manufacturing of Printed Electronics. I have created a new SFU’s Additive Manufacturing Laboratory, which quickly became an interdisciplinary research training platform with a substantial critical mass of research personnel. Additive manufacturing is an emerging field that integrates the aspects of nanotechnology, material science, and mechatronics to design novel materials and manufacturing of Internet-of-Things devices and their systems. My laboratory is equipped with the necessary facilities to generate transformative technological advances.

Publications & Patents: 1 book chapter, 51 refereed journal publications, 22 US patents, and 17 refereed conference proceedings have been published as a corresponding author.

Conferences, Workshops and Presentations: 32 invited talks from 2010, and 5 interviews with media such as Maclean, New Scientist, and YTN broadcasting were given so far.

Research/Project Funding – Received: Total external funding received as PI: $1,530,300 in total (from 2010 September to 2018 January) including NSERC DAS Award, two NSERC CRD, and international funds from S. Korea.

Supervision of Highly Qualified Personnel
Here is a summary for past HQP training in my lab: 1) Supervised one PDF, one PhD student, ten MSc students, and nine international visiting students to completion, 2) Currently supervise five PhD students and one MSc student, 3) Supervised 55 research Coop students, and 12 Undergraduate students by Capstone Design Projects, 4) Participated in 48 thesis examination for 30 PhD theses and 18 MSc thesis since 2010.

Active Service to the Academic Community
- Referee of Grant Proposal: proposals such as, NSERC Discovery grant in 2013-2018, NSERC Collaborative Research and Development (CRD) grant, NSERC Strategic Partnership grant, NSERC Idea to Innovations (I2I) grant, Canada Foundation for Innovation grant
- Evaluation Committee of Grant Proposals: Member of NSERC Engineering RTI Grants Selection Committee in 2017 and 2018.
- Conference Session Organizer:
  - Presider of the Next-generation nano-lithography session of Polymer Materials Science and Engineering, ACS 2012 National meeting in San Diego, USA, March 2012.
  - One of four Symposium BM4 organizers for Material Research Society's Fall Conference in Boston, 2016.
- Award Committee Member:
  - The 14th IEEE international conference on Nanotechnology in Toronto, August 2014.
CURRICULUM VITAE

Mehrdad Moallem, Ph.D., P.Eng.
School of Mechatronic Systems Engineering
Faculty of Applied Sciences
Simon Fraser University, Surrey, BC, Canada

Date: June 2018
Email: mmoallem@sfu.ca
Phone: 778.782.8156

Field(s) of Specialization: Electrical Engineering, Mechatronics, Control Systems, Robotics and Automation

Current Research Areas/Topics: Control Applications including: Control and Automation for Sustainable Energy Systems; Mechatronics, and Robotics; Real-time and Embedded Control; Control of Power Electronics Systems.

Career History

Dr. Moallem has more than twenty years of experience in multi-disciplinary areas related to control systems, real-time and embedded computing, electronic systems, and mechatronics. He has collaborated in the form of R&D and technology transfer activities with several companies and research institutions including Bombardier Inc., Mirabel, QC, and the Canadian Space Agency (1996-1998); Duke University, Durham, NC, USA (1998-1999); National Research Council of Canada, London, ON (2000-2007); the Canadian Surgical Technologies and Advanced Robotics, London, ON (2002-2007); Unity Integration Corporation, Vancouver, BC (2010-now); Future Vehicle Technologies, Maple-Ridge, BC (2010-present); and InteLuma Energy Systems, Vancouver, BC (2012-2015); and Rocky Mountain Bicycles, North Vancouver, BC (2013-present). Dr. Mopallem has served on the editorial board of major conferences and journals such as the American Control Conference, IEEE Transactions on Mechatronics, and Elsevier journal of Mechatronics. His expertise in control, power electronics, embedded computing, and mechatronic engineering will be relevant to the proposed CRD project.

<table>
<thead>
<tr>
<th>Dates</th>
<th>Rank and Position</th>
<th>Department</th>
<th>Institution</th>
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<tbody>
<tr>
<td>09/2012-onward</td>
<td>Professor</td>
<td>School of Engineering Science, Mechatronic Systems Engineering</td>
<td>Simon Fraser University, Surrey, BC, Canada</td>
</tr>
<tr>
<td>06/2007-09/2012</td>
<td>Associate Professor</td>
<td>School of Engineering Science, Mechatronic Systems Engineering</td>
<td>Simon Fraser University, Surrey, BC, Canada</td>
</tr>
<tr>
<td>09/2007-09/2009</td>
<td>Adjunct Research Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario, London, ON, Canada</td>
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<tr>
<td>07/2006-06/2007</td>
<td>Associate Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario, London, ON, Canada</td>
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<tr>
<td>08/1999-06/2005</td>
<td>Assistant Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario</td>
</tr>
<tr>
<td>2002-2007</td>
<td>Associate Scientist (affiliation)</td>
<td>Canadian Surgical Technologies and Advanced Robotics (CSTAR) group</td>
<td>Lawson Health Research Institute (UWO Hospital)</td>
</tr>
<tr>
<td>1998-1999</td>
<td>R&amp;D Engineer</td>
<td>Free-Electron Laser Laboratory</td>
<td>Duke University, NC, USA</td>
</tr>
<tr>
<td>1997-1998</td>
<td>Postdoctoral fellow</td>
<td>Electrical &amp; Computer Engineering</td>
<td>Concordia University, Montreal, Canada</td>
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Academic Qualifications

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<th>Institution</th>
<th>Field</th>
<th>Year</th>
</tr>
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<tr>
<td>B.Sc.</td>
<td>Shiraz University, Shiraz, Iran</td>
<td>Electrical &amp; Electronic Engineering</td>
<td>1986</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>Sharif University of Technology, Tehran, Iran</td>
<td>Electronic Engineering</td>
<td>1988</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>Concordia University, Montreal, QC, Canada</td>
<td>Electrical &amp; Computer Engineering</td>
<td>1997</td>
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Number of Postgraduate Students Supervised

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<th>Status</th>
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<th>Joint Supervision</th>
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<td>17</td>
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<td></td>
<td>Ongoing</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Master of Applied Science</td>
<td>Graduated</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Ongoing</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Achievements/Awards:
- University Professor (Simon Fraser University, 2015-2020): Recognition of senior scholars of distinction who are active participants in all aspects of their discipline and hold the rank of Professor.
- Attraction of research funds (industry/government) in excess of $10M over the career.

Number of Publications:

<table>
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<th>Publication</th>
<th>Quantity</th>
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<td>Journals</td>
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<tr>
<td>Books</td>
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</tr>
<tr>
<td>Referred Conferences</td>
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</tr>
<tr>
<td>Patents</td>
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</tr>
<tr>
<td>Book Chapters</td>
<td>7</td>
</tr>
<tr>
<td>h-index</td>
<td>36</td>
</tr>
<tr>
<td>i10-index</td>
<td>94</td>
</tr>
</tbody>
</table>

Recent Publications
Sustainable Energy Engineering Program

Appendix 5: Abbreviated curriculum vitae for faculty

August 2018
Faculty of Applied Sciences
Abbreviated curriculum vitae for faculty

Because this program will be delivered by new faculty who are leaders in the field of Sustainable Energy Engineering, an advisory committee will be struck (as noted in Appendix 4) to include experts in varying aspects of the discipline.

Members will include specialists in the environment, energy, and social policy from within the University, discipline appropriate industry leaders, and government representatives, to advise on program development, personnel hiring, and recruitment of students into the program.

The following Inaugural Director for the program has been appointed, with abbreviated CV provided on the following pages.

Dr. Kevin Oldknow, P.Eng.
Inaugural Director, Sustainable Energy Engineering Program
Associate Dean, Faculty of Applied Sciences, Simon Fraser University
Senior Lecturer, School of Mechatronic Systems Engineering
Dr. Kevin Oldknow, P.Eng.
Abbreviated Curriculum Vitae

Employment History at Academic Institutions

- **May 2018 - Present**
  Director, Sustainable Energy Engineering Program, SFU
- **January 2017 - Present**
  Associate Dean, Undergraduate Studies, Applied Sciences, SFU
- **September 2016 - Present**
  Senior Lecturer, Mechatronic Systems Engineering, SFU
- **September 2015 - Present**
  Faculty Teaching Fellow, Applied Sciences, SFU
- **August 2012 - August 2016**
  Lecturer, Mechatronic Systems Engineering, SFU
- **January 2011 - April 2011**
  Adjunct Professor, Mechanical Engineering, UBC
- **September 2009 - December 2009**
  Sessional Lecturer, Mechanical Engineering, UBC
- **September 2007 - December 2007**
  Sessional Lecturer, Mechanical Engineering, UBC

Other Employment History

- **September 2012 - June 2016**
  Principal Engineer, Wheel / Rail Interface
  L.B. Foster Rail Technologies
- **May 2011 - August 2012**
  Vice President, Technology and Business Development
  LB Foster Friction Management
- **January 2009 - May 2011**
  Corporate Vice President, Friction Management
  Portec Rail Group, Corporate Division
- **September 2007 - December 2008**
  Vice President, Applications and Operations
  Portec Rail Group, Kelsan Technologies Division
- **September 2005 - August 2007**
  Manager, Friction Control Technology
  Portec Rail Group, Kelsan Technologies Division
- **February 2005 - September 2005**
  Group Leader, Field Applications
  Portec Rail Group, Kelsan Technologies Division
- **June 2004 - February 2005**
  Field Application Engineer
  Portec Rail Group, Kelsan Technologies Division
- **September 2000 - May 2004**
  Product Development Consultant, Cameleon Controls
- **August 1996 - April 1998**
  Technical Project Manager, Procter & Gamble

Educational Background

- **2004** Ph.D. Mechanical Engineering, University of British Columbia
- **2000** M.A.Sc. Mechanical Engineering, University of British Columbia
- **1996** B.A.Sc Engineering Physics, University of British Columbia, Canada

Teaching History

- **MSE 102 - Applied Science, Technology and Society (2013-2016), SFU**
- **MSE 300 - The Business of Engineering, I (2013-2017), SFU**
- **MSE 352 - Digital Logic and Microcontrollers (2012), SFU**
- **MSE 380 - Dynamic Systems Modelling and Simulation (2012-2014, 2016), SFU**
- **MSE 403 - Technology Entrepreneurship I (2015, 2016), SFU**
- **MSE 404 - Technology Entrepreneurship II (2015, 2016), SFU**
MSE 481 - Industrial Control Systems (2013, 2015-2016), SFU
MSE 884 - Advanced Dynamics (2013), SFU
MSE 900 - Engineering in the Canadian Context (2015), SFU
MECH 365 - Machine Dynamics and Vibrations (2003), UBC
MECH 506 - Linear Vibrations (2007, 2009), UBC
MECH 464/563 - Industrial Robotics (2011), UBC

Selected Works


Roney, M., Bell, S., Paradise, S., Oldknow, K. and Igwemezie, J. (2010) Implementation of distributed power and friction control to minimize the stress state and maximize velocity in Canadian Pacific’s heavy haul / heavy grade train operations, Journal of Rail and Rapid Transit September 1, 2010 vol. 224 no. 5 465-471


MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

RE: Full Program Proposal for the Doctor of Philosophy in Sustainable Energy Engineering (SCUP 18-30)

DATE: October 17, 2018

At its October 10, 2018 meeting, SCUP reviewed and approved the full program proposal for the Doctor of Philosophy in Sustainable Energy Engineering within the Faculty of Applied Sciences, effective Fall 2019.

Motion:

That Senate approve and recommend to the Board of Governors the full program proposal for the Doctor of Philosophy in Sustainable Energy Engineering within the Faculty of Applied Sciences, effective Fall 2019.

c: K. Oldknow
    E. Fiume
MEMORANDUM

ATTENTION: Senate Committee on University Priorities (SCUP)  
FROM: Jeff Derksen, Chair of Senate Graduate Studies Committee (SGSC)  
RE: Full program proposal for a Doctor of Philosophy in Sustainable Energy Engineering

DATE: September 24, 2018

For approval:

At its meeting of September 11, 2018, SGSC approved full program proposal for a Doctor of Philosophy in Sustainable Energy Engineering and is recommending it to SCUP for approval, effective Fall 2019.

Motion: That SCUP approve and recommend to Senate the full program proposal for a Doctor of Philosophy in Sustainable Energy Engineering within the Faculty of Applied Science.
MEMORANDUM

Attention: Dr. Jeff Derksen
Dean, Graduate Studies

From: Dr. Mirza Faisal Beg
Faculty of Applied Science, Graduate Studies Committee

Date: August 24, 2018

Re: Full Program Proposal for Sustainable Energy Engineering graduate degrees and Professional Master’s in Mechatronic Product Realization

The faculty of Applied Sciences Graduate Program Committee would like to send two items to the SGSC for consideration. These are:

1) The full program proposal for the Sustainable Energy Engineering MASc and PhD degrees revised as per the feedback provided by your office.

2) The full program proposal for the Professional Master’s in Mechatronic Product Realization revised as per the feedback provided by your office.

FAS GPC has approved both of these submissions via an electronic vote. I request you to place these on the agenda for the next SGSC meeting.
MEMORANDUM

ATTENTION: Faisal Beg, Chair
Faculty of Applied Sciences
Graduate Program Committee

DATE: August 1st, 2018

FROM: Kevin Oldknow, Director
Sustainable Energy Engineering Program

RE: SEE MASc and PhD Full Program Proposals

Please find enclosed the following documents for consideration by the Faculty of Applied Sciences Graduate Program Committee:

1.) Sustainable Energy Engineering

   I. MASc Full Program Proposal (Revised)
   II. PhD Full Program Proposal (Revised)


Kevin Oldknow, Ph.D., P.Eng.
Doctor of Philosophy (PhD) in Sustainable Energy Engineering

Full Program Proposal

August 2018
Faculty of Applied Sciences
PhD in Sustainable Energy Engineering

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Full Program Proposal
PhD in Sustainable Energy Engineering

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EXECUTIVE SUMMARY

Overview of the SFU’s history, mission, and academic goals
As Canada’s engaged university, Simon Fraser University is defined by its dynamic integration of innovative education, cutting-edge research and far-reaching community engagement. SFU was founded in 1965 with a mission to bring an interdisciplinary approach to learning, embrace bold initiatives, and engage with communities near and far. Today SFU is consistently ranked amongst Canada’s top comprehensive universities and is one of the world’s leading teaching and research institutions.

The Sustainable Energy Engineering (SEE) program will align and reinforce SFU’s strategic and academic plans, as well as reinforce the Province of British Columbia’s commitment to stimulate industry-focused programs that support high demand occupations in the province’s technology sector. This will be achieved through the delivery of a program that provides a unique and specific education including foundational engineering principles, design practices, current technologies, economics and policies associated with the global Clean Technology (cleantech) sector.

Students will emerge from the program with the multidisciplinary skills needed to meet the province’s growing demand for cleantech professionals, as well as the capacity to become national and international leaders in developing engineering solutions for a sustainable world. It is further expected that the potential for significant positive societal impact will draw a diverse student body, in contrast with traditional engineering programs.

Proposed credential to be awarded
Doctor of Philosophy (PhD) in Sustainable Energy Engineering.

Location of program
The Sustainable Energy Engineering program will be hosted in a new facility that is being purpose-built to deliver a cutting edge engineering program with a focus on sustainable energy. Located adjacent to the existing SFU Surrey campus and exemplifying best practices in sustainability design, the building is intended to serve as a living lab for participating students and as a sustainable design showcase for SFU, the City of Surrey and the Province. Its proximity to the SFU Surrey campus, Surrey City Hall, and the developing Clean Technology (cleantech) industry clusters within the South Fraser region, will allow for enhanced collaboration in the provision of a sustainably oriented, industry-aware graduate engineering program.
Academic unit(s) offering proposed program
This program will be offered by the SFU Faculty of Applied Sciences, and will be administered by the Faculty of Applied Sciences directly. A total of 22 faculty and 16 staff are expected to be hired in conjunction with mounting and deployment of the SEE undergraduate program, with hiring expected to occur between 2018-2021 for faculty, and 2018-2020 for staff. Teaching and service assignments for faculty members associated with the SEE program will be administered by the Program Director, and staff associated with the SEE program will be managed by the FAS Dean's Office.

Anticipated program start date
Fall 2019

Anticipated completion time
It is anticipated that the program will typically be completed in 4-5 years of full time study.

Summary of proposed program
a) Aims, goals and/or objectives of the proposed program
The objective of the proposed program is to educate engineers who will lead research into the sustainable harvesting, conversion, storage, distribution, utilization, transition, and management of energy and environmental resources.

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution
The proposed program in Sustainable Energy Engineering builds upon the Faculty of Applied Sciences' commitment to technology-based innovation, and furthers SFU's interest in supporting advanced research that will contribute to the development of vibrant, healthy and technologically innovative communities. Through industry partnerships, international-level thought leadership and research, and progressive curriculum, this program is positioned to advance Faculty and University level goals in several key areas such as expanding industry collaborations within the South Fraser Region, strengthening ties with the City of Surrey and surrounding municipalities, and expanding the talent pool of advanced researchers in areas related to sustainable energy and clean technology.

The program also aligns with the Province's commitment to provide increased funding to industry-focused programs that support high demand occupations in the BC technology sector and with the University's interest in encouraging strategies that, as mentioned within the President's Goals and Objectives 2015-16 "support continued implementation of BC's Skills for Jobs Blueprint and the development of an associated strategy to ensure SFU meets its enrolment targets for programs that educate for high demand occupations" such as Engineering and establish SFU as "the leading engaged university defined by its dynamic integration of innovative education, cutting-edge research, and far-reaching community engagement".

Full Program Proposal
c) **Linkages between the educational goals and the curriculum.**

The program aims to offer a unique ecosystem for advanced research in sustainable energy engineering by drawing on existing strengths at SFU in general, and FAS in particular. Through training in formal coursework and hands-on research, SEE graduates will be capable of working with integrity to invent, improve, design and deploy sustainable clean energy technologies addressing the clean energy needs for now and the future.

d) **Potential areas/sectors of employment for graduates and/or opportunities for further study.**

Graduates of the Sustainable Energy Engineering PhD program will acquire a diverse range of knowledge and research skills that will enable them to pursue various career opportunities related to energy harvesting, conversion, storage, distribution, and energy-efficient systems and machines in a wide range of sectors, including wind, solar, geothermal, hydro-electric power, fuel cells, gas turbines, biomass, transportation, oil and natural gas as researchers, entrepreneurs, and consultants. These opportunities may be in the fast-growing cleantech sector in BC, or the graduates may find employment in other parts of Canada and the world. Relevant National Occupational Classification (NOC) codes include:

- 2131 Civil Engineers
- 2132 Mechanical Engineers
- 2133 Electrical Engineers
- 2141 Industrial and Manufacturing Engineers
- 2173 Software Engineers

This program will further prepare the graduates for leadership roles in academia and industry in Sustainable Energy Engineering and related Engineering disciplines at SFU and at other universities across Canada and internationally.

e) **Delivery methods**

The program will be a combination of face-to-face lecture-based courses, seminar courses, directed-studies, and advanced research courses conducted in state-of-art research labs leading to a graduate doctoral thesis.

f) **Program strengths**

Graduates will receive training in advanced research into novel clean energy technologies. They will also be provided opportunities for broadening their education by electives in energy-related economics, environmental science, business and entrepreneurship.
g) An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable and plans for admissions and transfer within the British Columbia post-secondary education system.

Active consultation within the SFU community regarding the SEE initiative (including prospective undergraduate and graduate programs) has been underway since mid-2016. This dialogue will continue moving forward, with particular emphasis as additional graduate programs (e.g. course-based MEng and Professional Master’s) are developed with a particular emphasis on pan-university involvement and interdisciplinarity.

External consultation has included dialogue with advisory council members, industry, and professional / regulatory bodies including Engineers and Geoscientists BC (previously the Association of Professional Engineers and Geoscientists of BC). Corresponding letters and statements of support are provided in Appendix 3.

h) Related programs in the institution or other British Columbia post-secondary institutions.

The SFU SEE doctoral program will be uniquely positioned as the only graduate research-intensive regional PhD program in BC that applies directly to sustainable energy systems and the related cleantech sector. There is currently no doctoral program in sustainable energy engineering in any of BC’s post-secondary institutions. The UBC Master of Engineering Leadership program in Clean Energy Engineering seems to be the most closely related to the proposed MASc degree in the SFU SEE program. However, unlike the two year research-intensive MASc in SEE program, the UBC degree is a combination of technical (60%) and leadership development (40%) aspects covered over a one-year term. The University of Victoria has an Institute for Integrated Energy Systems that conducts graduate level research but does not offer a MASc degree in energy engineering. It should be noted, however, that the Civil Engineering graduate program at UVic does include course offerings in sustainability and green buildings. BCIT has a School of Energy, but it does not mount any undergraduate or graduate programs directly in the area of energy engineering.

Contact information
Dr. Kevin Oldknow, P.Eng.
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering Program
778.782.9254
koldknow@sfu.ca
PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

The Doctor of Philosophy (PhD) in SEE is a research-intensive program that has a primary emphasis on the doctoral thesis that is based on substantial original research rather than course work.

The target audience for the PhD program in SEE is students with a graduate master’s degree in electrical engineering, computer engineering, mechanical engineering, engineering science, mechatronic systems engineering, or a related area.

The PhD program in SEE consists of course work (minimum 6 units beyond the M.A.Sc. level) and a thesis (SEE 899, 18 units) for a minimum of 24 units.

PhD students must enroll in SEE 897 (0): Research Seminar in every term during which they are registered, until all program requirements have been met.

PhD students must also complete SEE 890 (0): Qualifying Exam within 24 months of beginning their studies. Completion of SEE 890 (0) is a pre-requisite for registration in SEE 899 (18): PhD Thesis.

The remaining coursework (nominally 6 units) will be selected in consultation with the students’ senior supervisor and can include 3 units of directed studies. Additional courses, including those from outside FAS, may be required to correct deficiencies in the student’s background or broaden the students’ preparation for undertaking thesis work, and will be selected in consultation with the senior supervisor or the supervisory committee. Also if necessary, The Western Deans’ Agreement will support PhD students in SEE taking elective courses at participating institutions in BC.

b) Admission requirements

Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar, and have the following:

A master’s degree in electrical engineering, computer engineering, engineering science, mechanical engineering, mechatronic systems engineering or a related area.

c) Evidence of student interest and labour market demand

A survey of 96 cleantech and sustainable energy technology companies in Canada (conducted by The Delphi Group in the Fall of 2016 as part of the development process for the Sustainable Energy Engineering initiative1) identified the following cleantech segments as those expected to see the highest global growth over the next decade:

1. Energy storage and battery technology;

2. Clean power generation;
3. Smart grid, transmission, and distribution;
4. Clean transportation technology;
5. Energy efficiency, conservation, and demand-side management;
6. Green building design and construction; and
7. Water and wastewater.

For the market opportunities in British Columbia more specifically, BC-based companies selected (1) green building design and construction, (2) clean transportation technology, and (3) energy efficiency, conservation, and demand-side management as the top growth segments over the next decade. Many see higher growth potential outside of BC for their cleantech solutions in the short-term, although it may not require going far from home given potential increasing demand from other Western provinces such as Alberta and/or West coast states including California, Oregon, and Washington.

Cleantech companies that responded to Delphi’s survey identified a shortage of skilled and qualified engineers available in Canada for supporting the growth of their businesses.

Survey respondents suggested that a program offering a more “broad-based” energy systems focus that includes techno-economics and a specialization in certain areas of environmental or clean technology (such as energy storage and smart grid, a broad range of renewable energy technologies, alternative fuels and technologies, and resource optimization solutions) would add value to the industry and fill a current gap in the market.

d) Eligibility for scholarships, awards, and financial aid
Students will be able to apply for awards funded from the university’s operating budget, including entrance scholarships and graduate fellowships. Students will also be eligible for Teaching Assistantships and Research Assistantships. Normally, students in this program will be eligible for financial aid so that students may qualify for a loan if necessary.

e) Program evaluation and academic/administrative oversight
As mandated by Senate, the program will be externally reviewed at seven-year intervals. In addition, oversight will be provided by a SEE Steering Committee (refer to Appendix 4).

f) Main competitors outside BC
Graduate programs outside of B.C. with PhD programmes in the space of sustainable energy engineering include those listed below. Common threads amongst the programs (including the proposed SEE program at SFU) include a focus on renewable energy, and placement of energy systems technologies in a broader framework of ecological, economic and regulatory contexts. This is reflective of a growing global focus on graduate education in these areas. Distinctive aspects of the proposed SEE program include focal points for research that map onto the overarching themes of smart cities,
clean transportation and sustainable manufacturing, as well as a strong focus on research and thesis work.

University of Exeter: MSc, PhD, MPhil, MSc programs in Renewable Energy
http://emps.exeter.ac.uk/renewable-energy/postgraduate/

Berkeley University of California: Ph.D., M.A., M.S programs in Energy & Resources
http://grad.berkeley.edu/program/energy-resources/

TU Eindhoven: MSc, PhD in Sustainable Energy Technology
https://www.tue.nl/en/education/tue-graduate-school/graduate-programs/sustainable-energy-technology-graduate-program/

University of Oldenburg, Master/Bachelor and PhD programs in Renewable Energy
http://phd-renewable-energy.de/en/course-structure/

University of Toronto: MEng, MASC, PhD with Emphasis in Sustainable Energy
http://gradstudies.engineering.utoronto.ca/professional-degrees/emphasis-in-sustainable-energy/

RESOURCES

a) Enrolment Plan
An initial intake of 15 students in the doctoral program is expected, with a steady state intake of approximately 15-20 students yielding a steady state enrolment of 60 FTE (the projected distribution of graduate students between masters and doctoral levels is consistent with historical averages in FAS programs). These projections are also consistent with the funding levels that have been announced by the Provincial Government’s Ministry of Advanced Education, Skills and Training for graduate students in SEE at SFU.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments
The BC government recently announced (January 16, 2018) a total of 440 new student seats for the SEE program including 120 graduate student seats. As the SEE program is mounted, new faculty will be hired for teaching the SEE courses, and for developing the state-of-art laboratories for research in the areas of clean technologies and sustainable energy. The space for the SEE graduate program will be in the newly-built SEE building in Surrey. This is a new program, with new faculty, and new student spaces, and therefore is not expected to impact, reduce, or eliminate any other programs or resources with SFU and the new teaching bandwidth will be supplied by the hiring of new faculty specifically for this program. The Faculty of Applied Sciences plans to implement a
graduated hiring plan of 22 new faculty and 16 new (8 administrative and 8 technical, respectively) staff in conjunction with mounting and deployment of SEE undergraduate and graduate programs. Following is the approximate timeline for expected faculty hires:

2018/19 Fiscal year: 6 new faculty positions
2019/20 Fiscal year: 8 new faculty positions
2020/21 Fiscal year: 4 new faculty positions
2021/22 Fiscal year: 4 new faculty positions

c) Faculty member's teaching/supervision
In order to provide the expertise needed to cover required teaching areas, it is anticipated that incoming faculty will be balanced across the broad areas of thermo-fluids, electrical engineering and power systems, bio-process and renewable energy systems, advanced materials, mechanical design and manufacturing. In order to support and supervise graduate research in harmony with anticipated SEE research foci, it is further expected that faculty members will have research agendas relating to smart cities, clean transportation and sustainable manufacturing.

d) Proposed tuition and other program fees including a justification
Tuition will be charged on a per-term basis, consistent with SFU’s schedule of fees for regular (research based) graduate programs.
PART C: Appendices

Appendix 1 Calendar entry
Appendix 2 New courses
Appendix 3 Letters of support
Appendix 4 Details of program steering committee
Appendix 5 Abbreviated curriculum vitae for faculty
Sustainable Energy Engineering
Doctor of Philosophy, Applied Science

Description of Program

The Doctor of Philosophy (PhD) in sustainable energy engineering (SEE), offered through the Faculty of Applied Sciences, is a research-intensive program that has a primary emphasis on the PhD thesis.

The program aims to offer a unique ecosystem for advanced research in sustainable energy engineering. Through training in formal coursework and hands-on research, SEE graduates will be capable of working with integrity to invent, improve, design and deploy sustainable clean energy technologies addressing the clean energy needs for now and the future.

Candidates will develop a strong aptitude for research and exceptional quantitative, analytical, and design skills in areas such as sustainable harvesting, conversion, storage, distribution, utilization, transition, and management of energy and environmental resources.

Admission Requirements

Admission is competitive. Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 in the SFU Calendar, and have the following:

- A master's degree in electrical engineering, computer engineering, mechanical engineering, engineering science, mechatronic systems engineering or a related field;
- Submitted evidence of capability to undertake substantial original research;
- Identified a faculty member as a senior supervisor.

Program Requirements

The PhD program in SEE consist of course work and a thesis for a minimum of 24 units. Those who lack the necessary background knowledge may, at the discretion of the supervisor or the supervisory committee, be asked to complete additional courses beyond the program requirements in order to broaden the students’ preparation for undertaking thesis work.

Students must complete
SEE 897 - PhD Research Seminar (0) every term

and a minimum 6 units of course work selected in consultation with the senior supervisor

and a Qualifying Exam
SEE 890 - Qualifying Exam (0)

and a thesis
SEE 899 - PhD Thesis (18)
Program Length

Students are expected to complete the program requirements in 4-5 years.

Other Information

Transfer from the Master’s program to the PhD program

Proceeding to a PhD program without completing a master’s degree is discouraged. However, a student may be admitted after at least 12 months in the Master of Applied Science (MASc) program if all non-thesis requirements have been completed with a 3.67 or better cumulative grade point average (CGPA), outstanding potential for research has been shown, and approval of the student’s supervisory committee, graduate program committee and senate graduate studies committee has been given.

Course Work

If the subject matter of a course has been previously completed with graduate credit, the course may not be completed again for credit. Course alternatives can be substituted with the approval of the student’s supervisory committee.

Qualifying Examination

The student will submit a written research proposal and defend it orally to their supervisory committee within the first 24 months of admission. The student should register for the SEE PhD Qualifying Exam in the term in which the research proposal is to be defended. 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.

The possible outcomes of the qualifying examination are “satisfactory”, “satisfactory with concern”, and “unsatisfactory”. A student with “satisfactory with concern” will be required to re-submit the research proposal and defend it for the second and final time within six months and/or to complete more courses. Failing the qualifying examination will trigger an unsatisfactory progress report which may require program withdrawal as per Graduate General Regulation 1.8.2.

Thesis

Students define and undertake original research, the results of which are reported in a thesis. An examining committee is formed as defined in Graduate General Regulation 1.9.3.

Annual Progress

The student’s progress will be reviewed every 12 months by a supervisory committee of two or more faculty members. At each annual review, the student presents a summary of their work to date. Students not making satisfactory progress in their research topics, or failing to demonstrate satisfactory knowledge and understanding of recent publications in their general area of research, or failing to have their revised research proposal approved by the supervisory committee within 24 months of admission, may receive “unsatisfactory” on their progress review and be required to withdraw as per GGR 1.8.2 Review of Unsatisfactory Progress.
Academic Requirements within the Graduate General Regulations

All graduate students must satisfy the academic requirements that are specified in the graduate general regulations, as well as the specific requirements for the program in which they are enrolled.
Sustainable Energy Engineering Program

Appendix 2: New Courses

August 2018
Faculty of Applied Sciences
New Courses

- SEE 890 (0) Qualifying Exam
- SEE 897 (0) PhD Research Seminar
- SEE 899 (18) PhD Thesis
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
<th>Number (eg. 810)</th>
<th>890</th>
<th>Units (eg. 4)</th>
<th>0</th>
</tr>
</thead>
</table>

**PhD Qualifying Exam**

**Course title** (max. 100 characters)

<table>
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<th>PhD Qualifying Exam</th>
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</table>

**Short title** (for enrollment/transcript - max. 30 characters)

<table>
<thead>
<tr>
<th>PhD Qualifying Exam</th>
</tr>
</thead>
</table>

**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)

PhD Qualifying Exam. Graded on satisfactory/unsatisfactory basis.

**Rationale for introduction of this course**

**Term of initial offering (eg. Fall 2019)**

<table>
<thead>
<tr>
<th>Fall 2019</th>
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</thead>
</table>

**Course delivery (eg. 3 hrs/week for 13 weeks)**

<table>
<thead>
<tr>
<th>n/a</th>
</tr>
</thead>
</table>

**Frequency of offerings/year**

<table>
<thead>
<tr>
<th>3 times/year</th>
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</thead>
</table>

**Estimated enrollment per offering**

<table>
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<tr>
<th>30</th>
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</thead>
</table>

**Equivalent courses** (courses that replicate the content of this course to such an extent that students should not receive credit for both courses)

**Prerequisite and/or Corequisite**

**Co-requisite:** SEE 897 (0) Research Seminar

**Criminal record check required?**

| Yes | if yes is selected, add this as prerequisite |

**Additional course fees?**

| Yes | No |

**Campus where course will be taught**

| Burnaby | Yes |
| Surrey | Yes |
| Vancouver | Yes |
| Great Northern Way | Yes |
| Off campus | No |

**Course Components**

| Lecture | Yes |
| Seminar | Yes |
| Lab | Yes |
| Independent | Yes |
| Capstone | No |

**Grading Basis**

| Letter grades | Yes |
| Satisfactory/ Unsatisfactory | Yes |
| In Progress / Complete | No |

**Repeat for credit?**

| Yes | No |

**Total repeats allowed?**

| 2 |

**Repeat within a term?**

| Yes | No |

**Required course?**

| Yes | No |

**Final exam required?**

| Yes | No |

**Capstone course?**

| Yes | No |

**Combined with a undergrad course?**

| Yes | No |

If yes, identify which undergraduate course and the additional course requirements for graduate students:

* See important definitions on the curriculum website.

Page 1 of 2 Revised December 2017
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

Faculty/instructors will be hired prior to the first offering of the course.

Additional faculty members, space, and/or specialized equipment required in order to offer this course

None

Contact Person

Academic Unit / Program
Faculty of Applied Sciences

Name (typically, Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

Academic Unit Approval

A course outline must be included.

Non-departmentalized faculties need not sign

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Chair</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>KEVIN OLDKNOW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Faculty Approval

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

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. E. Beg</td>
<td></td>
<td>08/07/118</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 24 2018</td>
</tr>
</tbody>
</table>

If different from regular units:

Academic Progress Units
Financial Aid Progress Units
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
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<tbody>
<tr>
<td>Course title (max. 100 characters)</td>
<td>PhD Research Seminar</td>
</tr>
<tr>
<td>Number (eg. 810)</td>
<td>897</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>0</td>
</tr>
</tbody>
</table>

**PhD Research Seminar**

<table>
<thead>
<tr>
<th>Short title (for enrollment/transcript - max. 30 characters)</th>
<th>PhD Research Seminar</th>
</tr>
</thead>
</table>

**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)

Presentation and discussion of research topics and progress in seminar and publication formats. PhD students must enroll in SEE 897 during every term during which they are registered, until all program requirements have been met.

**Rationale for introduction of this course**

This course is intended to develop presentation, writing and feedback skills, and to give students in the program an opportunity to build a sense of community and disseminate their work to fellow students and faculty members on a regular basis. Guest seminars will also expose students to key societal, academic and industrial topics salient to a graduate education in Sustainable Energy Engineering. Students will receive a letter grade in each term for the duration of their studies.

**Term of initial offering (eg. Fall 2019)**

<table>
<thead>
<tr>
<th>Fall 2019</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Course delivery (eg. 3 hrs/week for 13 weeks)</th>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Frequency of offerings/year</th>
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</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Estimated enrollment per offering</th>
<th>30</th>
</tr>
</thead>
</table>

**Equivalent courses** (courses that replicate the content of this course to such an extent that students should not receive credit for both courses)

**Prerequisite and/or Corequisite**

**Criminal record check required?** Yes if yes is selected, add this as prerequisite

**Additional course fees?** Yes No

**Campus where course will be taught**

Burnaby  Yes  No
Surrey  Yes  No
Vancouver  Yes  No
Great Northern Way  Yes  No
Off campus  Yes  No

**Course Components**

Lecture  Yes  No
Seminar  Yes  No
Lab  Yes  No
Independent  Yes  No
Capstone  Yes  No

**Grading Basis**

Letter grades  Yes  No
Satisfactory/ Unsatisfactory  Yes  No
In Progress / Complete  Yes  No

**Repeat for credit?**

Yes  No

Total repeats allowed? 30

**Repeat within a term?**

Yes  No

**Final exam required?**

Yes  No

**Capstone course?**

Yes  No

**Required course?**

Yes  No

**Combined with a undergrad course?**

Yes  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
Faculty/instructors will be hired prior to the first offering of the course. It is anticipated that current FAS faculty members will not teach SEE courses.

Additional faculty members, space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON

Academic Unit / Program | Name (typically, Graduate Program Chair) | Email
--- | --- | ---
Faculty of Applied Sciences | Kevin Oldknow | koldknow@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
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<tr>
<td>Department Chair</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Kevin Oldknow</td>
<td></td>
<td>Aug 7, 2018</td>
</tr>
</tbody>
</table>

FACULTY APPROVAL
The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for 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.

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<td></td>
<td>08/07/18</td>
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</table>

A library review will be conducted. If additional funds are necessary, DGSC will contact the academic unit prior to SGSC.

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 24, 2018</td>
</tr>
</tbody>
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ADMINISTRATIVE REVIEW (for course only)
Library Check: [ ]
If different from regular units:
Course Attribute: [ ]
Course Attribute Value: [ ]
Instruction Mode: [ ]
Attendance Type: [ ]
Financial Aid Progress Units: [ ]
Sustainable Energy Engineering

SEE 897 (0) Ph.D. Research Seminar

Credits: 0

Course Description

Presentation and discussion of research topics and progress in seminar and publication formats. PhD students must enroll in SEE 897 during every term during which they are registered, until all program requirements have been met.

Intended Learning Outcomes

1. Develop and present a research presentation, provide an effective description of the student's research topic and progress thus far.

2. Provide constructive, analytical and empowering feedback to peers on presentations.

3. Prepare a written description of the student's research topic and progress thus far, in article format and using an appropriate writing style.

4. Provide constructive, analytical and empowering feedback to peers on writing samples.

Subjects and Topics

1. Writing processes, form, format
2. Academic/technical writing conventions
3. Critical and creative thinking
4. Referencing conventions and research strategies
5. Writing styles
6. Graphics and punctuation
7. Oral presentations
8. Presentation slide development
9. Providing constructive, analytical and empowering feedback
10. Teamwork skills and professionalism/responsibility

Course Format

- The class will meet regularly during the semester (nominally three hours per week for 13 weeks). These sessions will be divided into regularly scheduled seminar days, and writing and presentation workshops.
On seminar days, students will make seminar-style presentations to colleagues, faculty and staff members. Each student can expect to deliver one presentation per term, based on a schedule that is announced at the beginning of the term. When not themselves presenting, students are expected to attend their peers' presentations and prepare constructive, analytical and empowering feedback (using a form provided). Guest speakers will be invited on occasion to discuss topics relating to Sustainable Energy Engineering.

- On writing and presentation workshop days, guidance and instruction will be provided covering the topic areas listed above. Student will additionally work on revisions to their written assignments and provide feedback to peers on samples of their writing.

**Grading Scheme:**

The following grading scheme will be used to establish a grade for each student at the end of each term.

- Research Paper: 35%
- Feedback given to peers on their written work: 15%
- Presentation: 35%
- Feedback given to peers on their presentations: 15%
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>SEE</th>
<th>Number (eg. 810)</th>
<th>899</th>
<th>Units (eg. -1)</th>
<th>18</th>
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</thead>
</table>

**PhD Thesis**

<table>
<thead>
<tr>
<th>Short title (for enrollment/transcript - max. 30 characters)</th>
<th>PhD Thesis</th>
</tr>
</thead>
</table>

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.

**Rationale for introduction of this course**

<table>
<thead>
<tr>
<th>Term of initial offering (eg. Fall 2019)</th>
<th>Fall 2019</th>
</tr>
</thead>
</table>

Course delivery (eg. 3 hrs/week for 13 weeks)

| Estimated enrollment per offering | 30 |

**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 | Prerequisite: SEE 890 (0) PhD Qualifying Exam, Corequisite: SEE 897 (0) PhD Research Seminar |

Criminal record check required? Yes if yes is selected, add this as prerequisite

| Additional course fees? | Yes ☑ No |

Campus where course will be taught

| Burnaby | ☑ Surrey | Vancouver | ☑ Great Northern Way | Off campus |

| Course Components | ☑ Lecture | ☑ Seminar | ☑ Lab | ☑ Independent | ☑ Capstone |

| Grading Basis | ☑ Letter grades | ☑ Satisfactory/ Unsatisfactory | ☑ In Progress / Complete |

| Repeat for credit? | Yes ☑ No |

Total repeats allowed? 15

| Repeat within a term? | Yes ☑ No |

Required course?

| Yes ☑ No |

Final exam required? Yes ☑ No

| Capstone course? | Yes ☑ No |

Combined with a undergrad course? Yes ☑ 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

Faculty/instructors will be hired prior to the first offering of the course.

Additional faculty members, space, and/or specialized equipment required in order to offer this course
None

CONTACT PERSON

Academic Unit / Program
Faculty of Applied Sciences

Name (typically, Graduate Program Chair)
Kevin Oldknow

Email
koldknow@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign.

<table>
<thead>
<tr>
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<tr>
<td>KEVIN OLDKNOW</td>
<td></td>
<td>08/07/18</td>
</tr>
</tbody>
</table>

FACULTY APPROVAL

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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
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<tbody>
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<td>M. E. BEG</td>
<td>Signature</td>
<td>08/07/18</td>
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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

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<tbody>
<tr>
<td>Jeff Derksen</td>
<td>Signature</td>
<td>SEP 2 4 2018</td>
</tr>
</tbody>
</table>

ADMINISTRATIVE SECTION (for DGS office only)

Library Check:  
Course Attribute: GCAP  
Course Attribute Value: Thesis  
Instruction Mode:  
Attendance Type:  

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

Page 2 of 2 Revised December 2017
Sustainable Energy Engineering Program

Appendix 3: Letters of Support

University of British Columbia Faculty of Applied Science
University of Victoria Institute for Integrated Energy Systems
Surrey Board of Trade
Simba Technologies
Ballard Power Systems
Association of Professional Engineers & Geoscientists of BC
Downtown Surrey Business Improvement Association
Alpha Technologies
Powertech Labs
City of Surrey Mayor

August 2018
Faculty of Applied Sciences
June 13, 2018

Professor Eugene Fiume
Dean, Faculty of Applied Science
Simon Fraser University
8888 University Drive
Burnaby, BC V5A 1S6

Dear Eugene,

As you know, British Columbia currently graduates less than half the number of Masters- and PhD-level engineers as compared to our peer provinces, Ontario and Quebec. The opportunity to increase the number of graduate students in engineering programs across all of British Columbia has been a shared goal of all our institutions, and is critical to the future of the Province. Thus, I am writing to express my support for the proposed graduate programs in Sustainable Energy Engineering (SEE) at Simon Fraser University.

By building on SFU’s existing collaborations with industry and local government, and by leveraging SFU’s strengths in energy systems, mechatronics, wireless communications, and big data analytics, the proposed SEE programs will provide students with research and employment opportunities in areas such as smart cities and zero emissions buildings, clean transportation, and sustainable manufacturing. With specialized knowledge and research skills that are directly relevant to the BC cleantech industry, SEE students will enrich the talent pool for one of the fastest-growing sectors of the BC economy.

On behalf of the University of British Columbia’s Faculty of Applied Science—which itself provides strong graduate training in clean technology, smart cities, and sustainable transportation—I look forward to welcoming the proposed SEE programs into the engineering educational landscape and to even greater collaboration between our institutions. Indeed, it is only by working together that we can help BC realize its potential to be a global leader in cleantech innovation.

Once again, I enthusiastically support the proposed graduate programs in Sustainable Energy Engineering at SFU and wish you success in implementing them.

Sincerely,

James Olson, PhD, P.Eng., FCAE
Dean, Faculty of Applied Science
June 10, 2018

Dr. Kevin Oldknow, P.Eng.
Associate Dean, Faculty of Applied Sciences
Director, Sustainable Energy Engineering Program
Simon Fraser University

Re: Proposed Sustainable Energy Engineering program

Dear Dr. Oldknow,

The proposed graduate program in Sustainable Energy Engineering is a welcome addition to the training and education of highly qualified personnel for British Columbia and Canada. This program will produce engineering graduates with advanced knowledge and specialized research skills in clean energy systems, combining in-depth knowledge of energy technologies with a broad understanding of the techno-economic and social aspects of energy systems. These are the types of graduates in demand by organizations in both the public and private energy sectors locally and globally engaged in the growing green economy. This program will breed specialists and research engineers with strong grounding in foundational topics in energy engineering, and with the ability to integrate the social, environmental and economic aspects of sustainability in research aimed at developing new solutions. Holistic energy systems training has been limited so far to a few small graduate programs around the world, and additional training capacity is urgently needed within BC, Canada and globally to meet the challenges of deploying sustainable energy solutions adapted to diverse geographic, socio-economic and policy environments.

The MASc and PhD programs strengths include partnerships and expanding collaboration with the cleantech industry cluster in the South Fraser Region; the unique ties with the City of Surrey and its progressive sustainability agenda; and the planned recruitment of faculty with research foci in key areas of smart cities, clean transportation and sustainable manufacturing, complemented by two high visibility research chairs (Canada Research Chair in Sustainable Energy Systems Modelling and Industrial Research Chair in Energy Systems for Smart Cities).

With the continuing progress in the development and cost reduction of “clean”, “green” and renewable energy technologies and the global drive to meet challenging emissions and climate change targets, new opportunities are arising in the transportation, building, and process and manufacturing sectors. The ability to achieve these targets and capitalize on the opportunities will depend to a large extent on the availability of specialist combining research skills to chart innovative and economically viable solutions and the knowledge and skill sets required to work in interdisciplinary teams that can promote and facilitate adoption of these solutions by Society. The SEE graduate program is aimed at producing such specialists, and will represent a valuable addition to the existing engineering graduate programs to support innovation and sustainability in British Columbia and across Canada.

Sincerely,

Ned Djilali, PhD PEng FCAE FRSC
Canada Research Chair and Professor of Mechanical Engineering

University of Victoria/IESVic, PO Box 1700, STN CSC, Victoria, BC V8W 2Y2 CANADA
Tel: (250) 721 6034 Fax: (250) 721 6323 Email: ndjilali@uvic.ca www.iesvic.uvic.ca
The new building will allow SFU to accommodate an expansion of research for the School of Mechatanical and Mechatronics and testing needs that will benefit industry. Mechatronics enjoys a strong presence in the curriculum and offers a double degree program with business. Members of the faculty work closely with industry and their work record of industrial research grants is among the largest at SFU. A prepared centre in design and manufacturing will enable research and development activities and space will also be dedicated to students commercializing their research through the Technology Entrepreneurship Program to apply product collaborations between third and fourth-year business and applied science students.

The innovation and construction process is enabled by the commitment of the City of Surrey and its four partners with SFU. The land is being sold to SFU and development and construction permits will be fast tracked. The City of Surrey has contributed funding for an industrial research lab to encourage knowledge that this building will further enable the transition of the new Surrey campus and to the local economy. These research and development initiatives are priorities for the City's economic development strategy.

The new building will house 5,200 square meters of industrial innovation, including a large-scale research and development lab, as well as offices and meeting spaces. The building will be connected to the campus through a central corridor, allowing easy collaboration between researchers in different disciplines. The site will also include a green roof and solar panels to reduce the building's carbon footprint.

This project is needed to meet the increasing enrollment demand from the fast-growing university-aged population in the south Fraser Valley and for workers in B.C. that has the highest labour market demand for engineers in Canada but lacks the training. The project will accommodate growth in the demand for sustainable energy solutions in buildings, such as bio-energy, construction, natural resources, transportation, utilities and energy. SFU is the only research university in the South Fraser region. This project provides the opportunity for industry-based collaborations for which SFU and SFU Surrey have a strong reputation. The program offered in this building will provide the training and education required to meet the region's labour market needs and maintain a competitive economy.

The project will expand Surrey's burner training and design engineering program, supporting the building's needs for the integration of industrial education, cutting-edge research and fostering community engagement. SFU Surrey has been a leader in this field and has demonstrated the benefits of its approach to enhancing the local economy.

The project will expand SFU's innovation and commercialization activities through:

• Direct industry partnerships.
• Redefinition of health and safety rules of fee-paying students.
May 3, 2016

To whom it may concern:

Re: SFU Proposed Sustainable Energy and Environmental Engineering Program

I am writing this letter in conjunction with Amyn Rajan, CEO of Simba Technologies, to show our support for the expansion of SFU’s Surrey campus. This proposed expansion would see the installation of a new engineering building to increase student training spaces, as well as research, development and design labs.

Simba Technologies is a Vancouver software company that provides advanced analytical data access through its software, support and professional services. We partner with leading software companies around the globe to ensure we develop robust, commercial-grade analytic software solutions.

As a member of the local high-tech profession, we are a strong advocate for improving education in British Columbia. Amyn and Simba Technologies have donated more than $1 million to support student scholarships around the province aimed at improving diversity, and ensuring research and development remain at world-class levels in B.C.

We believe SFU’s proposed Sustainable Energy and Environmental Engineering Program (SE3P) would train the next-generation of engineers who incorporate a new spirit of innovation into their work.

It is our understanding the new building in Surrey would enable 320 new undergraduate student spaces and 120 graduate student spaces in the SE3P program. It would also allow the School of Mechatronic Systems Engineering to expand their research program into a custom-built space in the new building and provide new design studios to support its Technology Entrepreneurship@SFU program.

B.C. needs to offer cutting-edge technology engineering education to stay ahead of advances and to compete on the world stage.

Currently, Simba is in an accelerated growth period and in a little more than a year we have doubled our staff complement from 75, to over 150 employees. The only limitation to our growth, and our ability to further entrench the world-wide data connectivity marketplace to British Columbia and Canada, is our access to skilled, educated and qualified employees. We rely heavily on SFU to help meet our recruitment demands.

This project will meet the increasing enrollment demand from the fast-growing university-aged population in the south Fraser Valley and for engineers. B.C. has one of the highest labour market demand for engineers in Canada but seriously lags behind peer provinces in the percentage of engineering graduates per capita.

As a member of the technology sector in Vancouver, we can speak to how growth in our company has been suppressed due to a lack of talent. A project of this magnitude can help alleviate the issues that B.C. is facing in terms of talent shortages.
If you wish to hear directly from me, I would be more than pleased to speak to you directly about the possible impacts of SFU's Surrey campus expansion.

Sincerely,

[Signature]

Kelly Rainforth
Director Human Resources

[Signature]

Amyn Rajan
CEO
May 4, 2016

To whom it may concern,

I am writing to express my strong support for the proposed expansion of SFU's Surrey campus with a new engineering building which will house expanded research facilities and student training spaces.

As a member of industry working in fuel cell production, Ballard has collaborated with SFU's School of Mechatronic Systems Engineering for eight years. Our areas of collaboration include research involving polymer electrolyte membrane (PEM) fuel cells used to run transportation vehicles and other motive applications, such as heavy-duty transit buses and fork lifts, as well as to power stationary systems. SFU and Ballard have received multi-year funding through the NSERC Automotive Partnership Canada program and this collaboration has enabled us to do innovative research together with faculty members and highly trained graduate students. We also hire SFU co-op students and post-doctoral fellows and provide training to them in fuel cell research and development. Overall, our collaboration with SFU involves more than four faculty members, and several dozen graduate students and undergraduate students.

This partnership is extremely valuable to Ballard as it enables us to tap into significant expertise and innovative and novel ideas at the university to broaden our capabilities. For instance, through close collaboration with Ballard, SFU has developed a unique understanding of an important lifecycle mechanism for PEM fuel cell operation, which will support an improved ability to design fuel cells to achieve outstanding durability. This will directly support achieving full commercial competitiveness with incumbent technologies for fuel cell powered buses in the near- to mid-term.

We see tremendous benefit in expanding SFU's Surrey campus and introducing a program dedicated to sustainable energy and environmental engineering. This type of innovative program would serve companies such as Ballard very well in terms of developing a greater pool of talent to draw upon in the alternative industry sector. We have already hired engineers from SFU, drawn mostly from our collaborative efforts. We have an ongoing need for skilled fuel cell/clean energy engineers and find it difficult to find those with the appropriate background. An expansion of the SFU engineering program will support our future needs in this area.

The new building will support a new sustainable energy and environmental engineering program, allow for an additional 120 graduate students and house mechatronics research being done today in Surrey's Central City mall building. It will also enable the hiring of more than 18 research faculty to expand the research capacity in the energy, hydrogen, clean-tech, electricity, and LNG sectors.

I am in full support of this expansion and believe it could bring tremendous benefit to engineering training and help to propel B.C. to a leadership position in research and development in the alternative energy sector. At Ballard we operate in a highly competitive sector and need to stay on the leading edge of our market – education and training is a key component to this and we believe the direction that SFU is taking with its new program is exactly what is needed at this time.

Sincerely,

Dr. Kevin Colbow
Vice President, Technology & Product Development
Tel.: 604-412-3187
Email: kevin.colbow@ballard.com
May 4, 2016

Dr. Joanne Curry  
Vice-President, External Relations  
Simon Fraser University  
Strand Hall  
8888 University Drive  
Burnaby, B.C. V5A 1S6

Re: Proposed New Building for Sustainable Energy and Environmental Engineering Program

Dear Dr. Curry,

I am pleased to provide my support in principle for the proposed expansion of SFU’s Surrey campus to house the proposed new Sustainable Energy and Environmental engineering program (‘SE3P’), aimed at meeting an important need in the province – that of educating future engineers capable of developing new technologies to help to meet Canada’s goals for a green economy.

I understand that once fully operational, the proposed new engineering program will add 320 undergraduate student spaces and 120 graduate spaces at SFU’s Surrey campus; and that the new five-floor engineering building will include custom-built space for research and state-of-the-art engineering training to house a the SE3P program.

It is important to the Association that all those who wish to become academically qualified to practice engineering in British Columbia have access to quality learning spaces. It is my understanding that the proposed new facilities will do just that for the SE3P program.

My experience has been that SFU has an excellent record of meeting Engineers Canada’s accreditation standards for undergraduate programs in its current Engineering Science and Mechatronic Systems Engineering programs. I look forward to the development of the proposed new SE3P undergraduate program and to SFU’s working towards the accreditation of program by Engineers Canada’s Accreditation Board.

Sincerely yours,

Gillian Pichler, P. Eng.  
Director, Registration  
Association of Professional Engineers & Geoscientists of BC

cc: Ann English, P.Eng. Chief Executive Officer and Registrar, APEGBC  
    Tony Chong, P.Eng. Chief Regulatory Officer and Deputy Registrar, APEGBC
May 4, 2016

Support for a new Sustainable Energy and Environmental Engineering Building in Surrey Simon Fraser University (SFU) Campus

This submission is made on behalf of the Downtown Surrey Business Improvement Association.

The Downtown Surrey Business Improvement Association operates within Surrey City Centre and is comprised of 1300 businesses and property owners representing total property taxes paid of over $14 million. Our territory encompasses 60 blocks centered on King George Boulevard from 96 Avenue with additional businesses to the south surrounding Surrey Memorial Hospital, to 112 Avenue in the north. Our mission is to facilitate business improvement, community economic development, business revitalization and enhancement in what is designed and intended to be the downtown core of the City of Surrey. Our goal is to assist in building a vibrant, safe, and liveable downtown where people can invest, work, live, learn and play. Surrey City Centre is growing and evolving and we are proud to be part of this exciting change.

In the core of our Downtown, is the Surrey Simon Fraser University Campus, a leader in engaged learning, research and innovation. The demographic case for the new Sustainable Energy and Environmental Engineering Building in Surrey; South of the Fraser is well documented. There is an urgent requirement for expansion in a region that is home to over 19% of British Columbia’s population and BC’s largest school district. Simon Fraser University Surrey has surpassed its enrollment targets and the entrance grades required are continuing to rise. One of the main goals was to increase Surrey’s lower transition rates and this has been accomplished with a 10% increase in Surrey School District students moving on to post-secondary education. However, we are concerned that the lack of university spaces and availability is beginning to have a negative impact on the aspirations of BC’s future workforce who are unable to enter the program of their choice. Referring to the Conference Board of Canada, British Columbia is losing up to $4.7B in GDP and 616M in tax revenues annually because too few residents have the education and skills needed for businesses to innovate and grow.

In addition to meeting future labour market needs, the City Centre businesses believe that the growth of Surrey’s campus would act as a catalyst for economic development and would be excellent investment for our downtown core. Simon Fraser University’s establishment in 2002 has helped to define Surrey’s City Centre and fueled new growth. Further expansion in engineering, health programs and research will draw other research and community partners to the area and involve commercialization of space; will support local industries and new companies by providing access to student entrepreneurs, graduates and faculty expertise in areas of high labour market demand; and the region will benefit from spin-off companies. It will have a direct economic impact on our area coupled with the potential to advance
Canada's climate change and sustainability goals. The foundation on innovation and entrepreneurship, in today's world is education.

Many studies have cited that entrepreneurial students attending university develop into very successful businesspeople, which has been the documented case at Simon Fraser University. The university entrepreneur often will foster the relationships and develop their future companies within that specific community. The give back and role of growth they facilitate within the community is multi-faceted. They broaden the tax base with their spin off companies, employ local residents, serve as coaches, judge business plan competitions and serve on advisory boards for small business owners and work with local high school students on special initiatives. The SFU Surrey expansion plan is the bridge of innovation and entrepreneurship facilitating the possibilities for our future start-ups south of the Fraser.

Overall, this creates a win for education, a win for business and a big win for our youth and leaders of tomorrow; which in turn, benefits all the communities south of the Fraser.

Yours truly,
Downtown Surrey Business Improvement Association

Elizabeth Model
CEO
elizabeth@downtownsurreybia.com
Feb 3, 2017

To Whom It May Concern:

Re: Support for Expansion of SFU's Surrey Campus to Introduce a new Sustainable Energy Engineering (SEE) Building

I am pleased to write this letter on behalf of Alpha Technologies Ltd., Burnaby, BC to confirm our support for the expansion of a sustainable Energy Engineering Building immediately adjacent to SFU's existing Surrey Campus.

Alpha Technologies Ltd., a member of The Alpha Group, is an established leader in the design, manufacture, service and installation of powering solutions for the Telecom, CATV, Traffic, Security, Industrial, and Renewable Energy Industries. Alpha builds on over 40 years of experience to develop solutions that resolve customers' unique powering challenges around the world. With over 500 employees, Alpha is one of the top high-tech employers in the province of British Columbia.

The Kaiser Foundation for Higher Education is a philanthropic organization created by Alpha Technologies' founder Mr. Fred Kaiser to support higher education in the areas of Power Electronics and Sustainable Energy technologies. The Fred Kaiser Foundation for Higher Education, has made several strategic investments in B.C. education through substantial donations to UBC, SFU, and BCIT. The goal of the Foundation is to advance the development of knowledge and talent in the focus fields of study to prepare the next generation for the knowledge-based economy and a sustainable global environment.

Alpha Technologies is committed to being a strong partner to the SFU research team, and has a track record of collaborating successfully with academic research programs. The area of renewable power and smart energy has experienced an exponential growth for the last decade and presents a significant economic opportunity for Canada. Our industry requires a steady stream of job-ready and well-trained engineers and entrepreneurs, who can ideally be productive on the first day of their employment. SFU's proposed undergraduate and graduate programs have the potential to train tomorrow's engineers to become national and international leaders in developing engineering solutions for a sustainable world. Once the program is at full capacity, the SEE program is expected to accommodate more than 300 full-time equivalent undergraduate students.

I firmly believe that the SEE program will accommodate growth and demand for skilled labour in pursuing technical careers in areas such as alternative energy systems, energy storage, smart cities, clean transportation and sustainable manufacturing.
Cutting-edge engineering education is the key in allowing BC based companies to compete with the best in the world. As a member of the technology sector in Vancouver, I can speak to how growth in my own company has been hampered due to a lack of local talent. Alpha Technologies has recruited power conversion engineers from around the world due to the limited number of students that are graduating from local BC universities. A program of this magnitude can help alleviate some of the issues that B.C. is facing in terms of talent shortages. I would be more than pleased to speak to you directly about the possible impacts of SFU's Surrey campus expansion.

Sincerely,

Victor Goncalves, P.Eng, FEC
Chief Technology Officer
Alpha Technologies, Ltd.
February 7, 2017

To whom it may concern

Powertech is pleased to support SFU’s Surrey campus expansion that will accommodate new student training spaces and custom-built research and development space.

Powertech Labs, BC Hydro's clean energy subsidiary, is one of the largest testing and research laboratories in North America, situated in Surrey, British Columbia. Our 11-acre facility offers 15 different primary testing labs for a one-stop-shop approach to managing utility generation, transmission and distribution power systems. Our clients include utilities and energy companies from around the world. Through our physical labs, we house a broad range of scientists, engineers, and technical specialists; we are a magnet for all market participants many of whom actually spend time with our staff in our laboratories as their products are being tested.

Our collaboration with Simon Fraser University began with a Letter of Intent signed with SFU, and the City of Surrey in 2010 to advance sustainability through clean energy initiatives. Since that time, Powertech is pleased to collaborate with SFU's School of Mechatronics and to have established shared space in our Surrey Campus for fuel cell researchers from SFU allowing them to first-hand see how our researchers are developing leading technologies to reduce environmental footprint and improve system performance. We are also working closely with SFU and the City of Surrey to establish a jointly sponsored chair in Smart Energy Systems.

We are fully aware that for a university's engineering programs to meet special requirements there is a need to maintain a high level of research capabilities. Currently, not all research and development labs at SFU's Surrey campus are able to accommodate equipment needs, such as fume hoods and wet lab space. With this new building, SFU could take a leading position in training Canada’s future sustainability engineers.

There is a great demand for engineers who are well-versed in incorporating sustainability into their engineering and design solutions and we find that we usually will have to go outside the province if not outside Canada to find the right skills. It would benefit Powertech and many others in the sector if B.C. was able to expand engineering education, particularly in the sustainability area.

SFU's proposed Sustainable Energy Engineering (SEE) Program would be a strategic win for both SFU and Powertech Labs. It will train next-generation of engineers who are able to work with today's challenges and enabling local economic development across BC and Canada.

Powertech fully supports the expansion in Surrey and we hope that our important educational partner (and neighbor) sees this new building and program come to fruition in the coming years.

Yours truly,

Raymond Lings
President & CEO
Powertech Labs
June 19, 2018

Andrew Petter  
President and Vice-Chancellor  
Simon Fraser University:  
8888 University Drive  
Burnaby, BC  
V5A 1S6

Dear Dr. Petter:

On behalf of Surrey City Council, I am pleased to provide this letter of support for Simon Fraser University's (SFU) new Sustainable Energy Engineering (SEE) program. This program, a first of its kind in Western Canada, aligns strongly with the City's objective to empower our youth as global, clean technology leaders through collaboration, entrepreneurship and innovation.

Surrey is one of the fastest growing cities in Canada and our young and talented population require advanced skills and training through graduate programs in order to fill industry skills gaps. University graduate level research will enable the City of Surrey to foster leaders in sustainable energy systems and clean technology increasing economic competitiveness across the region. The SEE program will serve to strengthen both the City’s and SFU’s common objective of promoting vibrant, healthy communities.

SFU remains a key partner for Surrey, and our two organizations have a longstanding history of partnerships since SFU’s arrival in City Centre over 10 years ago. We are proud to have invested in an Industrial Research Chair with SFU for clean energy in smart cities and are excited to see SFU pursuing a smart cities track as part of the SEE program.

I am delighted to support Simon Fraser University’s Sustainable Energy Engineering program as a unique initiative that will encourage entrepreneurial development, attract investment, and create jobs in our City. Thank you in advance for your thoughtful consideration of this opportunity.

Sincerely,

Linda Hepner  
Mayor  
City of Surrey
Sustainable Energy Engineering Program

Appendix 4: Program Steering Committee

June 2018
Faculty of Applied Sciences
Program Steering Committee

As the Sustainable Energy Engineering initiative (including undergraduate and graduate programs) is mounted at SFU, a Steering Committee and an Advisory Committee will be established.

Governance of the Sustainable Energy Engineering undergraduate and graduate programs will rest in the Program Director and Steering Committee, which will comprise full-time faculty members of SFU. The Chair of the Steering Committee will normally be the Director. In addition to the Chair, five faculty members will initially (prior to program launch) be appointed to the Steering Committee by the Dean of Applied Sciences upon the advice of the Director of the Program and other interested parties, and with due regard to the mix of disciplinary perspectives needed to maintain and develop the program. During the first three years of Program operation this will increase to a total of seven faculty members in addition to the Chair. Once the Steering Committee has reached its full complement of eight faculty members (including the Chair), the distribution of these members will be as follows:

a. At least two research faculty members (Assistant Professor, Associate Professor or Professor)
b. At least two teaching faculty members (Lecturer, Senior Lecturer or University Lecturer)
c. At least one female faculty member

The Advisory Committee will include external representatives and various invited members from academia, industry and the community, and will provide advice to the Director and Steering Committee in areas including research foci, faculty hiring priorities and the development of new academic programming such as course-based and professional masters programs.

For the purpose of developing this Full Program Proposal, an ad-hoc Advisory Committee was formed with the following membership; abbreviated CVs are provided on the following pages. The Committee participated actively in program design and revisions.

Dr. Majid Bahrami, P.Eng.
Professor, School of Mechatronic Systems Engineering, Simon Fraser University
Canada Research Chair in Alternative Energy Conversion Systems

Dr. Faisal Beg, P.Eng.
Professor, School of Engineering Science, Simon Fraser University
Associate Dean, Faculty of Applied Sciences, Simon Fraser University

Dr. Ned Djilali, P.Eng. (chair)
Professor, Department of Mechanical Engineering, University of Victoria
Canada Research Chair in Energy System Design and Computational Modelling
Dr. Michael Elkerling
Professor and Graduate Program Chair, Department of Chemistry, Simon Fraser University
Joint Affiliation with the NRC Institute for Fuel Cell Innovation

Dr. Woo Soo Kim, P.Eng.
Associate Professor, School of Mechatronic Systems Engineering, Simon Fraser University

Dr. Mehrdad Moallem, P.Eng.
Professor and Graduate Program Chair, School of Mechatronic Systems Engineering
Abbreviated Curriculum Vitae of Professor Majid Bahrami

Professor, P.Eng., CRC, Fellow ASME, member ECS, AIAA
School of Mechatronic Systems Engineering
Faculty of Applied Science
Simon Fraser University

http://www.sfu.ca/~mbahraini/

Education

• PDF, Microelectronics Heat Transfer Lab., U of Waterloo, Canada 2004-2006
• PhD, Mechanical Eng., University of Waterloo, Canada 2000-2004
• B.Sc., Mechanical Eng., Sharif U of Technology, Tehran, Iran 1988-1992

Work Experience

• Professor, Simon Fraser University, Mechatronic Systems Engineering 2015
• Co-founder and CEO, Watergenics Inc., Vancouver, Canada 2015-2018
• Canada Research Chair, Alternative Energy Conversion Systems, Simon Fraser University, Canada 2014-2019
• Co-founder and CTO, Matergenics Engineering, Vancouver, Canada 2013-2015
• Associate Professor, Simon Fraser University, Canada 2011-2015
• Assistant Professor, Simon Fraser University, Canada 2008-2011
• Adjunct Professor, University of Victoria, Mechanical Engineering, Canada 2008-2011
• Assistant Professor, University of Victoria, Mechanical Engineering, Canada 2006-2008
• Postdoctoral Fellow, University of Waterloo, Mechanical Engineering, Canada 2004-2006
• Research Assistant, University of Waterloo, Mechanical Engineering, Canada 2000-2004
• Thermal Engineer, Keeprite Refrigeration, Ontario, Canada 1999-2000
• Thermal Engineer, Tavhieh (Formerly Chrysler) HVAC Systems, Tehran, Iran 1995-2000
• Instructor/Lecturer (part-time), Satari University, Tehran, Iran 1995-1997

Research Keywords: Sustainable air conditioning systems, heat transfer, fluid flow, sorption technology, atmospheric water harvesting, energy recovery systems, graphite heat exchangers, thermal energy storage, thermal management of lithium-ion batteries, transport phenomena in porous media and micro/nano-structured materials, PEM fuel cells, microelectronics cooling, membrane systems, microfluidics, super-insulators, analytical modeling, experimental validation.

Majid Bahrami

Research Projects and Funding (selected partial list; total funds awarded + $12M)

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Funding Source</th>
<th>Amount</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive Cooling Solution for Higher Power Battery Charger</td>
<td>NSERC, BC Ministry of Energy and Mines</td>
<td>$76,000</td>
<td>2016-2020</td>
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<tr>
<td>Materials for Enhanced Energy Technologies</td>
<td>NSERC CREATE</td>
<td>$275,000</td>
<td>2015-2021</td>
</tr>
<tr>
<td>NSERC Energy Storage Technology Network</td>
<td>NSERC SPG-N</td>
<td>$40,000/yr</td>
<td>2015-2020</td>
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<tr>
<td>Green Cooling Solutions for High Power Electronics</td>
<td>NSERC CRD &amp; Alpha</td>
<td>$65,000/yr</td>
<td>2013-2018</td>
</tr>
<tr>
<td>Green Sustainable Air Conditioning and Refrigeration Systems for Service Vehicles</td>
<td>Automotive Partnership Canada</td>
<td>$592,475</td>
<td>2012-2016</td>
</tr>
<tr>
<td>Bulk and Interfacial Transport Properties of Porous Fuel Cell Materials</td>
<td>NSERC CRD &amp; AFCC</td>
<td>$150,000</td>
<td>2014-2019</td>
</tr>
</tbody>
</table>

Academic Supervision, Service (Partial list)

- Trained more than 120 highly qualified personnel (HQP) who have gone on to successful careers in academia and industry including three professors
- Developed leading a multi-national research initiative supported by the Canadian Queen Elizabeth II Diamond Jubilee Scholarships - Advanced Scholars on sustainable energy, potable water, and crops for doctoral and postdoctoral scholars from developing low-income countries
- Developed 6 undergraduate, 4 graduate courses, 3 teaching laboratories
- Served on numerous academic committees, organized several conference sessions
- Served on NSERC Discovery Grant review panel, Qatar National Fund, and Belgium IWT

Publications, Awards, Outreach (Partial list)

- Established the world-class Laboratory for Alternative Energy Conversion (LAEC) and has attracted >$12M of research funding as a principal investigator (2010 - 2018)
- Published 6 patents, 139 peer-reviewed articles in prestigious journals, 152 conference papers/presentations at highly ranked venues, with h-index of 32 and his i10-index of 78 (Google Scholar, April 2018)
- Fellow of the American Society of Mechanical Engineers (ASME) 2016
- Won the 2017 Mohammed bin Rashid al Maktoum Global Water Award, the UAE Water Foundation for innovative research and development in sustainable water technology
- Received Canada “Clean50” Awards two consecutive years, 2016 and 2017
- Given numerous public, invited talks and interviews on national and international radio/TV, including CBC, Global News, CNN
Mirza Faisal Beg
B-Tech. (Honors), MS, Ph.D., P.Eng.
Professor, School of Engineering Science
Simon Fraser University, Burnaby, BC Canada
http://www.ensc.sfu.ca/~mfbea

Positions and Employment
2015 - Associate Dean, Research and Graduate studies, Faculty of Applied Science, Simon Fraser University
2014 - Professor, School of Engineering Science, Simon Fraser University
2013 - Associate Member, Division of Neurology, Faculty of Medicine, University of British Columbia
2009 - 2014 Associate Professor (with tenure), Engineering Science, Simon Fraser Univ.
2008 - Adjunct Professor, School of Applied Mathematics, Simon Fraser University
2008 - Adjunct Professor, School of Biomedical Physiology and Kinesiology, Simon Fraser University
2003 - 2009 Assistant Professor, School of Engineering Science, Simon Fraser University

Education and Training

The Johns Hopkins University School of Medicine
Doctoral program in Biomedical Engineering
• Thesis: Computational Anatomy - Metrics on Flows of Diffeomorphisms for Image and Landmark Matching
• Mentor: Professor Michael I. Miller

Master of Science (1994 – 1997)
Boston University, School of Biomedical Engineering
Graduate program in Biomedical Engineering
• Thesis: Effects of aging on motor unit firing behavior
• Mentor: Professor Carlo J. De Luca

Bachelor of Technology (with Honors) (1989 – 1993)
Indian Institute of Technology, Kharagpur, Department of Electrical Engineering
Undergraduate option in Instrumentation Engineering
• Thesis: H-infinity based proportional, integral and derivative controllers for feedback control
• Mentor: Professor Kanti B. Dutta

Awards and Honors
2015 ‘Excellence in Research’ Award, Faculty of Applied Science, Simon Fraser University (given to one Professor in the faculty of approximately 110)
2012 Meritorious Achievement award, Association of Professional Engineers and Geoscientists of British Columbia (given to one Engineer in the province of BC each year)
2011 'Excellence in Teaching' Award, Faculty of Applied Science, Simon Fraser University (given to one Professor in the faculty of approximately 110)
2008 - 2014 Career Investigator, Michael Smith Foundation for Health Research, BC

Research Funding

The primary sources of my funding have been NSERC (discovery grants), CHRP (collaborative health research program, NSERC and CIHR), Michael Smith Foundation of Health Research (MSFHR), Alzheimer Association of Canada and Pacific Alzheimer Research Foundation of British Columbia.

Project Title: OCTSurfer - Advanced Imaging and Integrated Image Analysis Platform for 3D Optical Coherence Tomography Images of the Eye
Funding: CHRP  Type: External
Annual: 275k  Total: 850k
Involvement: Principal Investigator

Project Title: Novel Retinal Biomarkers for Alzheimer's Disease
Funding: Brain Canada - MIRI  Type: External
Annual: 500k  Total: 1500k
Involvement: Principal Investigator

Project Title: CBRAIN: Canadian Brain Research And Informatics Platform
Funding: Brain Canada – Platform Grant  Type: External
Annual: 1000k  Total: 3000k
Involvement: Co-PI with Principal Investigator Dr. Alan Evans (McGill University)

Project Title: Brains behind the Eyes: Interpreting medical images
Funding: National Science & Engineering Research Council (NSERC)  Type: External
Annual: 40k  Total: 120k

Project Title: Brains behind the Eyes: Interpreting medical images
Funding: National Science & Engineering Research Council (NSERC)  Type: External
Annual: 50k  Total: 250k


Prof. Nedjib (Ned) Djilali, FCAE, FRSC
Department of Mechanical Engineering & Institute for Integrated Energy Systems
University of Victoria
www.uvic.ca/estp

Education/Training

Doctorate, Mechanical Engineering (Fluid Mechanics), University of British Columbia, 1987
Master’s, Aerodynamics, Fluid and Structural Mechanics, Imperial College of Science, Technology and Medicine, 1979
Bachelor, Aeronautical Engineering, University of Hertfordshire, 1977

Employment/Affiliations

Professor, Mechanical Engineering, UVic, 1999-present
Canada Research Chair, Advanced Energy Systems Design & Computational Modeling, Tier 1, UVic, 2005-2019
Adjunct Professor, Mechatronics Engineering, SFU, part-time, non-tenure track, 2010-2016
Interim Director, Pacific Institute for Climate Solutions (PICS), UVic, 2008-2009
Executive Director, Institute for Integrated Energy Systems, UVic, 2002-2007
Professor in Residence, Angstrom Power Inc., 2004-2005
Associate Dean, Engineering, UVic, 2000-2002
Associate Professor, Mechanical Engineering, UVic, 1994-1999
Assistant Professor, Mechanical Engineering, UVic, 1991-1994
Staff Specialist, Advanced Aerodynamics Department, Bombardier Aerospace, Montreal, 1989-1990
Post-Doctoral Fellow & Research Associate, Mechanical Engineering, UBC, 1987-1989

Bio

Dr. Djilali’s research focuses on transport phenomena (fluid flow, heat, mass and charge transport) and energy systems integration and analysis. The applications of this research have ranged from aerodynamics and zero-emission cars, to electrochemical energy conversion and water purification. He has established an internationally recognized laboratory in the areas of fuel cell technology and energy systems integration. Many graduates trained in his lab have become leaders in academia and industry.

As Director of the Institute for Integrated Energy Systems (2001-07), he spearheaded a significant expansion of sustainable energy research activities by engaging industrial partners and researchers from many disciplines to investigate issues around integration of fuel cells, hydrogen and renewable energy. Dr. Djilali was closely involved in the development of the BC Hydrogen & Fuel Cell Industry Strategy and co-authored a report for the Premier’s Technology Council; he served on the NRC Fuel Cell Program Advisory Board and on the Hydrogen Highway Steering Committee; he has testified in front of a standing committee of the Senate of Canada and lectured on Parliament Hill on sustainable energy systems. He also played a lead role in the Wind Energy Strategic Network (WESNET) and in the NSERC H2CAN Strategic Research Network. As Interim Director (2009) and Chair of the Program Committee, he led the Pacific Institute for Climate Solutions (PICS) during its inception phase and continued subsequently to play an active role in promoting interdisciplinary research across science, technology, economics and social sciences to inform policy development.

Awards (Selected)

- Outstanding Engineering Teacher Award (1992 and 1993), Engineering Institute of Canada (Vancouver Island Chapter)
- High Level Research Fellowship (1998), Ministry of Education, Research & Technology, France
Ned Djilali — Short CV

- Ludwig Mond Prize (1998), Institution of Mechanical Engineers (UK)
- Fellow, Canadian Society for Mechanical Engineering (2003)
- Fellow, Canadian Academy of Engineering (2010)
- Honorary Professorship, Tianjin University (2013)
- Fellow, Royal Society of Canada (2013)
- Jules Stachiewicz Medal, Canadian Society for Mechanical Engineering (CSME) (2017)
- David H. Turpin Gold Medal, University of Victoria (2018)

Publications/Patents

<table>
<thead>
<tr>
<th>Book Chapters</th>
<th>Journal Papers</th>
<th>Keynote/Plenary Lectures</th>
<th>Conference Papers/Abst.</th>
<th>Patents</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
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<td>35</td>
<td>215</td>
<td>14</td>
<td>64</td>
</tr>
</tbody>
</table>

Google Scholar: ~11,000 citations; H-index = 55

Research Funding (last 4 years):
1. NSERC CREATE, Materials for enhanced energy technologies. PI: R Gordon. $11,650,000, 2015-2021.
5. CRC, Advanced energy systems design and computational modeling. $1,400,000, 2012-2019.
8. NSERC Discovery, Transport phenomena in fuel cells. $350,000, 2011-2016; $290,000, 2016-2021

Collaboration
Dr. Djilali has established industrial collaborations with the following companies: Automotive Fuel Cell Coop. (AFCC), Atomic Energy Canada (AECL), Angstrom Power Inc., ASL Environmental Sciences, Ballard Power Systems Inc., CFDRC, Greenlight Power Technologies and Toyota Motor Corp.

Dr. Djilali current academic collaborations include: SFU, UBC, Pacific Northwest National Lab (US), Tianjin University (China), Chongqing University (China), International Institute for Applied Systems Analysis (Austria)
Curriculum Vitae

Prof. Dr. Michael H. Eikerling

March 2018

PERSONAL DATA

DATE AND PLACE OF BIRTH: January 23, 1969, in Paderborn, Germany
CITIZENSHIP: German citizen; permanent resident of Canada

HOME AFFILIATION

Department of Chemistry at Simon Fraser University
8888 University Drive, Burnaby, BC, V5A 1S6, Canada
ph.: +1 778 782 4463
e-mail: meikerl@sfu.ca

DEGREES

Doctorate (Ph.D.) in Theoretical Chemical Physics, TU München, Germany
Supervisors: Prof. Dr. U. Stimming and Prof. Dr. A. Kornyshev
1999

Physik-Diplom in Theoretical Solid State Physics, RWTH Aachen, Germany
Supervisor: Prof. Dr. H. Capeilmann
1995

ACADEMIC RESEARCH AND EMPLOYMENT HISTORY

<table>
<thead>
<tr>
<th>Department of Chemistry, SFU</th>
<th>Department of Physics, SFU</th>
<th>Inst. für Theor. Physik II, HHU Düsseldorf</th>
<th>NRC Institute, Vancouver</th>
<th>Department of Chemistry, SFU</th>
<th>Department of Chemistry, SFU</th>
<th>Department of Physics, TU München</th>
<th>MST-11, Los Alamos National Laboratory</th>
<th>IWV 3, FZ Jülich</th>
<th>IEV 3, FZ Jülich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>Associate Member</td>
<td>Visiting Professor</td>
<td>Secondment (50%)</td>
<td>Associate Professor (tenure)</td>
<td>Assistant Professor</td>
<td>Research Associate</td>
<td>Postdoctoral Fellow</td>
<td>Postdoctoral Fellow</td>
<td>Research Assoc. (Ph.D. student)</td>
</tr>
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</table>

RESEARCH OVERVIEW

MAIN AREAS OF EXPERTISE:
• Theoretical chemical physics and physical electrochemistry
• Theoretical and computational electrocatalysis
• Modeling and simulation of heterogeneous media: soft matter, interfaces, and nanomaterials
• Electrochemical energy science

PUBLICATIONS:
• Journal articles: 116 published, 6 accepted/in press, 3 under review
• Book chapters: 7 published, 1 in press
• Textbook on physics of fuel cells: published in 2014 (CRC Press, with A. Kulikovsky)
• Citations (Web of Science): > 3500 (without self-citations), h-index = 35
• 8 articles cited > 100 times, 5 articles cited > 200 times

CONFERENCE CONTRIBUTIONS AND SEMINARS:
• > 75 invited (16 keynote, 5 plenary); 21 contributed; > 50 seminars (acad. institutions or industry)

SUPERVISION:
• 19 postdocs (14 completed), 16 Ph.D. students (8 completed), 4 M.Sc. students (3 completed)

RESEARCH FUNDING:
• Secured for my research: $5M (individual: $2M, collaboration: $3); total secured: $18M
SELECTED COLLABORATION PROGRAMS AND PARTNERSHIPS


• NSERC Automotive Partnership Canada (APC) network on Catalysis Research for Polymer Electrolyte Fuel Cell (CaRPE-FC, 2012-2017): theme leader for electrocatalysis and nanomaterials design; lead scientist for physical theory and materials modeling; member of steering committees.


• Automotive Fuel Cell Cooperation Corp.: molecular modeling of self-organization in electrochemical materials; method development, parametric studies, and implementation of data management tools.

• Greenlight Innovation, Inc.: development and implementation of modeling-based tools for intelligent diagnostics of renewable energy systems; 1 patent filed.

• Ballard Power Systems, Inc.; Nissan Motor Corp.; Cool-It Hiway Services, Inc.: development and implementation of particle-based physical-statistical models of electrode degradation.

MAJOR ADMINISTRATIVE ROLES

• Chair of Departmental Graduate Studies Committee since 1/2018

• Chair of Departmental Graduate Studies Committee 5/2015 – 8/2016

• Appointed Member of the International Advisory Board of the European Fuel Cell Forum (EFCF) since 2017

• Member of Technical Steering Committee of Hydrogen South Africa (HySA) catalysis since 2013

• Member of Scientific Steering Committee and Technology Analysis Committee of pan-Canadian fuel cell network (CaRPE-FC) 2012-2017

• Chair of Physical Electrochemistry Division of the International Society of Electrochemistry 2013-2016

• Chair of Canada Section of the Electrochemical Society 2014-2016

AWARDS AND PRIZES

• 2017 Alexander Kuznetsov Prize for Theoretical Electrochemistry of the ISE 2017

• Award from Norwegian Centre for International Cooperation 2012


EDITORIAL ROLES

Editorial Board Member of journal “Electrocatalysis”, Springer.

Editorial Board Member of journal “Scientific Reports”, NPG.

ORGANIZATION OF CONFERENCES, SYMPOSIA, AND WORKSHOPS (MAJOR EVENTS)

Lead-organizer of symposium Advances in Theory and Modeling of Electrochemical Systems, 68th AGM of the ISE, Providence, RI 8/2017


Lead-organizer of symposium on Interfacial Electrochemistry and Electrocatalysis from Molecular Perspective at Pacifichem, Honolulu, HI 12/2015
Dr. WOO SOO KIM, P.Eng

Associate Professor in the School of Mechatronic Systems Engineering,
Simon Fraser University.

Employment History

2016 Sept. - Current  Associate Professor, School of Mechatronic Systems Engineering, Faculty of Applied Sciences, Simon Fraser University.


2010 Sept. – 2016 Aug.  Assistant Professor, School of Mechatronic Systems Engineering, Faculty of Applied Sciences, Simon Fraser University.


Educational Background

2009 PostDoc  Massachusetts Institute of Technology (MIT), Department of Materials Science and Engineering, USA “Silver Nanoparticle Self-Assembly for Plasmonic Applications.”

2006 Ph.D.  Korea Advanced Institute of Science and Technology (KAIST), Department of Materials Science and Engineering, South Korea “Nano Imprint Lithography with Surface Functionalized Sol-gel Hybrid Polymer toward Mechanically Durable Stamp Applications.”

2003 M.Sc.  Korea Advanced Institute of Science and Technology (KAIST), Department of Materials Science and Engineering, South Korea “Soft Lithography of Sol-gel Hybrid Polymers for Photonic Applications.”

2001 B.Sc.  Yonsei University, Department of Materials Engineering, South Korea

Awards, Honors and Scholarships

2016  Title: International Short Visit Award 2018, Award: $12,000, Type: Research, Organization: Swiss National Science Foundation

2010  Title: Brain Pool Fellowship: $25,000, Type: Research, Organization: National Research Foundation of South Korea

2016  Title: Hanwha Advanced Material Award 2016, Award: $13,000, Type: Research, Organization: Hanwha Corporation’s New Faculty Award

2010  Title: Wendy McDonald Endowed Research Fellow Award: $5,000, Type: Research, Organization: Simon Fraser University

2009  Title: The first prize of Quadrant Award 2007: €15,000, Type: Research, Organization: ETH Zurich, Details: International PhD thesis competition in Polymeric and Composite Materials and Manufacturing Field held in ETH Zurich in Switzerland
Research Objectives
Over the past eight years as a Principle Investigator in Simon Fraser University, I have established a strong and flourishing research program in Additive Manufacturing of Printed Electronics. I have created a new SFU’s Additive Manufacturing Laboratory, which quickly became an interdisciplinary research training platform with a substantial critical mass of research personnel. Additive manufacturing is an emerging field that integrates the aspects of nanotechnology, material science, and mechatronics to design novel materials and manufacturing of Internet-of-Things devices and their systems. My laboratory is equipped with the necessary facilities to generate transformative technological advances.

Publications & Patents: 1 book chapter, 51 refereed journal publications, 22 US patents, and 17 refereed conference proceedings have been published as a corresponding author.

Conferences, Workshops and Presentations: 32 invited talks from 2010, and 5 interviews with media such as Maclean, New Scientist, and YTN broadcasting were given so far.

Research/Project Funding – Received: Total external funding received as PI: $1,530,300 in total (from 2010 September to 2018 January) including NSERC DAS Award, two NSERC CRD, and international funds from S. Korea.

Supervision of Highly Qualified Personnel
Here is a summary for past HQP training in my lab: 1) Supervised one PDF, one PhD student, ten MSc students, and nine international visiting students to completion, 2) Currently supervise five PhD students and one MSc student, 3) Supervised 55 research Coop students, and 12 Undergraduate students by Capstone Design Projects, 4) Participated in 48 thesis examination for 30 PhD theses and 18 MSc thesis since 2010.

Active Service to the Academic Community
- Referee of Grant Proposal: proposals such as,
  NSERC Discovery grant in 2013-2018, NSERC Collaborative Research and Development (CRD) grant, NSERC Strategic Partnership grant, NSERC Idea to Innovations (I2I) grant, Canada Foundation for Innovation grant
- Evaluation Committee of Grant Proposals: Member of NSERC Engineering RTI Grants Selection Committee in 2017 and 2018.
- Conference Session Organizer:
  - Presider of the Next-generation nano-lithography session of Polymer Materials Science and Engineering, ACS 2012 National meeting in San Diego, USA, March 2012.
  - One of four Symposium BM4 organizers for Material Research Society’s Fall Conference in Boston, 2016.
- Award Committee Member:
  - The 14th IEEE international conference on Nanotechnology in Toronto, August 2014.
CURRICULUM VITAE

Mehrdad Moallem, Ph.D., P.Eng.
School of Mechatronic Systems Engineering
Faculty of Applied Sciences
Simon Fraser University, Surrey, BC, Canada

Date: June 2018
Email: mmoallem@sfu.ca
Phone: 778.782.8156

Field(s) of Specialization: Electrical Engineering, Mechatronics, Control Systems, Robotics and Automation

Current Research Areas/Topics: Control Applications including Control and Automation for Sustainable Energy Systems; Mechatronics, and Robotics; Real-time and Embedded Control; Control of Power Electronics Systems.

Career History

Dr. Moallem has more than twenty years of experience in multi-disciplinary areas related to control systems, real-time, and embedded computing, electronic systems, and mechatronics. He has collaborated in the form of R&D and technology transfer activities with several companies and research institutions including Bombardier Inc., Mirabel, QC, and the Canadian Space Agency (1996-1998); Duke University, Durham, NC, USA (1998-1999); National Research Council of Canada, London, ON (2000-2007); the Canadian Surgical Technologies and Advanced Robotics, London, ON (2002-2007); Unity Integration Corporation, Vancouver, BC (2010-now); Future Vehicle Technologies, Maple-Ridge, BC (2010-present); and InteLuma Energy Systems, Vancouver, BC (2012-2015); and Rocky Mountain Bicycles, North Vancouver, BC (2013-present). Dr. Moallem has served on the editorial board of major conferences and journals such as the American Control Conference, IEEE Transactions on Mechatronics, and Elsevier journal of Mechatronics. His expertise in control, power electronics, embedded computing, and mechatronic engineering will be relevant to the proposed CRD project.

<table>
<thead>
<tr>
<th>Dates</th>
<th>Rank and Position</th>
<th>Department</th>
<th>Institution</th>
</tr>
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<tbody>
<tr>
<td>09/2012-onward</td>
<td>Professor</td>
<td>School of Engineering Science, Mechatronic Systems Engineering</td>
<td>Simon Fraser University, Surrey, BC, Canada</td>
</tr>
<tr>
<td>06/2007-09/2012</td>
<td>Associate Professor</td>
<td>School of Engineering Science, Mechatronic Systems Engineering</td>
<td>Simon Fraser University, Surrey, BC, Canada</td>
</tr>
<tr>
<td>09/2007-09/2009</td>
<td>Adjunct Research Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario, London, ON, Canada</td>
</tr>
<tr>
<td>07/2006-06/2007</td>
<td>Associate Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario, London, ON, Canada</td>
</tr>
<tr>
<td>08/1999-06/2005</td>
<td>Assistant Professor</td>
<td>Electrical &amp; Computer Engineering</td>
<td>The University of Western Ontario</td>
</tr>
<tr>
<td>2002-2007</td>
<td>Associate Scientist (affiliation)</td>
<td>Canadian Surgical Technologies and Advanced Robotics (CSTAR) group</td>
<td>Lawson Health Research Institute (UWO Hospital)</td>
</tr>
<tr>
<td>1998-1999</td>
<td>R&amp;D Engineer</td>
<td>Free-Electron Laser Laboratory</td>
<td>Duke University, NC, USA</td>
</tr>
<tr>
<td>1997-1998</td>
<td>Postdoctoral fellow</td>
<td>Electrical &amp; Computer Engineering</td>
<td>Concordia University, Montreal, Canada</td>
</tr>
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</table>
Academic Qualifications

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<tr>
<th>Degree</th>
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<th>Field</th>
<th>Year</th>
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<tbody>
<tr>
<td>B.Sc.</td>
<td>Shiraz University, Shiraz, Iran</td>
<td>Electrical &amp; Electronic Engineering</td>
<td>1986</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>Sharif University of Technology, Tehran, Iran</td>
<td>Engineering</td>
<td>1988</td>
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<tr>
<td>Ph.D.</td>
<td>Concordia University, Montreal, QC, Canada</td>
<td>Electronic Engineering</td>
<td>1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical &amp; Computer Engineering</td>
<td></td>
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Number of Postgraduate Students Supervised

<table>
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<th>Program</th>
<th>Status</th>
<th>Senior Supervisor</th>
<th>Joint Supervision</th>
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<tbody>
<tr>
<td>Ph.D.</td>
<td>Graduated</td>
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<td>17</td>
</tr>
<tr>
<td></td>
<td>Ongoing</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Master of Applied Science</td>
<td>Graduated</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Ongoing</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Achievements/Awards:

- University Professor (Simon Fraser University, 2015-2020): Recognition of senior scholars of distinction who are active participants in all aspects of their discipline and hold the rank of Professor.
- Attraction of research funds (industry/government) in excess of $10M over the career.

Number of Publications:

<table>
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<th>Publication</th>
<th>Quantity</th>
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<td>Journals</td>
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<tr>
<td>Books</td>
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<td>Referred Conferences</td>
<td>105</td>
</tr>
<tr>
<td>Patents</td>
<td>2</td>
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<tr>
<td>Book Chapters</td>
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<tr>
<td>h-index</td>
<td>36</td>
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<tr>
<td>i10-index</td>
<td>94</td>
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</table>

Recent Publications

Sustainable Energy Engineering Program

Appendix 5: Abbreviated curriculum vitae for faculty

August 2018
Faculty of Applied Sciences
Abbreviated curriculum vitae for faculty

Because this program will be delivered by new faculty who are leaders in the field of Sustainable Energy Engineering, an advisory committee will be struck (as noted in Appendix 4) to include experts in varying aspects of the discipline.

Members will include specialists in the environment, energy, and social policy from within the University, discipline appropriate industry leaders, and government representatives, to advise on program development, personnel hiring, and recruitment of students into the program.

The following Inaugural Director for the program has been appointed, with abbreviated CV provided on the following pages.

Dr. Kevin Oldknow, P.Eng.
Inaugural Director, Sustainable Energy Engineering Program
Associate Dean, Faculty of Applied Sciences, Simon Fraser University
Senior Lecturer, School of Mechatronic Systems Engineering
Dr. Kevin Oldknow, P.Eng.
Abbreviated Curriculum Vitae

Employment History at Academic Institutions

May 2018 - Present
Director, Sustainable Energy Engineering Program, SFU

January 2017 - Present
Associate Dean, Undergraduate Studies, Applied Sciences, SFU

September 2016 - Present
Senior Lecturer, Mechatronic Systems Engineering, SFU

September 2015 - Present
Faculty Teaching Fellow, Applied Sciences, SFU

August 2012 - August 2016
Lecturer, Mechatronic Systems Engineering, SFU

January 2011 - April 2011
Adjunct Professor, Mechanical Engineering, UBC

September 2009 - December 2009
Sessional Lecturer, Mechanical Engineering, UBC

September 2007 - December 2007
Sessional Lecturer, Mechanical Engineering, UBC

Other Employment History

September 2012 - June 2016
Principal Engineer, Wheel / Rail Interface
L.B. Foster Rail Technologies

May 2011 - August 2012
Vice President, Technology and Business Development
LB Foster Friction Management

January 2009 - May 2011
Corporate Vice President, Friction Management
Portec Rail Group, Corporate Division

September 2007 - December 2008
Vice President, Applications and Operations
Portec Rail Group, Kelsan Technologies Division

September 2005 - August 2007
Manager, Friction Control Technology
Portec Rail Group, Kelsan Technologies Division

February 2005 - September 2005
Group Leader, Field Applications
Portec Rail Group, Kelsan Technologies Division

June 2004 - February 2005
Field Application Engineer
Portec Rail Group, Kelsan Technologies Division

September 2000 - May 2004
Product Development Consultant, Cameleon Controls

August 1996 - April 1998
Technical Project Manager, Procter & Gamble

Educational Background

2004 Ph.D. Mechanical Engineering, University of British Columbia
2000 M.A.Sc. Mechanical Engineering, University of British Columbia
1996 B.A.Sc Engineering Physics, University of British Columbia, Canada

Teaching History

MSE 102 - Applied Science, Technology and Society (2013-2016), SFU
MSE 352 - Digital Logic and Microcontrollers (2012), SFU
MSE 380 - Dynamic Systems Modelling and Simulation (2012-2014, 2016), SFU
MSE 403 - Technology Entrepreneurship I (2015, 2016), SFU
MSE 404 - Technology Entrepreneurship II (2015, 2016), SFU
Selected Works


Roney, M., Bell, S., Paradise, S., Oldknow, K. and Igwemezie, J. (2010) Implementation of distributed power and friction control to minimize the stress state and maximize velocity in Canadian Pacific’s heavy haul / heavy grade train operations, Journal of Rail and Rapid Transit September 1, 2010 vol. 224 no. 5 465-471


July 24, 2018

From: MSE Graduate Program Committee Chair
To: Faculty of Applied Sciences Graduate Program Committee

Subject: Professional Master’s in Mechatronic Product Realization

Dear FAS Graduate Program Committee

Attached please find the following documents for feedback and approval by FAS:

1. Revised program proposal for Professional Master’s in Mechatronic Product Realization. The revised proposal was approval by MSE GPC and MSE Faculty on July 23, 2018.

2. New course proposal (MSE 901 Becoming a Professional Engineer):

3. New course: MSE 794 Graduate Co-op Practicum II

4. Course Change: "MSE 793 Graduate Co-op Practicum" to be changed to "MSE 793 Graduate Co-op Practicum I". The proposal has been approved by the MSE GPC and MSE faculty on January 12, 2018.

Sincerely,

Mehrdad Moallem
Professor and Graduate Program Chair
School of Mechatronic Systems Engineering

Phone: 778 782 8156
MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

RE: Full Program Proposal for the Master of Engineering in Mechatronic Product Realization (SCUP 18-28)

DATE: October 17, 2018

At its October 10, 2018 meeting, SCUP reviewed and approved the full program proposal for the Master of Engineering in Mechatronic Product Realization within the Faculty of Applied Sciences, effective Fall 2019.

Motion:

That Senate approve and recommend to the Board of Governors the full program proposal for the Master of Engineering in Mechatronic Product Realization within the Faculty of Applied Sciences, effective Fall 2019.

c: F. Firmani
   M. Moallem
   E. Fiume
MEMORANDUM

ATTENTION Senate Committee on University Priorities (SCUP)
FROM Jeff Derksen,
Chair of Senate Graduate Studies Committee (SGSC)
RE: Full program proposal for a Master of Engineering in Mechatronic Product Realization

For approval:

At its meeting of September 11, 2018, SGSC approved full program proposals for and a Master of Engineering in Mechatronic Product Realization and is recommending it to SCUP for approval, effective Fall 2019.

Motion:
That SCUP approve and recommend to Senate the full program proposal for a Master of Engineering in Mechatronic Product Realization within the Faculty of Applied Science.
The faculty of Applied Sciences Graduate Program Committee would like to send two items to the SGSC for consideration. These are:

1) The full program proposal for the Sustainable Energy Engineering MASc and PhD degrees revised as per the feedback provided by your office.

2) The full program proposal for the Professional Master’s in Mechatronic Product Realization revised as per the feedback provided by your office.

FAS GPC has approved both of these submissions via an electronic vote. I request you to place these on the agenda for the next SGSC meeting.
July 24, 2018

From: MSE Graduate Program Committee Chair
To: Faculty of Applied Sciences Graduate Program Committee

Subject: Professional Master's in Mechatronic Product Realization

Dear FAS Graduate Program Committee

Attached please find the following documents for feedback and approval by FAS:

1. Revised program proposal for Professional Master's in Mechatronic Product Realization. The revised proposal was approval by MSE GPC and MSE Faculty on July 23, 2018.

2. New course proposal (MSE 901 Becoming a Professional Engineer):

3. New course: MSE 794 Graduate Co-op Practicum II

4. Course Change: "MSE 793 Graduate Co-op Practicum" to be changed to "MSE 793 Graduate Co-op Practicum I". The proposal has been approved by the MSE GPC and MSE faculty on January 12, 2018.

Sincerely,

Mehrdad Moallem
Professor and Graduate Program Chair
School of Mechatronic Systems Engineering

Phone: 778 782 8156
Master of Engineering in Mechatronic Product Realization

Full Program Proposal

October 15, 2018 (revised proposal)

School of Mechatronic Systems Engineering
PART A: Information required by the Ministry of Advanced Education

EXECUTIVE SUMMARY

Overview of the SFU’s history, mission, and academic goals

The School of Mechatronic Systems Engineering (MSE) proposes the creation of a Master of Engineering in Mechatronic Product Realization (MEng). Building upon the success of its undergraduate and graduate programs, the MEng 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.

From fall 2015 this program was offered as a Cohort Special Arrangements Master’s Program in Mechatronic Product Realization through the Office of Graduate Studies at SFU. The special cohort program is now in its third year and has been rapidly increasing in demand. During this period, our students have successfully gained experience in the Canadian workplace through the co-op program and through experience on the job upon graduation. After completing the first two cohort programs, the program is now mature and ready for conversion into a regular program.

Mechatronic Product Realization covers the entire process of design 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 Master of Engineering in Mechatronic Product Realization is to help British Columbia and Canada stay competitive in product design and manufacturing in a rapidly changing world. The proposed program is also in line with the vision of assisting the City of Surrey to become a major contender in manufacturing, nationally and globally. As a key academic partner of the City of Surrey, through the MPR program, the MSE offers a unique engineering training program that feeds local companies with highly qualified engineers.

The MPR program’s main target is Internationally Trained Engineers (ITEs). According to Engineers and Geoscientists BC (EGBC), nearly 50% of the new Professional Engineer applicants are ITEs. The curriculum of the MPR program focuses on addressing the needs of ITEs to expedite their integration into the Canadian workforce. The MPR also serves as an avenue for Canadian engineering professionals to upgrade their skills to become more competitive in the global manufacturing realm.

MSE is a multidisciplinary accredited engineering program (granted the maximum of six years in 2014) that uniquely integrates mechanical, electronics, control, software, and computer

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1 Western Canada Advanced Manufacturing Conference (2017), Seeding the Revolution The Dialogue for Advancing Manufacturing Innovation & Transformation in Canada Surrey City Hall, 13450 104 Ave, Surrey, BC V3T 1V8
2 Accredited by the Canadian Engineering Accreditation Board
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 to prepare better professional graduates for market challenges. The School is proud to be one of the top-ranked engineering programs in Canada. MSE’s graduating engineers (graduate and undergraduate) are trained to work in industries including electronics, automotive, medical, aerospace, etc. with distinctive education in business and entrepreneurship.

**Proposed credential to be awarded**

Master of Engineering in Mechatronic Product Realization

**Location of program**

The new program is offered in the School of Mechatronic Systems Engineering at the Surrey campus of SFU.

**Academic unit(s) offering proposed program**

School of Mechatronic Systems Engineering in the Faculty of Applied Sciences.

**Anticipated program start date**

Fall 2019.

**Anticipated completion time**

Four or five terms (16 or 20 months) to complete the Program. The duration depends on whether the students take a four or eight-month co-op placement during the degree.

**Summary of proposed program**

1. **Aims, goals, and/or objectives of the proposed program**

According to the City of Surrey market research, manufacturing in Canada directly employs about 1.8 million Canadians. However, because of fierce global competition and fast-paced changes in the manufacturing sector, Canada’s manufacturing competitiveness may be at risk. The international market is embracing the industry 4.0, or the fourth industrial revolution, which is rapidly altering traditional manufacturing, “providing a huge competitive advantage to economies such as China, U.S.A, Germany, and Japan that are investing strategically in technology and innovation in this sphere.”

The School of Mechatronic Systems Engineering has positioned itself to become a top international program in advanced manufacturing. In line with this aspiration, it has successfully partnered with

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2 McLean’s Magazine March 2011
3 Western Canada Advanced Manufacturing Conference (2017), Seeding the Revolution The Dialogue for Advancing Manufacturing Innovation & Transformation in Canada Surrey City Hall, 13450 104 Ave, Surrey, BC V3T 1V8
Siemens to administer the Siemens Mechatronic certification program where three MSE faculty are trained in Berlin to teach these industry standard training courses. Another building block of this plan is the proposed MSE Master of Engineering Program (M. Eng.) in Mechatronic Product Realization (MPR).

The primary goal of MPR is to help British Columbia (and Canada) to become more competitive in a rapidly changing world. By offering a leading edge professional degree program in mechatronics product realization, MSE provides 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.

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 Engineers and Geoscientists BC (EGBC) point to a clear need for such a program. As mentioned earlier, the MPR is well in line with the City of Surrey manufacturing aspirations. MPR is expected to have an intake of more than twenty-five (25) students (Fall 2019).

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

The proposed program is a direct outcome of the Faculty of Applied Sciences Academic Plan 2013-18.5

“Develop professional graduate programs – FAS plans to develop professional graduate programs directed to selected industry sectors. Potential areas are large-scale data analysis, health informatics, mechatronics and communication engineering. These programs can also be targeted to new immigrants interested in upgrading their qualifications. The potential for collaboration with Life-Long Learning will be explored.”

The SFU’s strategic plan is to continue the university’s growth in globally relevant and strategically important areas by transforming the landscape of teaching and learning. The MPR program is well in line with the mandate of the University to increase experiential learning opportunities in which students “learn by doing.” The MPR program provides the student with a premier curriculum—through dedicated courses, design projects, and industrial co-ops—to stay competitive in product design and manufacturing. The program is distinctive as it provides several experiential learning opportunities to effectively train engineers. The program also focuses on enhancing the communication and critical thinking skills of the students.

SFU Surrey: There is a strong public policy to expand post-secondary education in the South Fraser Region. Thus SFU has identified the further development of the Surrey campus as a top priority.

Given that the program is offered in Surrey campus, it is in line with the academic planning of the University.

The program is also in line with the academic plan of the university to improve access for under-represented communities. SFU has long been committed to making education more accessible and puts considerable resources into this. Furthermore, given the changes in the demography of British Columbia one objective of the program has been to provide training for foreign-trained professionals such as landed immigrants for better integration into the workforce. The program is also envisaged to address the worldwide demand for educational programs that focus on highly sought after skills in the area of product design and manufacturing.

c) Linkages between the educational goals and the curriculum.

Rooted in the belief that experiential learning is likely the most effective way to train engineers in mechatronic product realization, the MPR program is planned 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 the 15 units, students will take at least six units from design and manufacturing methods courses. Based on the suggestions by the MSE industrial advisory board, FAS External Advisory Board, Canadian Manufacturers, and Exporters, and Engineers and Geoscientists BC, there are also six units that students can take from MSE 801-3, which focusses on communications and technical writing; and MSE 900-3 that covers standards and codes, law and ethics, engineering economics, and project management. Students can also take three units or more from other advanced technical courses offered in MSE. Because of a competitive job market, co-op employers mainly prefer students who have completed a minimum of one year of coursework. As a result, an on-line (0 unit) course has been designed in collaboration with the SFU Co-op office and Engineers and Geoscientists BC to allow students to be able to graduate on their co-op term. A support letter from Work Integrated Learning appears in Appendix 5. The curriculum design addresses the needs of ITEs to help integrate them into the Canadian workforce. Their specific needs of technical communication, EGBC recognition, and Canadian work experiences can be addressed through completing this program. The curriculum also addresses the practicing engineers’ needs to be well-skilled in the entire design process, to appreciate the role of mechatronics product realization in the context of business development, to gain new knowledge in mechatronics, and to gain project management experience.

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

1) Coursework: Mechatronic Product Realization with intensive hands-on experience,

2) Product Realization projects, combined with law, ethics, and business aspects of engineering, and
d) Potential areas/sectors of employment for graduates and/or opportunities for further study.

The graduates of this program will have potential opportunities similar to those of our undergraduate program alumni. Since mechatronics is a multidisciplinary engineering field, our graduates have the advantage of being qualified for a broader spectra of jobs. The MSE program has an excellent reputation of graduating students who find employment provincially, nationally and internationally. Of note, organizations such as BC Hydro, TESLA, SpaceX, Intel, Kiewit, Arista, and Seaspan have hired our graduates.

For the period 2011-2015, the employment record of our MSE alumni is summarized in the figure below. The data were generated by personal contact with the alumni or by accessing their LinkedIn account. The data include a population of 259 students who graduated during this period.

The List of NOC codes for jobs obtained by our MSE alumni is given below

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2132</td>
<td>Mechanical Engineers</td>
</tr>
<tr>
<td>2133</td>
<td>Electrical and Electronics Engineer</td>
</tr>
<tr>
<td>2147</td>
<td>Computer Engineers</td>
</tr>
<tr>
<td>2173</td>
<td>Software Engineers and Designers</td>
</tr>
<tr>
<td>2141</td>
<td>Industrial and Manufacturing Engineers</td>
</tr>
<tr>
<td>0211</td>
<td>Engineering Managers</td>
</tr>
<tr>
<td>0911</td>
<td>Manufacturing Managers</td>
</tr>
<tr>
<td>2146</td>
<td>Aerospace Engineers</td>
</tr>
<tr>
<td>2145</td>
<td>Petroleum Engineers</td>
</tr>
</tbody>
</table>

e) Delivery methods

The Program will be delivered in a traditional face-to-face classroom-based setting. Students will complete at least 30 units of graduate work: 15 units directly related to experiential learning, which includes an eight-month capstone design project (covered in two consecutive terms), intensive lab
work, and an industrial co-op. For the capstone projects, students may select from an industry-sponsored, a faculty or student-proposed project. The capstone design project is an open-ended student-driven problem that entails components of teamwork, technical communication, engineering ethics and social implications. Teams of students receive the constant guidance of one of our faculty members who act as their supervisor for the eight-month period. For the rest of 15 units, students will take at least six units from design and manufacturing methods courses. The Program will be delivered using a cohort model, but optional courses will provide students with flexibility (primarily in the final term) to deal with their interests.

f) Program Strengths

This Program fills a significant need of highly qualified personnel in the areas of product realization design, manufacturing, and automation. The strength of the program relies on the combination of three critical key areas: experimental learning, academic courses in modern mechatronic systems, and work experience.

This program is intended to provide a transition path from the academic formation to the Canadian workplace. In addition to the specialized courses on mechatronic design, some courses focus on law and ethics, professionalism, standard and codes, engineering economics and project management. The capstone project is proposed by an industrial sponsor, though some projects are proposed by faculty whose research has industrial relevance. Based on our experience with the undergraduate capstone project, the students may also propose their own projects, which have an entrepreneurial spirit. In all cases, students have to solve real-life problems and maintain constant communication with the industrial partners and the project supervisor, who is a faculty member of our school. Once the formative training of academic courses and capstone design are completed, the students are placed on a four or eight-month co-op, where they gain significant experience in the Canadian workplace. All students that are in a co-op term require taking an online course that has been developed in collaboration with the SFU co-op office (see the attached support letter from Work Integrated Learning). It is worth mentioning that the co-op office has a 100% placement record during the three years of the program. This success has been achieved through dedicated workshops on resume writing and interview skills, developing relations with employers, and assisting students on a personal basis.

An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable and plans for admissions and transfer within the British Columbia post-secondary education system.

There is a high demand for engineering professional degree programs in Canada with a few successful Master of Engineering programs established across Canada. The MPR will fill a niche market.

The program was conceived after full discussions and consultation with the following persons and organizations:

- MSE advisory Board including
Master of Engineering in Mechatronic Product Realization

- Matt Dion (Chief Executive Officer - Mintent),
- Bruce Fingarson (General Manager & COO Automation West Technologies, formerly: Surrey Fluid Power Ltd.), and
- Gillian Pichler, (Director, Registration & Licensing EGBC). Engineering practice is regulated by the Association of Professional Engineers and Geoscientists of the Province of British Columbia (EGBC).

- 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
  - Arie Van Muyen, Manager of Engineering, Ellet Industries
  - Chris Campbell, Senior Manager, R&D, Indoor General Area, Philips Lighting North America
  - Dory Meynert, VP Supply Chain, Creation Technologies
  - Ray Wong, Chief of Engineering, SeaStar Solutions
  - Wes Hallam, Director of Manufacturing, Corvus Energy
  - Victor Goncalves, Director of Engineering, Alpha Technologies
  - Laura Petrescu, Manager of Engineering and Technology Development, Avcorp Industries, Inc.

Through the cohort special arrangement program, MSE has built up a close collaboration with the Fraser International College (FIC). FIC has developed a 13-week non-credit program leading to admission into the Master of Engineering in Mechatronic Product Realization program (MPR). FIC promotes the MPR to international students and admits students based on the admissions requirements of the University (https://www.fraseric.ca/programs/pme). A memorandum of understanding was signed between SFU and FIC in June 2016 (Appendix 5).

Related programs in the institution or other British Columbia post-secondary institutions.

The School of Mechatronic Systems Engineering offers a research-based Master’s of Applied Science (MASc) degree. This is a thesis-based program focused on an independent project with a significant research component. The student defends the thesis in a public examination (defence), according to the university regulations. Students in the MASc program may complete an optional one-term co-op placement.
The School of Engineering Science (ENSC) at SFU offers a course-intensive Master of Engineering (MEng) program. This program curriculum includes a core set of specified ENSC courses in advanced engineering topics (12 units), a set of elective graduate courses from ENSC (15 units) which can include courses from Computing Science, MSE, or the Faculty of Science (up to 9 units) to broaden and deepen the students’ knowledge in their area of interest. Unlike a cohort program, students in the ENSC MEng program provides students the freedom to customize their course choices independently. An additional 3 unit course on engineering project management and development, and the ability to enroll in up to two co-op placements (optional) for real-world industrial experience rounds out this program designed to broaden and strengthen students’ knowledge base in engineering.

The University of British Columbia (UBC) has two Master of Engineering programs: Master of Engineering Leadership (MEL) and Master of Engineering (MEng). Both of these programs are course-based programs that have a duration of 12 months with an optional co-op placement. The MEL program targets practicing professionals and it combines business and leadership skills with technical courses on particular specializations, none of which is mechatronics. The MEng program is a field-specific course-based program designed for engineers wishing to upgrade their training. Among the different options, there is one on Mechatronic Design offered by the Department of Mechanical Engineering. This program is distinct from ours as it focuses on the academic aspect of mechatronics, coursework only, whereas our program is designed around the transition between university and industry.

The University of Victoria (UVic) has a generic Master’s in Engineering (MEng) program that is designed to strengthen and extend the knowledge gained at the undergraduate level. The program consists of eight graduate-level courses, a graduate seminar, and a research project.

The MSE’s MPR program provides its graduates with training in mechatronic product design and manufacturing technologies, as well as real-world experience through a mandatory industrial co-op program that will expedite their absorption into the job market. The combination of technical, communication, engineering law and ethics, and business courses and mandatory co-op, make it unique in Canada.

Contact information

Farid Golnaraghi
Professor and Director, School of Mechatronic Systems Engineering
(778) 782-8054
mfgolnar@sfu.ca
PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

Students will complete 30 units of graduate work. These units are divided into three sections: 15 units of graduate coursework, 12 units of specialized lab/project work, and 3 units of work experience, which includes a co-op term and an online course titled “Becoming a Professional Engineer” that must be taken in conjunction with co-op.

Six courses must be taken from the choices below:

- The following three courses:
  - MSE 801 – Research and Publication Methods (3)
  - MSE 900 – Engineering in the Canadian Context (3)
  - MSE 901 – Becoming a Professional Engineer (0), in conjunction with co-op
- At least two of the following courses:
  - MSE 726 – Introduction to Engineering Design Optimization (3)
  - MSE 727 – Finite Element Analysis (3)
  - MSE 780 – Manufacturing Systems (3)
- One graduate technical elective course:
  - Any other MSE 700/800 level course (3)

Lab/Project Work

Students must take the following lab/project-based courses. Only students enrolled in the Master of Engineering in Mechatronic Product Realization program will be permitted to enroll in these courses:

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

Co-Operative Education

A term of co-operative education is an integral part of this program. Students will register in MSE 793 and be expected to find a suitable industry partner for the co-op term with the assistance of the co-op office. Those students who wish to conduct an 8-month coop placement, will have to register to a second co-op course. The students may also opt to work as a paid research assistant under the supervision of a faculty member in an area relevant to the program. Alternatively, if a co-op placement cannot be made due to extenuating circumstances, a student may request to the program...
director to take an appropriate graduate course instead (with preference given to MSE graduate courses). Students are required to enrol in the course “Becoming a Professional Engineer” during the co-op term which will be administered by one of the MSE faculty members.

Academic Requirements within the Graduate General Regulations

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

Target Audience

Our intended audience is individuals, both within Canada and internationally, who already have degrees in mechanical engineering, electrical engineering or a related field, but who wish to enhance their career opportunities in the rapidly growing area of mechatronics. It is not intended to prepare students on a research path; that is the focus of existing MSc degrees offered at SFU and elsewhere.

b) Admission requirements

To qualify for admission to the Master of Engineering program in Mechatronic Product Realization, a student must satisfy the university admission requirements for a Master’s program as stated in Graduate General Regulations 1.3 in 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.

Applicants graduated from either a Canadian or a foreign university are welcome to apply. Applicants must meet the minimum University requirements as per graduate admissions policy "1.3.3: Admission to a Master’s Program"

c) Evidence of student interest and labor market demand

The School has conducted a significant market survey in support of the MPR program and the attached labor market survey results from our current co-op employers are provided in Appendix 5. This survey was to gauge the likelihood of participating companies supporting practicing engineers taking this program. It is also found through the survey that “Advanced Manufacturing” might not be the best area. Therefore, a focus group of local manufacturers was organized afterwards whose deliberations led to a change in the focus and the title of the program (see below).

A focus group of local manufacturers indicated that the market demand 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 Society of Internationally Trained Engineers (ITE). A focus group of SITEs has been organized at MSE Surrey and overwhelmingly 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 5 for the support letter from SITE-BC president.

The Canadian Manufacturers & Exporters (CME) is Canada’s leading trade and industry association serving as the voice of 10,000 leading companies. CME has a path2work program that is mandated to place ITEs to the workforce. CME is a strong supporter of the proposed MPR program.

EGBC 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 for applying Engineer In Training (EIT) with no need to take additional courses or exams. EGBC will further recognize their co-op experience as Canadian work experience. Please see Appendix 5 for their support letter.

The following is an example of the companies in which the MSE MPR students have been placed for co-op industrial positions:

- Affinity Manufacturing Ltd.
- Algo Communications
- Automation West Technologies Ltd.
- Ballard Power Systems Inc.
- BC Hydro
- Empower Operations Corp.
- Laboratory for Alternative Energy Conversion
- Mercedes-Benz Fuel Cell.
- Sierra Wireless
- StandardAero Inc.
- Stem Cells Technologies Inc.
- TransLink
- Vitrum Glass Group
- Weatherhaven Global Resources Ltd.

The following table reflects the number of applicants interested in the program and the actual number admitted individuals who actually showed up. As shown, the demand for the program is on a steady rise. Based on the numbers shown, it is expect to have around 25 students enrolled in the program in 2019-2020 academic year.

6 The story of a MSE MPR student working at Weatherhaven caught the attention of SFU News: https://www.sfu.ca/sfunews/stories/2018/05/sfu-graduate-student-applies-engineering-skills-to-advance-natio.html
<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Applicants</th>
<th>Admits to Program (Actually showed up)</th>
</tr>
</thead>
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<tr>
<td>2015</td>
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<td>2</td>
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<tr>
<td>2016</td>
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<tr>
<td>2017</td>
<td>45</td>
<td>15</td>
</tr>
<tr>
<td>2018</td>
<td>74</td>
<td>23</td>
</tr>
<tr>
<td>2019</td>
<td>–</td>
<td>EXPECTED 25</td>
</tr>
</tbody>
</table>

**d) Eligibility for scholarships, awards, and financial aid**

The current plan is to offer two graduate awards valued at $6,000 each from the School of Mechatronic Systems Engineering to attract top students to our program. With increasing enrollment in the program, potentially more awards can be given. The budget for the above awards will be allocated from the MPR tuition transfers to MSE.

Students admitted to the program can make use of the financial aid program. The School of Mechatronic Systems Engineering program manager has contacted the financial aid office concerning this eligibility.

**e) Program evaluation and academic/administrative oversight**

The steering committee for the Master of Engineering Program consists of the Program Chair (currently Dr. Flavio Firmani), the Chair of the Graduate Program Committee (currently Dr. Mehrdad Moallem), and the Director of the School (currently Dr. Farid Golnaraghi).

The program will be reviewed internally using the same mechanisms that are used to review the other graduate programs in the School of Mechatronic Systems Engineering. Changes to the program will be administered through the MSE Graduate Program Committee.

**f) Main competitors outside BC**

At its conception, the MSE was the second Mechatronics undergraduate degree program in Canada. At this point, there are at least five programs in place in the country. However, SFU MSE is the only independent degree program.

Our key competitor is the University of Waterloo’s Department of Mechanical and Mechatronics Engineering which has an MEng program with a Graduate Diploma in Design. This diploma also requires a 2-term capstone design project, which is equivalent to ours; however, it does not have a mandatory co-op requirement.

The University of Toronto’s Department of Mechanical and Industrial Engineering offers an MEng coursework program. Students may customize their degree by taking some mechatronic-related courses towards a technical specialization certificate in the area of Robotics and Mechatronics. The program has neither a design capstone project nor a mandatory co-op requirement.
McMaster's Electrical and Computer Engineering department offers two MEng programs, Electrical and Biomedical Engineering and Electrical and Computer Engineering. Neither of these programs has a mechatronic design content nor a mandatory co-op requirement.

The University of Ottawa's Faculty of Engineering offers a generic MEng program where students take a variety of courses including some courses in the area of dynamics, controls, automation and robotics. The program neither has a dedicated stream in Mechatronics nor a mandatory co-op requirement.

The majority of MEng programs offered in other Canadian universities are more generic, where students take a variety of courses that are not specific to a particular field.
PART C: RESOURCES

a) Enrolment Plan

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Applicants</th>
<th>Admits to Program (Actually showed up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>15</td>
<td>2</td>
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<tr>
<td>2016</td>
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<td>2018</td>
<td>74</td>
<td>23</td>
</tr>
<tr>
<td>2019</td>
<td>–</td>
<td>EXPECTED 25</td>
</tr>
</tbody>
</table>

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments

The program will require three MSE faculty (and one backup to address study leaves) to teach its specifically designed MPR courses ($342,000/yr.). These courses are treated in the same fashion as the other courses offered in the School, as far as the faculty workload is concerned. The program will require an Academic Program Coordinator ($30,000/yr), who will be in charge of administrative, recruitment and admission requirements of the program. The courses are laboratory heavy, and require participation of the MSE technical staff, and teaching assistants who will be paid through the funds generated by the MPR tuition fees (expected to be around $50,000/yr.). Also MSE has agreed to contribute in-part towards the salaries of a co-op coordinator, and a co-op advisor (the total amount is under negotiation at this stage but should not exceed $20,000/yr.) until the university overheads can sustain these expenses. An additional $20,000/yr. will be devoted to the course operational needs.

For 25 students per year, the program will be self funding and would not require additional resources.

c) Faculty member’s teaching/supervision

Three faculty members are required to specifically teach

- MSE 900 – Engineering in the Canadian Context (3)
- MSE 995 – Advanced Modeling and Prototyping (6)
- MSE 921 – Product Realization Project I (3)
- MSE 922 – Product Realization Project II (3)
- MSE 901 – Becoming a Professional Engineer (0)

The other program courses are offered at the School on a regular basis and are absorbed internally.
d) Proposed tuition and other program fees including a justification

Tuition for the full Program will be charged on a term basis, as presented in the original cohort arrangement program, with a 25% continuing fee after the compulsory 16-month program. The reduction on the continuing fee structure has the purpose of promoting students to take a two-term co-op. Many industrial companies prefer longer co-ops because of the time that is required for training students. However, the co-op salary of our MSE MPR students is considerably less than the salary received by students in other SFU professional programs, making the cost of extending their work experience to two terms less affordable.

The regular program (one-term co-op) will have a cost of $28,143 per student for domestic students and $33,782 for international students. The extended program (two-term co-op) will have a cost of $29,902 for domestic and $35,893 for international students. The co-op fees are included in the term fees. The tuition fees are summarized in the following table:

Regular Program (4 terms)

<table>
<thead>
<tr>
<th></th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
<th>Term 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$28,143.24</td>
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<tr>
<td>International</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$33,781.63</td>
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Extended Coop Program (5 Terms)

<table>
<thead>
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<th></th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
<th>Term 4</th>
<th>Term 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$7,035.81</td>
<td>$1,758.95</td>
<td>$29,902.19</td>
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<tr>
<td>International</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$8,445.41</td>
<td>$2,111.35</td>
<td>$35,892.98</td>
</tr>
</tbody>
</table>
Since each year there will be a new cohort, the expenses are calculated on a yearly basis. The tuition fees will offset the following expenses:

<table>
<thead>
<tr>
<th>Program Expenses</th>
<th>Cost per Unit</th>
<th>Number of Units</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time Faculty</td>
<td>$121,379.00</td>
<td>2.0</td>
<td>$242,758.00</td>
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<td>Program Coordinator</td>
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<td>Co-op Coordinator/Advisor</td>
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<td>$20,000.00</td>
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<td>Technical Support</td>
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<td>$24,000.00</td>
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<td>Teaching Assistants</td>
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<td>Marketing</td>
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<td>Graduate Awards</td>
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<td>$12,000.00</td>
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<tr>
<td>EAL Curriculum</td>
<td>$500.00</td>
<td>1.0</td>
<td>$500.00</td>
</tr>
</tbody>
</table>

Subtotal Program Expenses $489,274.50

Budget Justification

Full-Time Term Faculty

Three full-time term faculty members are required to teach specifically designed MPR courses. We follow Policy A 12.05 on full-time term research faculty. The salary for each full-time term faculty will be at the Assistant Professor salary scale and combined with a market differential; the salary will be $103,240 plus 17.57% benefits for the full-time faculty ($121,379 ea). The full-time term lecturer salary is $85,000 plus 17.57% benefits ($99,934.50).

The specifically designed MPR courses include 27 units related to the Graduate Coursework and the Laboratory Courses (8 courses). This request also accounts for anticipated faculty leaves. An intake of 20 students in every cohort will cover for two full-time term faculty members. The hirings will be made as the student intake stabilizes towards the maximum of 25 students.

Academic Program Coordinator

The program assistant will be an APSA staff member (Grade 6, Step 7, 0.5 FTE) 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. This position is equivalent to the program coordinator in the MEng in Computer Science. The salary will be $60,836.00 for 1.0 FTE, thus $30,418.00 for 0.5 FTE.

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 $8,000.00 per term (excluding coop term) to pay for their time.

**Teaching Assistants**

Teaching assistants will be paid at $1392 per base unit (for PhD students; the rate is slightly lower for master's students). We have allocated 17 base units for the courses in this program totaling $23,664.00. This is more TA support than in our normal graduate program, but warranted by the lab coursework in this program.

**Co-op Coordinator and Co-op Advisor**

The unit expects the co-op personnel salaries to arrive from the program overhead funds. Until then, we aim to support, in part, the co-op program with two positions. The first position is a half-time Co-op Coordinator Position (APSA, Grade 10, Step 8, 0.5 FTE) who will be responsible for developing the employer relations and generating postings within the program to help ensure that all the students are placed in a co-op position. The second position is a half-time Co-op Student Career Advisor (APSA, Grade 7, Step 6, 0.5 FTE) who will be responsible of assisting students with resume writing, interview skills, etc. The contribution of MSE to the total amount is under negotiation at this stage but should not exceed $20,000/yr. until the university overheads is sustainable to pay these costs.

**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 increasing enrollment in the program, potentially more awards can be given.

**EAL Curriculum**

Since most of the students are anticipated to be international, they will face barriers in language and communication skills while seeking placements for employment. To this end, MSE will support students having English as a second language. The online course Job Search Success offered by the Work Integrated Learning (Co-op Education) is $20.00 per student, $500.00 for the cohort.
Master of Engineering in Mechatronic Product Realization

PART C: Appendices

Appendix 1. Calendar entry

Mechatronic Product Realization

MASTER OF ENGINEERING

Description of Program

The Mechatronic Product Realization program trains students with leading-edge product development techniques, processes, and manufacturing systems.

Mechatronics is a multi-disciplinary engineering field that incorporates three areas of study: mechanical, electrical and computer engineering. 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, including consumer products and electronics, automotive, medical, industrial and aerospace.

Offered by the School of Mechatronic Systems Engineering at Simon Fraser University, this program provides students with a premier curriculum—through dedicated courses, design projects, and industrial co-ops—to stay competitive in product design and manufacturing.

Admission Requirements

Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar and 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 (CGPA) of 3.0 or the equivalent.

Program Requirements

This program consists of required courses, lab courses, and a co-op for a minimum of 30 units.

Students must complete
MSE 801- Research and Publication Methods (3)
MSE 900 – Engineering in the Canadian Context (3)
MSE 901- Becoming a Professional Engineer (0)
MSE 995- Advanced Modeling and Prototyping (6)

and two of
Master of Engineering in Mechatronic Product Realization

MSE 726 – Introduction to Engineering Design Optimization (3)
MSE 727 – Finite Element Analysis (3)
MSE 780 – Manufacturing Systems (3)

and one graduate MSE course

and two projects
MSE 921 – Product Realization Project I (3)
MSE 922 – Product Realization Project II (3)

and a minimum of one co-op term
MSE 793 – Graduate Co-op (3) *

*students must enrol in MSE 901 – Becoming a Professional Engineer (0) concurrently

Program Length
Students are expected to complete the program requirements in 4 or 5 terms (16 or 20 months).

Other information
Co-op
A co-op internship is an integral part of this program. Students will register for one or two co-op terms. With assistance from the co-op coordinator for this program, students will be expected to find a suitable industry partner for the co-op placement. The students may also opt to work for a faculty member as a paid research assistant. Alternatively, in extenuating circumstances, a student may appeal to the program director to take an elective course from the list of electives for this program instead of a co-op. Students are required to enroll in the course becoming a Professional Engineer during the co-op term. This course is administered by the MSE faculty. The duration depends on whether the student takes a 4 month or 8 month co-op placement during the degree.

Academic Requirements within the Graduate General Regulations
All graduate students must satisfy the academic requirements that are specified in the Graduate General Regulations, as well as the specific requirements for the program in which they are enrolled.
Appendix 2. New course

- MSE 901 – Becoming a professional Engineer (0)
### Graduate Course Change

Attach a separate document if more space is required.

<table>
<thead>
<tr>
<th>Course Subject/Number</th>
<th>Units</th>
<th>Effective Term and Year</th>
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</thead>
<tbody>
<tr>
<td>MSE793</td>
<td>3</td>
<td>Fall 2019</td>
</tr>
</tbody>
</table>

**Course Title**
Graduate Co-op Practicum I

**Rationale for Change:**
Introduction of a second course: Graduate Co-op Practicum II (MSE 794)

**Proposed Changes [Check all that apply]**
- [ ] Course number
- [x] Units*
- [x] Title
- [ ] Description
- [x] Prerequisite
- [ ] Other

**Complete only the fields to be changed**

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<th>TO</th>
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<tbody>
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<td>Course Title</td>
<td>Course Title [max 100 characters]</td>
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<tr>
<td>Graduate Co-op Practicum</td>
<td>Graduate Co-op Practicum I</td>
</tr>
<tr>
<td>Course Short Title</td>
<td>Course Short Title [max 30 characters]</td>
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<tr>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>Co-req MSE 901</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
</tr>
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</table>

*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.

Page 1 of 2 Revised May 2015
REMINDER: All course changes must be identified on a cover memo and confirmed as approved when submitted to FGSC and SGSC.

### CONTACT PERSON

<table>
<thead>
<tr>
<th>Department / School / Program</th>
<th>Contact name</th>
<th>Contact email</th>
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<tr>
<td>Mechatronic Systems Engineering</td>
<td>Mehrdad Moallem</td>
<td><a href="mailto:mmoallem@sfu.ca">mmoallem@sfu.ca</a></td>
</tr>
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</table>

### DEPARTMENTAL APPROVAL

<table>
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<tr>
<th>Department Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Moallem</td>
<td></td>
<td>July 24, 18</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmad Red</td>
<td></td>
<td>July 24, 2018</td>
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</tbody>
</table>

### FACULTY APPROVAL

<table>
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<tr>
<th>Faculty Graduate Studies Committee (FGSC)</th>
<th>Signature</th>
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<tr>
<td>M. Faisal Beg</td>
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### SENATE GRADUATE STUDIES COMMITTEE APPROVAL

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<tr>
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<th>Signature</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 24, 2018</td>
</tr>
</tbody>
</table>

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

## Course Details

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>MSE</th>
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<td>794</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
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</tbody>
</table>

### Course Title

**Graduate Co-op Practicum II**

### Short Title

**Grad Co-op II**

### Course Description

To complement their academic studies, students in the MSE graduate program may complete this optional one-semester co-op practicum (MSE 794) of paid practical experience in an appropriate industrial setting. The practicum will appear on the student's transcript, but does not count towards the student's CGPA and course requirements for the degree. Students require a pre-approval from the senior supervisor and Graduate Program Chair in order to apply for the practicum. Arrangements for the practicum are made through the School's co-op coordinators and SFU's Co-op office.

### Rationale for Introduction

Some co-op employers and students would prefer to have 8 months of co-op. The course can be taken following MSE793 (Graduate Co-op Practicum I) to fulfill the above requirement.

### Term of Initial Offering

**Fall 2019**

<table>
<thead>
<tr>
<th>Frequency of offerings/year</th>
<th>3</th>
</tr>
</thead>
</table>

### Estimated Enrollment

| Estimated enrollment per offering | 10 |

### Equivalent Courses

Pre-req: MSE 793; Co-req: MSE 901

### Pre-requisite and/or Corequisite

Additional course fees? Yes ☑ No

### Criminal Record Check

Criminal record check required? Yes ☑ No

### Campus

Campus where course will be taught:
- ☑ Burnaby
- ☑ Surrey
- ☑ Vancouver
- ☑ Great Northern Way
- ☑ Off campus

### Course Components

- ☑ Lecture
- ☑ Seminar
- ☑ Lab
- ☑ Independent
- ☑ Capstone

Grading Basis:
- ☑ Letter grades
- ☑ Satisfactory/Unsatisfactory
- ☑ In Progress/Complete

### Repeat for Credit

Repeat for credit? Yes ☑ No

Total repeats allowed? ☑

Repeat within a term? Yes ☑ No

### Required Course

Required course? Yes ☑ No

Final exam required? Yes ☑ No

Capstone course? Yes ☑ No

### Combined with Undergrad Course

Combined with a undergrad course? Yes ☑ No

*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

MSE faculty supervising graduate students

Additional faculty members, space, and/or specialized equipment required in order to offer this course

No such resources are required to offer this course

CONTACT PERSON

Academic Unit / Program
Mechatronics

Name (typically, Graduate Program Chair)
Mehrdad Moallem

Email
mmoallem@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
M. Moallem

Department Chair

Signature

Date

July 24, 2018

FACULTY APPROVAL

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

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

Signature

Mirza Faisal Beg

Date

SEP 24, 2018

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

Jeff Derksen

Signature

Date

SEP 24, 2018

ADMINISTRATIVE SECTION (for DGS office only)

Library Check: SEP 06 2018

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

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<tr>
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<th>MSE</th>
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<tr>
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<tr>
<td>Units (eg. 4)</td>
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**Becoming a Professional Engineer**

<table>
<thead>
<tr>
<th>Short title (for enrollment/transcript - max. 30 characters)</th>
<th>Becoming a PEng</th>
</tr>
</thead>
</table>

**Course description for SFU Calendar**

Core competencies and skills required by a Professional Engineer (PEng) are presented including code of ethics and the fundamental steps in becoming a professional engineer in British Columbia (BC). The course teaches students how to report and substantiate their work experience to Engineers and Geologists BC (EGBC), the licensing and regulatory body in BC; and how to document their skills and experience by critiquing prior documentation and through documentation of their coop experience. It should be noted that there would be no formal evaluation of skills by SFU.

**Rationale for introduction of this course**

Co-op office requires that students should not finish their studies with a co-op semester being their last semester. This 0-credit online course is proposed to resolve the issue. The students can take it online while doing their co-op.

**Term of initial offering** (eg. Fall 2019) **Course delivery** (eg. 3 hrs/week for 13 weeks)

<table>
<thead>
<tr>
<th>Fall 2019</th>
<th>Online</th>
</tr>
</thead>
</table>

**Frequency of offerings/year**

<table>
<thead>
<tr>
<th>3 per year</th>
<th>Estimated enrollment per offering</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

**Equivalent courses** (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

N/A

**Prerequisite and/or Corequisite**

Students in Mechatronics Product Realization MEng program; co-requisite: MSE 793 or MSE 794

**Criminal record check required?**

Yes

Additional course fees? Yes No

**Campus where course will be taught**

- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

**Course Components**

- Lecture
- Seminar
- Lab
- Independent
- Capstone
- Online

**Grading Basis**

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

**Repeat for credit?**

Yes No

Total repeats allowed? 0

Repeat within a term? Yes No

**Required course?**

Yes No

Final exam required? Yes No

Capstone course? Yes No

**Combined with a undergrad course?**

Yes 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

Krishna Vijayaraghavan

Additional faculty members, space, and/or specialized equipment required in order to offer this course

No space or specialized equipment required

CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechatronics</td>
<td>Mehrdad Moallem</td>
<td><a href="mailto:mmoallem@sfu.ca">mmoallem@sfu.ca</a></td>
</tr>
</tbody>
</table>

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
M. Moallem

Department Chair
A.

Signature

Date
July 24, 18

M. Moallem

Date
July 27, 2018

FACULTY APPROVAL

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.

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

Mirza Faisal Beg

Signature

Date

FACULTY GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee

Jeff Derksen

Signature

Date

ADMINISTRATIVE SECTION (For DGS office only)

Library Check: SEP 19 2018

Course Attribute: 

Course Attribute Value: 

Instruction Mode: 

Attendance Type: 

If different from regular units:

Academic Progress Units: 

Financial Aid Progress Units: 

Page 2 of 2 Revised December 2017
Becoming a Professional Engineer (MSE 901)

School of Mechatronic Systems Engineering

Description:
This course has been developed in consultation with the Engineers and Geoscientists British Columbia (EGBC) to familiarize students with the fundamental steps needed to become a professional engineer (P.Eng.) in BC. Through this course, students will be exposed to the core competencies and skills required by a P.Eng. and the P.Eng. code of ethics. The course also teaches students how to report and substantiate their work experience to EGBC, the licensing and regulatory body. The students will learn to document their skills and experience by critiquing prior documentation and through hands on documentation of their coop experience.

Credit: 0 credit; SAT/UNSAT grading

Pre-Requisite/Co-requisite:
To be taken in co-op term

Outcome:
- Explain the responsibilities of a P.Eng.
- Recognize the steps need for becoming a P.Eng.
- Documenting skills under the competency reporting systems.
- Critique work experience/skills reporting and substantiation.
- Introduce the concept of lifelong learning.
- Understands steps to apply to be an Engineer-In-Training (EIT).

Instructor:
MSE faculty

Delivery Method:
The course will be delivered via online lectures.

Course Modules
- Overview of EGBC and on registering as a professional engineer (P.Eng.)
- Review of the core competencies and skills required by a P.Eng.
- Evaluation and licensure process undertaken by EGBC
- EGBC process of evaluation of experience such as international experience, prior experience and non-P.Eng supervision

(Last updated July 2018)
• Identification skills within the categories of the seven core competencies and proper documentation of skills* for career development
• Introduction to the mandatory EGBC Overview of Legal and Ethical Issues Course.
• Procedure for Engineer-In-Training (EIT) with EGBC

* Documentation is the main area people fail in doing well and are denied designation. EGBC has agreed to provide resources and examples.

**Course Assessment:**
Grade will be based on the following:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Assignment Grading:* Assignments will be assigned and assessed by the instructor and the relative weightages will be determined by the degree of difficulty and time required for its completion.

*Report:* Students will create a detailed report to self-evaluate the prior experience and reflect on competencies (identifying skills gap). Students will also present a plan for lifelong learning to acquire their missing competencies.

*Late Work:* Late or missed work will not be tolerated. Failure to meet assignment deadlines will result in a loss of two points per calendar day, up to five calendar days. On the sixth calendar day, it will not be accepted. If emergencies arise, and sometimes they do, communicate with your instructor to see if the deadline can be moved to help you get back on track.

*Plagiarism:* Any instance of cheating or plagiarism will result in loss of credit for the work and will be reported to the Director of the School of MSE.

*Grading Scheme:* Student will receive a satisfactory (‘S’) grade if they receive a total score of 70% or more.

(Last updated July 2018)
Appendix 3. Details of program steering committee (if applicable)

Dr. Flavio Firmani, Program Chair

Dr. Mehrdad Moallem, Chair of the Graduate Program Committee

Dr. Farid Golnaraghi, Director of the School of Mechatronic Systems Engineering
Appendix 4. Abbreviated curriculum vitae for faculty
Flavio Firmani Ph.D., P.Eng.

School of Mechatronic Systems Engineering, Simon Fraser University, Surrey BC, V3T 0A3.
Office: Galleria 4378, Tel: 778.782.9940, email: ffirmani@sfu.ca

ACADEMIC EMPLOYMENT

2014 – Present  Lecturer, School of Mechatronic Systems Engineering, Simon Fraser University

2012 – 2014  Coordinator in Engineering Design, Faculty of Engineering, University of Victoria

2007 – 2014  Research Associate, Department of Mechanical Engineering, University of Victoria

2004 – 2014  Sessional Lecturer, Faculty of Engineering, University of Victoria

EDUCATION

2006  Doctor of Philosophy (Ph.D.) in Mechanical Engineering, Department of Mechanical Engineering, University of Victoria, Victoria, B.C., Canada. Thesis: Force-Unconstrained Poses of Redundantly Actuated Planar Parallel Manipulators

1999  Bachelor (B.Eng.) in Mechanical and Electrical Engineering, Faculty of Engineering, UNAM, Mexico City, Mexico. Thesis: Kinematic Analysis of a Hexapod and its Application to Controlling the Secondary Mirror of a Telescope (in Spanish)

TEACHING EXPERIENCE

2014 - Present  Lecturer at School of Mechatronic Systems Engineering, SFU, Surrey.

MSE 210 – Engineering Measurement and Data Analysis
MSE 211 – Computational Methods for Engineers
MSE 221 – Statics and Strength of Materials
MSE 380 – Systems Modelling and Simulation
MSE 410 – Capstone Design Technical Project I
MSE 411 – Capstone Design Technical Project II
MSE 428 – Design of Mechanisms
MSE 490 – Advanced Kinematics of Robotic Systems

2004 – 2014  Sessional Lecturer at University of Victoria.

MECH 430 / MECH 580 – Robotics
MECH 335 – Theory of Mechanisms
ELEC 426 – Robotics
GRADUATE STUDENT CO-SUPERVISION

- Shaun Bourgeois, M.Sc., 2016-Present

AWARDS AND NOMINATIONS

- Teaching Excellence of the Faculty of Engineering, UVic (Nominated, 2014)
- Gillian Sherwin Award for Excellence in Teaching, UVic, (Nominated, 2009)
- IFToMM Young Delegate Award, (2007)
- Andy Farquharson Award for Excellence in Graduate Student Teaching, (2006)
- University of Victoria Fellowship, (2000)
- Distinguished Student Scholarship, Faculty of Engineering, UNAM, (1993)

SELECTED PUBLICATIONS

Journal Publications


Conference Publications


SELECTED SERVICE ACTIVITIES

- Coordinator of the Professional Master’s Program: Mechatronic Product Realization
- Coordinator of the Manufacturing and Automation Specialization
- Member of the Undergraduate Course Curriculum (UCC)
- Member of the Teaching Appointments Review Committee (TARC)
- Co-op Liaison Representative
- Supervisor of Capstone Projects – 4 teams (2017) and 2 teams (2016)
Bruce Fingarson, Eng.L., ASCT.
10710 Doncaster Crescent
N. Delta, B.C. V4C 8A5

Home: (604) 589-0860 Cell: (604) 318-0321 E-Mail: bfingarson@gmail.com

PROFILE:
- A highly creative and motivated VP of Operations and Engineering for a $50 million company facilitating a successful team in the distribution and automation of electrical, hydraulic, mechanical and pneumatic systems in an industrial sales environment.
- Successfully created, implemented and maintain the QA, TQM and OHSA programs to acquire and maintain full IsNetworld compliance. These programs include document control, quality assurance, safety and health standards, policies and programs.
- 29 years experience in the aviation field enabled an in-depth understanding of the cultures and quality requirements within the pilot, Department of Transport, mechanic and maintenance groups. Fully responsible for simulator certification bi-annually.
- Advanced skills in technical operations, maintenance management, analysis of programs, processes and projects for improved quality assurance, efficiency and strategic planning, coaching and leadership is enhanced with 4 years of instructing in the Robotics and Automation department of BCIT, guest lecturing for the Mechatronics System Engineering students Capstone project course and Sessional Professor, Mechatronics System Engineering for both a graduate and undergraduate course for Simon Fraser University.
- Direct operational and functional control of a team delivering value added lean manufacturing, engineered systems and research and development of proprietary systems for the Oil and Gas industry.
- Excellent management, coaching, creativity and interpersonal skills developed during multifaceted Board experiences and coaching development.
- Excellent ability with Excel, Word, PowerPoint and various industrial CAD software products.

HIGHLIGHTS OF QUALIFICATIONS:

Business Development and Retention
- Cultivated and managed the relationship with key suppliers to enhance sales and revenue opportunities.
- Design engineer and consultant for Enbridge and their BC gas infrastructure to move toward fully green solutions for gas control.
- Provided product, installation, commissioning, on-site training and remote consulting for TransCanada Pipeline in Mexico to assist their implementation of LNG pipelines. Additional control assessment, design, commissioning and installation support has occurred for both newly installed compressor stations at Tamazanchae and Naranjos as well as existing pipeline infrastructure.
- Created all TQM and OHS policy documentation to fulfill industry requirements to work in the Oil and Gas industries in BC. Fully IsNetworld compliant for controls and actuation in the Gas industry, including design, engineering consulting, fabrication and installation.
- Guided research and development for proprietary systems while ensuring full certification specifications of all equipment to applicable CSA standards and regulations.

Leadership
- Specified product selection and team member inclusion, then led the team in the full installation, implementation and cutover of the Enterprise Resource Planning (ERP) system for Automation West Technologies, resulting in no lost revenue events. The new ERP system facilitates a personal dashboard yielding "up to the hour" financial status of the company allowing for key indicator monitoring and responsive financial management. Assisted in the migration of the ERP system to the new corporate structure after the acquisition of AWT by Proax Technologies Ltd.
- Facilitated key employee growth yielding reduced shipping costs, tighter purchasing control of inventory (reducing inventory overhead and allowing the write down of 30% of inventory dead stock), higher compliancy to OSHA and QA programs and production enhancements.
- Created a new warehouse inventory strategy and led a team to completion of the re-organization and implementation resulting in cost saving to the company by reduced order picking to shipping times as well as an increase in work load availability. Introduction of lean manufacturing concepts to the shop enhanced product quality and increased throughput.
- Participated with a team to accredit the curriculum of the Robotics and Automation Program at BCIT resulting in a clear understanding of the link between industry and academia.
Operations and Project Management

- Creation and implementation of a strategic plan to ensure functional duplicity for all key company roles (Automation West Technologies Ltd.).
- Creation and implementation of industry specific Quality Assurance and Health and Safety Policies for Automation West Technologies Ltd. to ensure ISNetworid certification is maintained, resulting in continued and growing revenue flows, with a focus on continued growth and expanded revenue opportunities in the Oil and Gas industry.
- Created and presented emergency preparedness, fire safety, HAZOP standards and safety procedures for the flight simulator department as well as Automation West Technologies Ltd.
- Created, implemented and monitors the TQM and OHS programs to ensure maintained quality and safety for our employee groups.

Financial

- Reduced IT costs by 35% by introducing strategic maintenance practices and equipment standardization (Automation West Technologies Ltd.).
- Grew overall company margins by 8% in the last fiscal year through negotiations with suppliers, managing customer expectations and tightly controlling quality and operational costs resulting in the highest margins to date.
- Allocated resources to ensure all 11,000 inventory items, orders, AR and AP transfers were accurate and timely. In addition, ensured all personnel were trained fully and the ERP system setup yielded appropriate financial data for enhanced, accurate decision making.

WORK HISTORY:

VP Operations and Engineering

Automation West Technologies Ltd., BC
2007 – present

- Strategic planning for improving business opportunities in wider and more diverse fields.
- Corporate Safety Officer responsible for approving all TQM, OSHA, and QA policies and processes.
- Scheduling and implementation of human resources to meet company requirements.
- Managing and monitoring all operational aspects of the company.
- Responsible for full P & L with unlimited signing authority.

Flight Simulator Operations Duty Manager, YVR

Air Canada, Richmond, BC
2001 - 2007

- Managed all technical aspects for a team of simulator technologists to ensure the flight training devices maintained certification by Transport Canada allowing for uninterrupted training for flight crews.
- Emergency Warden, responsible for all WHIMIS, Emergency Preparedness, HAZMAT and First Aid program maintenance in the Flight Simulator Department.
- Conducted annual performance evaluations.

Flight Simulator Technologist / senior Technologist

Canadian Airlines / CP Air, Richmond, BC
1979 - 2001

- Designed and engineered, fabricated, tested, verified and installed critical subsystems within the simulator environment.
- As Chairman of CAST (Canadian Association of Simulator Technologists), sat on the Council of Canadian Airlines Employees to ensure the continuing operation of Canadian Airlines during periods of high financial distress and hostile takeover attempts by Air Canada.

Assistant Instructor, Robotics and Automation (50% part time)

British Columbia Institute of Technology, Burnaby, BC
1984 - 1988

- Specified and set up robotic lab equipment to ensure quality course delivery.
- Ran various Robotics and Automation labs and courses.
EDUCATION:

Graduated with 1st class, Control Electronics, British Columbia Institute of Technology
Two year Arts and Science, University of British Columbia

PROFESSIONAL AFFILIATION:

Association of Professional Engineers and Geoscientists of BC, certified Eng. L. in 2015

PROFESSIONAL ENHANCEMENTS:

✦ EWP (Electrical Work Practitioner) certification board member for AScTT (current)
✦ Member of the Master’s Program Development Committee, Mechatronics Engineering, Simon Fraser University (current)
✦ Guest Lecturer for design criteria, Mechatronics Engineering, Simon Fraser University (currently)
✦ Sessional Professor, Mechatronics System Engineering, Simon Fraser University (currently)
✦ Co-founder, President and Head Sensei, 4th Dan, Delta Kaigan Judo Club (2005 - present)
✦ Certified Level III Coach (2008) and Master Coach Developer for Judo BC (2011 - present)
✦ 2nd Vice President, Judo BC (a not for profit society) (2013 - present)
✦ President and Director, Marpole Curling Club, Director, Pacific Coast Curling Assoc. (1997-99)
✦ Member of the Accreditation Board for Robotics and Automation, BCIT (2004)
✦ Chairman and Vice Chairman, Canadian Assoc. of Simulator Technologists sitting on the Council of Canadian Airline Employees (1992 - 96)
G. GARY WANG, PH.D., P. ENG.

School of Mechatronic Systems Engineering, Simon Fraser University, Surrey BC, V3T 0A3.
Office: Galleria 4378, Tel: 778.782.8495, email: gwa5@sfu.ca

ACADEMIC EMPLOYMENT

Professor (2011-present), Simon Fraser University (SFU), Mechatronic Systems Engineering
Associate Professor (2008-2011), SFU, Mechatronic Systems Engineering
Associate Professor (2004-2007), The University of Manitoba (UM), Dept. of Mech. and Manuf. Engr.
Assistant Professor (1999-2003), UM, Dept. of Mech. and Manuf. Engr.

EDUCATION

PhD Mechanical Engineering, University of Victoria, BC 1999
MSc School of Mechanical Science and Engineering, Huazhong University of Science and Technology (HUST), Wuhan, China 1995
BSc School of Mechanical Science and Engineering, HUST, China 1992

AWARDS AND NOMINATIONS

• Fellow, American Society of Mechanical Engineers (ASME) (2013-present), member since 1998
• Associate Editor, Engineering Optimization Journal, geographically representing North America
• Associate Editor, ASME Transactions, Journal of Mechanical Design
• Co-chair, Inaugural International Symposium on Frontiers in Engineering Design, National Science Foundation of China, 2016
• Excellence in Teaching, 2014, SFU, one of the three recipients of the year, $2500 cash award
• Award of Teaching Excellence, 2015, SFU Faculty of Applied Science
• Rh Award for Outstanding Research, 2007, The University of Manitoba, $10000 cash award, the only one in the Applied Science Category
• I. W. Smith Award for Creating Engineering, 2005, The Canadian Society for Mechanical Engineering
• Leader of the Design Automation Committee in the premier International Design Engineering Technical Conferences (IDETC)

SELECTED PUBLICATIONS


**SELECTED INDUSTRY PROJECTS**

*General Motor Company (GM)*, Auto-body Assembly Process Optimization

*Toyo Pumps*, New Pump Design, Modeling, and Optimization

*Aurel Systems Inc.*, Knowledge Assisted Large-scale Production Optimization for Chemical Plants

*Exro Technologies*, Modeling and Optimization of Racing Electrical Cars Using Reconfigurable Motors

*St. Paul's Hospital*, Emergency Department Modeling and Process Optimization for Wait Time Reduction

*Manitoba Hydro*, System Planning Optimization for Maximum Profit

*Westland Helicopters*, Engine Air Intake Shape Optimization

*Monarch Industries*, Incorporating Rapid Prototyping into Mold Making Process

*Philips and Temro*, Design Automation of Industry Silencers

**TEACHING**

Developed and taught: Statics and Strength of Material (MSE 221), Machine Design (MSE 320), Intro to Engineering Design Optimization (MSE426/726), Finite Element Analysis (MSE 427)

Taught at U of Manitoba: Computer Aided Design and Analysis, Quality Control, Facilities Planning, Capstone Design, Engineering Optimization.
Kevin Oldknow, Ph.D., P.Eng.
Senior Lecturer, School of Mechatronic Systems Engineering
Associate Dean, Faculty of Applied Sciences

Education

2004 Ph.D. Mechanical Engineering (Manufacturing Controls), University of British Columbia, Canada
Dynamically Reconfigurable Machining Systems, with research focusing on control strategies and architectures, system dynamics and metal cutting processes

2000 M.A.Sc. Mechanical Engineering (Manufacturing Controls), University of British Columbia, Canada
A Dynamically Reconfigurable System Architecture and FPGA Based Servo Controller for Distributed Machine Tool Control

1996 B.A.Sc Engineering Physics, University of British Columbia, Canada

Other Professional Training

May 2012 - May 2012 University of Chicago Booth School of Business, Certificate: Finance for Executives

December 2009 - December 2010 MIT/Sloan School of Management, Executive Certificate: Strategy and Innovation

June 2008 - June 2008 Kellogg School of Management, Certificate: IRI/Kellogg Shaping Innovation Leaders

Employment History at Academic Institutions

January 2017 - Current Associate Dean, Undergraduate Studies, Applied Sciences, Simon Fraser University
September 2016 - Current Senior Lecturer, Mechatronic Systems Engineering, Simon Fraser University
September 2015 - Current Faculty Teaching Fellow, Applied Sciences, Simon Fraser University
August 2012 - August 2016 Lecturer, Mechatronic Systems Engineering, Simon Fraser University
January 2011 - April 2011 Adjunct Professor, Mechanical Engineering, University of British Columbia
September 2009 - December 2009 Sessional Lecturer, Mechanical Engineering, University of British Columbia
September 2007 - December 2007 Sessional Lecturer, Mechanical Engineering, University of British Columbia
January 2003 - April 2003 Sessional Instructor, Mechanical Engineering, University of British Columbia
Kevin Oldknow, Ph.D., P.Eng.
Senior Lecturer, School of Mechatronic Systems Engineering
Associate Dean, Faculty of Applied Sciences

Other Employment History

<table>
<thead>
<tr>
<th>Date</th>
<th>Title and Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2016 - Current</td>
<td>President, Oldknow Consulting Inc.</td>
</tr>
<tr>
<td>September 2012 - June 2016</td>
<td>Principal Engineer, Wheel / Rail Interface, L.B. Foster Rail Technologies</td>
</tr>
<tr>
<td>May 2011 - August 2012</td>
<td>Vice President, Technology and Business Development, LB Foster Friction Management</td>
</tr>
<tr>
<td>January 2009 - May 2011</td>
<td>Corporate Vice President, Friction Management, Portec Rail Group, Corporate Division</td>
</tr>
<tr>
<td>September 2007 - December 2008</td>
<td>Vice President, Applications and Operations, Portec Rail Group, Kelsan Technologies Division</td>
</tr>
<tr>
<td>September 2005 - August 2007</td>
<td>Manager, Friction Control Technology, Portec Rail Group, Kelsan Technologies Division</td>
</tr>
<tr>
<td>February 2005 - September 2005</td>
<td>Group Leader, Field Applications, Portec Rail Group, Kelsan Technologies Division</td>
</tr>
<tr>
<td>June 2004 - February 2005</td>
<td>Field Application Engineer, Portec Rail Group, Kelsan Technologies Division</td>
</tr>
<tr>
<td>September 2000 - May 2004</td>
<td>Product Development Consultant, Cameleon Controls</td>
</tr>
<tr>
<td>August 1996 - April 1998</td>
<td>Technical Project Manager, Procter &amp; Gamble</td>
</tr>
</tbody>
</table>

Teaching Experience

At Simon Fraser University:
MSE 352 - Digital Logic and Microcontrollers (2012)
MSE 403 - Technology Entrepreneurship I (2015, 2016)
MSE 404 - Technology Entrepreneurship II (2015, 2016)
MSE 893 - Advanced Dynamics (2013)
MSE 900 - Engineering in the Canadian Context (2015)

At the University of British Columbia:
MECH 563/464 - Industrial Robotics (2011)
Kevin Oldknow, Ph.D., P.Eng.
Senior Lecturer, School of Mechatronic Systems Engineering
Associate Dean, Faculty of Applied Sciences

MECH 506 - Linear Vibrations (2007, 2009)

Thesis, Dissertation or Major Project Supervision / Co-Supervision

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Project/Thesis Title</th>
<th>Status</th>
<th>Began</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamali, Seyed Hossein</td>
<td>Ph.D.</td>
<td>Regenerative Control of Vibration Systems</td>
<td>Active</td>
<td>2017-3</td>
<td></td>
</tr>
<tr>
<td>Kaur, Manpreet</td>
<td>Ph.D.</td>
<td>3D printed micro-truss development for soft robotics application</td>
<td>Active</td>
<td>2017-3</td>
<td></td>
</tr>
<tr>
<td>Zihajezadeh, Shaghayeigh</td>
<td>Ph.D.</td>
<td>Wearable Sensor System for Human Localization and Motion Capture</td>
<td>Completed</td>
<td>2016-1</td>
<td>2017-1</td>
</tr>
<tr>
<td>Andersen, Kimball</td>
<td>M.A.Sc.</td>
<td>Optimization of a Low-melting Alloy for Fused Filament Fabrication</td>
<td>Completed</td>
<td>2015-1</td>
<td>2015-2</td>
</tr>
</tbody>
</table>

Selected Publications


Kevin Oldknow, Ph.D., P.Eng.
Senior Lecturer, School of Mechatronic Systems Engineering
Associate Dean, Faculty of Applied Sciences


Selected Service Activities

University, Faculty and Departmental Committees

November 2017 - Current Member, Student Data Governance Council (SDGC)
July 2017 - Current Member, Student Systems Priority Setting Committee (PSC)
April 2017 - Current Member, Senate Committee on Undergraduate Studies (SCUS) Working Group
January 2017 - Current Member, Strategic Enrolment Management Committee (SEMC)
January 2017 - Current Member, Surrey Campus Coordinating Committee (SCCC)
November 2016 - Current Member, Senate Committee on Undergraduate Studies (SCUS)
January 2017 - Current Chair, Faculty of Applied Sciences Undergraduate Curriculum Committee (FAS UCC)
October 2016 - Current Chair, Sustainable Energy Engineering Program Task Force
May 2015 - October 2016 Member, Mechatronic Systems Engineering Executive Committee
May 2013 - October 2016 Co-Director, Technology Entrepreneurship@SFU program
May 2013 - October 2016 Member, Mechatronic Systems Engineering Undergraduate Curriculum Committee
November 2012 - December 2015 Member, Professional Master's in Mechatronic Product Realization (MPR) Program Development Committee
Kevin Oldknow, Ph.D., P.Eng.
Senior Lecturer, School of Mechatronic Systems Engineering
Associate Dean, Faculty of Applied Sciences

Other Service to the University

September 2015 - Current  Faculty Teaching Fellow, Faculty of Applied Sciences
January 2013 - August 2017  Supervised a total of 13 Mechatronic Systems Engineering Senior Undergraduate (Capstone) project teams as follows:
2017 – 2 teams
2016 – 3 teams
2015 – 4 teams
2014 – 3 teams
2013 – 1 team

Active Service to the Academic Community

March 2016 - Current  Referee, ASME Journal of Manufacturing Science and Engineering
September 2015 - Current  Referee, Wear: An International Journal on the Science and Technology of Friction, Lubrication and Wear
November 2013 - Current  Referee, IMechE Journal of Rail and Rapid Transit (JRRT)

Service to the Community At Large

September 2015 - Current  Member of Board of Examiners (P.Eng.), Engineers and Geoscientists British Columbia (formerly APEGBC)
June 2015 - September 2016  National Advisory Committee Member: Working in Canada Seminar, Association of Professional Engineers and Geoscientists of BC (APEGBC)
September 2015 - March 2016  Coach, Steve Nash Youth Basketball - North Vancouver (Seymour)

Selected Awards, Honors and Scholarships

2015  
Title: Faculty Teaching Fellow, Faculty of Applied Sciences  
Type: Fellowship  
Organization: Simon Fraser University  
Details: Three year term (September 2015 - August 2018) as Faculty Teaching Fellow

2010  
Title: IMechE Railway Division Prize - A.R. Bennett Premium/ C.S. Lake Award  
Type: Research  
Organization: IMechE  
Details: Award for paper: Implementation of Distributed Power and Friction Control to Minimise the Stress State and Maximise Velocity in Canadian Pacific's Heavy Haul/Heavy Grade Operations

2000  
Title: NSERC PGS B Post-Graduate Scholarship  
Type: Scholarship  
Organization: NSERC

1999  
Title: BC Advanced Systems Institute Graduate Student Scholarship  
Type: Scholarship  
Organization: BC Advanced Systems Institute
Dr. Krishna Vijayaraghavan, P.Eng
Mechatronic Systems Engineering, Simon Fraser University
250-13450 102 Ave, Surrey BC Canada V2T 0A3
www.krishna-vijayaraghavan.com
e-mail: krishna@sfu.ca, ph: 778-782-9077

Dr. Vijayaraghavan works on enhancing alternative energy systems. He has specifically been developing a research program to advance new system models as well as new theories in nonlinear controls and fault diagnostics to improve the reliability of these systems. While his primary research area and much of his long-term research plan falls within the area of nonlinear control systems, Dr. Vijayaraghavan was hired as part of the design group at MSE. Hence his research also focuses on integrated physical system and control system optimization in alternative energy systems. Recently he took the leadership role in writing a $5-million grant proposal to NRCan in collaboration with researchers at SFU and Powertech Labs. The requested equipment along with the in-kind contribution and planned funding would develop fault-diagnostics technologies and improve system design of chargers for electric vehicles. Dr. Vijayaraghavan’s application area aligns well with the strategic research plan at SFU, which is currently exploring an energy systems program. Renewable energy is also a key area of focus for the Innovation Boulevard being established by the city of Surrey. Dr. Vijayaraghavan has also teaches several core engineering courses and has strived to improve his teaching through teaching development programs. Dr. Vijayaraghavan is currently instituting an innovative intelligent tutoring system (ITS) that aims to revolutionize the way assignments are integrated into course curriculum. After successful pilot implementation, Dr. Vijayaraghavan is keen to expand this ITS to other courses in MSE and eventually across SFU. Dr. Vijayaraghavan has also served the department as a member of several departmental committees and thesis committees and has initiated work to offer MSE courses through distance education (pending UCC and departmental approval). Dr. Vijayaraghavan is also committed to outcome-based education (OBE) and has recently created a web-software (hosted at obe.mse.surrey.sfu.ca) to evaluate student learning outcomes for OBE. He will be working closely with the UCC chair to develop this into a more comprehensive tool for OBE roll-out. The contents of Dr. Vijayaraghavan’s curriculum vitae are as follows.

Interests and Background ................................................................. 2
Work Experiences ........................................................................ 2
Research Contributions .................................................................. 3
Publications Patents and Invited talks ........................................... 5
Research Funding .......................................................................... 9
Teaching Innovation Funding .......................................................... 13
Awards ......................................................................................... 13
Teaching ...................................................................................... 14
Supervision of Students (HQP Training) ........................................ 18
Service ....................................................................................... 22
Dr. Krishna Vijayaraghavan

**Interests**
Enhancing energy systems through integrated physical system and control system design.

**Background**

**Education**
- Ph.D., Mechanical Engineering, University of Minnesota (Twin cities), Minneapolis, U.S.A, July 2010.

**Skills**
- Linux and Windows operating system.
- Installation and programming with real-time application interface (RTAI) for Linux.
- Embedded control using Microcontroller.
- SolidWorks, ProE, AutoCAD, Ansys, Ansys CFX, Ansys Fluent and OpenFOAM.
- Expertise in C/C++ and knowledge of PHP, HTML, SQL, C#, Fortran, Pascal and Basic.
- National Instrument LabVIEW®, Matlab Simulink® and Matlab XPC target (real-time system).
- Power electronic circuit design and Printed Circuit Board (PCB) design.

**Work Experiences**

**Assistant Professor of Mechatronic Systems Engineering at Simon Fraser University** (Surrey, BC, Canada, Jul 2011-current)
- Enhancing alternative energy systems through integrated physical system and control system design.
- Teaching core undergraduate and graduate course.
- Active participation in several committees within the department.
- Service to the broader community through youth mentorship.

**Design and optimization for the next generation semiconductor manufacturing at Applied Materials Inc.** (Santa Clara, CA, USA, Jul 2010-Jul 2011)
- Design of semiconductor manufacturing equipment to achieve capabilities for processing the next generation of semiconductor chips.
- Part of an interdisciplinary team and design lead in the development of delivery systems for next generation precursors resulting in patents P1 and P2.

**Research Assistant in the Department of Mechanical Engineering at the University of Minnesota** (Minneapolis, MN, USA, Jan 2006-Jul 2010)
- Novel traffic sensor powered by harvesting energy from short duration vibrations arising from passing automobiles.
- A fundamental contribution to the field of energy harvesting from short duration vibrations.
- Collaborator on a project developing implantable battery-less wireless sensors for Total Knee Replacement Implants (TKRs).
Patent for a Battery-less Wireless Weigh-in-Motion (WIM) sensor (P3).

Graduate Teaching Assistant in the Department of Mechanical Engineering at the University of Minnesota
(Minneapolis, MN, USA, Jan 2006-Jul 2010)
- Received consistently high evaluations from students as a Senior Teaching Assistant for ME 4231 Motion Control Laboratory (Jan 2009 – Jun 2009; Aug 2006 - Dec 2007; Jan 2004 - Dec 2005).

Graduate research intern at Honeywell Inc.
(Golden Valley, MN, USA, Jun 2009-Dec 2009)
- Energy usage model to maximize the energy efficiency of heating and ventilation systems.
- Control strategies for issuing air filter change notification to minimize energy wastage.
- Analytical flow models for monitoring indoor air quality in buildings and for determining the optimal location for air quality sensors.
- Computational droplet evaporation and transport model for optimal design of humidifiers.
- Comprehensive furnace and air conditioner models for Fault Detection and Isolation and thermo-hydraulic model for the air conditioner (AC) performance deterioration due to refrigerant leaks.

Research Contributions
Dr. Vijayaraghavan's primary research area and much of his long-term research plan falls within the area of nonlinear control systems. As part of the design group at MSE, he has also focused his efforts on integrated physical system and control system optimization of alternative energy system as a secondary research area. Dr. Vijayaraghavan's contributions are listed below.

Contribution 1: Nonlinear controllers for fault detection and parameter identification in alternative energy system.
Faults and parameter degradations in even a small subsystem, a sensor or an actuator of a complex system can result in severe performance degradation and may indicate imminent catastrophic failure. With the growth in highly nonlinear systems such as wind-turbines and fuel-cells, fault detection and parameter identification (FD-PI) has become increasingly important in alternative energy systems. Additional sensors may increase redundancy and enable the control system to monitor every single subsystem. However adding new sensors will become prohibitively expensive in many systems. Additionally, a controller may misidentify nonlinear effects and sensor noise as faults in these systems. Dr. Vijayaraghavan and his team have been developing observers and observers based FD-PI for noisy nonlinear which have resulted in seven journal articles (five since joining SFU) being published/accepted. Here a nonlinear observer utilizes a system model and measurements to generate virtual sensor outputs. This response is then compared to the expected system response to perform FD-PI. Dr.
Curriculum Vitae

Shahram Amiri

#202-125 Milross Ave • Vancouver, BC, V6A 0A1, Canada
Cell: (778) 822-2581; Email: shahram.amiri@outlook.com

DISCIPLINE SPECIALIZATIONS

Design and Development of Medical Devices  Orthopaedic Biomechanics
Biomechanics of Human Musculoskeletal Systems  Computer Assisted Radiology & Surgery
Medical Imaging – Image Processing  Image-Guided Therapy

EDUCATION

Post-doc., Dept. of Orthopaedics, University of British Columbia, Vancouver, BC, Canada ……….2009 - 2012
Intra-op and post-operative image-based assessments of knee and hip arthroplasty; Surgical device development for enhancing component alignments in arthroplasty; Design and development of a novel knee prosthesis

Ph.D., Mechanical Engineering, Queen’s University, Kingston, ON, Canada, …………………2008
DISSERTATION: Conceptual design for a surface-guided total knee replacement with normal kinematics

M.Sc., Biomedical Engineering, Amir Kabir University, Tehran, Iran, …………………..2001
DISSERTATION: Optimization of the shape of the tibial component of a knee prosthesis to minimize wear

B.Sc., Mechanical Engineering, K.N.Toosi University of Technology, Tehran, Iran, …………. 1999

ACADEMIC EXPERIENCE

Adjunct Professor, School of Mechatronic Systems Engineering, SFU, ………..…….. May 2015 – Present

Adjunct Professor, Department of Orthopaedics, University of BC, ………..…….. June 2015 – June 2016

Research Associate, Department of Orthopaedics, University of British Columbia, ……Oct 2012 – June 2015
Independent research program on: Innovative image-based technologies for total hip arthroplasty, Developing smart surgical tools based on intraoperative three-dimensional imaging

Faculty Member, Biomedical Engineering Program, University of British Columbia, … Sep 2013 – June 2016
Associate Faculty Member, Department of Mech. Eng., University of BC, ………..…….. Sep 2013 – June 2016

INDUSTRIAL EXPERIENCE

Founder and Director, Torus Biomedical Solutions Inc., ………..…….. Jun 2015 – Present
Medical Imaging Technologies for Orthopaedic Surgery Applications

Orthopaedic Research Engineer, Zimmer GmbH, Winterthur, Switzerland, ………..……..2008 - 2009
Developing a virtual dynamic assessment tool for prosthesis design
Finite element analysis of knee replacement prostheses

Design and Manufacturing Inspector, TAM IKCO, Tehran, Iran, ………..……..2001 - 2003
Inspection of various stages of design and manufacturing of automotive stamping dies

Design Engineer, NMI Co, Tehran, Iran, ………..…….. Feb 2001 - Nov 2001
Design of quality assessment testing devices based on Peugeot-Citroen quality standards

Design Engineer/Project Manager, Maham Co, Tehran, Iran, ………..……..1999 - 2001
Reverse engineering, process planning, and tooling the manufacturing line of various products

CONSULTING EXPERIENCE

Founder and Consultant, Torus Biomedical Solutions Inc., ………..…….. Jun 2012 – Jun 2015
**ACADEMIC GRANT FUNDING**

UBC Orthopaedic Research Excellent Fund (OREF) Application, 2014 [Awarded]
PROJECT: *New C-arm based techniques for quick and safe intraoperative imaging of the pelvis and stereotactic guiding of fixation screws in pelvic fracture reductions*
ROLE: Co-Principal Investigator, AMOUNT: $ 20,000, CONTRIBUTION EFFORT: 95%
Co-Applicants: Dr. Kelly A. Lefaivre, Dr. Pierre Guy, Dr. David R. Wilson, Dr. Antony Hodgson

Vancouver Coastal Health Research Institute Innovation and Translational Research Award, 2014 [Awarded]
PROJECT: *Innovative Intra-operative Image-based Solutions for Total Hip Arthroplasty*
ROLE: Principal Investigator, AMOUNT: $ 49,800, CONTRIBUTION EFFORT: 100%
Co-Applicants: Dr. Bassam A. Masri, Dr. David R. Wilson, Dr. Donald Garbuz

Collaborative Health Research Program (CHRP) Application 2014-2017, [Awarded]
PROJECT: *Development and Clinical Efficacies of an Innovative Quantitative Intraoperative C-arm System*
ROLE: Co-Principal Investigator, AMOUNT: $ 470,000 ($157,000/year), CONTRIBUTION EFFORT: 50%
Co-Applicants: Dr. Carolyn Anglin, Dr. Pierre Guy, Dr. Anthony Hodgson, Dr. Bassam A. Masri

NSERC Discovery Grant (Individual) Application 2013-2017, [Awarded]
PROJECT: *Innovative Solutions for Patient-Specific Needs in Joint Arthroplasty*
ROLE: Principal Investigator, AMOUNT: $120,000 ($24,000/year), CONTRIBUTION EFFORT: 100%

UBC Orthopaedics Research Excellence Fund (OREF), 2012 [Awarded]
PROJECT: *Validation of an Innovative Measurement Method for Cup Orientation in Total Hip Arthroplasty*
ROLE: Co-Principal Investigator, AMOUNT: $15,000, CONTRIBUTION EFFORT: 90%
Co-Applicants: Dr. David R. Wilson, Dr. Bassam A. Masri, Dr. Donald Garbuz

Discovery Advancement Program (DAP) Canadian Arthritis Network (CAN), 2012 [Awarded]
PROJECT: *An Innovative Radiographic Method to Measure Acetabular Cup Orientation in Total Hip Arthroplasty*
ROLE: Co-Principal Investigator, AMOUNT: $55,000, CONTRIBUTION EFFORT: 90%
Co-Applicants: Dr. David R. Wilson

Commercial Development Grant Program (CDGP) Canadian Arthritis Network (CAN), 2011 [Awarded]
PROJECT: *Novel Knee Replacement with Physiological Motions*
ROLE: Co-Principal Investigator, AMOUNT: $40,000, CONTRIBUTION EFFORT: 90%
Co-Applicants: Dr. David R. Wilson

**ACADEMIC HONOURS AND AWARDS**

Canadian Arthritis Network (CAN) Post-Doctoral Fellowship, 2009 to 2010
Queen's Thesis Completion Bursary, 2008
Queen's Graduate Award, 2003 to 2006
Duncan & Urlla Carmichael Fellowship, 2006
Queen's Tuition Bursary, 2003 to 2005
Huntly MacDonald Sinclair Tuition Fellowship, 2004

**TEACHING QUALIFICATIONS AND EXPERIENCE**

Professional Development Training/Certificates
Teaching and Learning in Higher Education, SGS901 Course - 35 hours, Queen's University, 2008
Teaching and Learning Scholarship certificate, Queen's University, 2008
Teaching and Learning Practical Experience certificate, Queen's University, 2008
Teaching and Learning Professional Development certificate, Queen's University, 2008

Workshop Instructor
International workshop on imaging-based measures of osteoarthritis, Vancouver, 2010
Instructor of a course on joint modeling and applications in osteoarthritis-related research (80 participants)
Instructor
University of British Columbia, Vancouver, BC, Canada, 2014
Instructor for selected sessions in Orthopaedic Biomechanics as part of MECH 435/535 combined undergraduate and graduate course of Mechanical Engineering program (40 students)

Queen’s University, Kingston, ON, Canada, 2003-2008
Instructor for Fluid Dynamics, Robotics, Dynamics, and Heat Transfer labs as part of MECH398/MECH399 course required for students in the third year of Mechanical Engineering program (160 students in each semester)
Redesigned a third year lab in Mechanical Engineering (MECH399/Heat Transfer) to improve the delivery of the content (160 students in groups of up to 8)

Teaching Assistant
Queen’s University, Kingston, ON, Canada, 2003-2008
Teaching assistant in several courses including Manufacturing Processes (MECH215) and Mechanics of Materials (MECH321) second and third year courses in the Mechanical Engineering program

Course Instructor
Pooya Technical Institute, Tehran, Iran, 2002
Taught SolidWorks software to a class of 20 engineers in 12 sessions

INTELLECTUAL PROPERTY


Tracking System for Imaging Machines and Related Apparatus; Inventor(s): Amiri S.; Provisional US Patent; Application No: 61889473; EFS ID: 17100241; Date filed: 2013-10-10; PCT Patent Application No. PCT/CA2014/050986; Date filed: 2014-10-10

PUBLICATIONS

Peer-Reviewed Publications
Appendix 5. Support Letters:

- Support Letter from Co-op
- Memorandum of understanding between SFU and FIC
- Labour market survey results
- Support Letter from SITE-BC
- Support letter from EGBC ( Formerly APEGBC)
December 13, 2017

Senate of Simon Fraser University
Regarding: Mechatronics System Engineering Professional Master’s Program

Dear Senate Committee,

When the MSE PMP program was initially developed there was agreement to support a mandatory co-operative education component as an integral part of the program.

During the mapping of the program MSE needed to schedule the co-op work term on a student’s final semester in the program. However, SFU Co-op’s accreditation through Co-operative Education and Work Integrated Learning Canada (CEWIL) requires students to complete their degree on an academic semester.

If students could concurrently enroll during the co-op work term in an MSE course this would satisfy the accreditation criteria of completing their studies on an academic semester.

Sincerely,

Shauna Tonsaker
Director pro tem, Work Integrated Learning
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
February 24, 2015

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. Currently, close to 50% 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 important to successful and fulfilling employment in Canada.

As described in the Program Proposal for Professional Master’s in Engineering in Mechatronic Product Realization (December 19, 2014), many of the facets of the proposed program align with APEGBC requirements for entry to the profession:

i. In accordance with APEGBC policy, graduates from Professional Master’s of Engineering in Mechatronic Product Realization at Simon Fraser University who have previously graduated from a four- to five-year university level undergraduate engineering program in a directly-related discipline of engineering (mechanical, electrical/electronic, manufacturing or mechatronics engineering) would be considered to be academically qualified for registration as a professional engineer in a directly-related field of practice. Graduates with other academic backgrounds will be evaluated on a case-by-case basis.

ii. APEGBC policy also allows that the co-operative experience element of a program if aligned with APEGBC’s competency requirements and directly supervised by a professional engineer with expertise sufficient to take responsibility for the work, can be credited towards the required one year
(of a total of four years of qualifying engineering experience) that must be in a Canadian Environment;

iii. The application fee for graduates who apply for APEGBC Engineer-in-Training status will be waived if they apply for enrolment within 12 months of graduation from the program; and

iv. Program participants may sign up as APEGBC Student Members and report their experience on APEGBC’s online Competency Experience Reporting System.

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,

[Signature]

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
Memorandum of Understanding ("MOU") dated 7 June, 2016

between:

Fraser International College Limited ("FIC")

-and-

Simon Fraser University ("SFU")

Preamble

A. FIC and SFU entered into a Recognition and Educational Services Agreement dated October 1, 2010 (the "Agreement"), and pursuant to the Agreement FIC develops and offers a range of educational services to students and SFU.

B. FIC is developing a non-credit pre-Master's preparatory program called the Pre-Master's in Engineering (the "PME") to prepare students for SFU's Mechatronic Product Realization Professional Master's Program (the "MPR"). The PME is described in Schedule 1 of this MOU.

C. FIC and SFU believe that it will be mutually beneficial for FIC to offer the PME at the FIC campus as a preparatory program leading to admission into the MPR at SFU.

D. FIC and SFU enter into this MOU to set out their understanding of the basis upon which the PME curriculum will be developed and delivered by FIC to international students as a Program and Courses under the Agreement.

1. Responsibilities of FIC

FIC agrees to:

1.1 Promote the PME to international students as a preparatory program leading to admission into the MPR at SFU.

1.2 Continuously monitor the PME and all associated curriculum to prepare students to be successful upon entry in the MPR.

1.3 Attend to all administrative functions pertaining to the program development and delivery of the PME, in consultation with SFU's School of Mechatronic Systems Engineering and the Dean of Graduate Studies, including hiring instructors, program advertising and recruiting international students that meet the admissions requirements outlined in Schedule 2 of this MOU.

1.4 Admit students based on the admissions requirements outlined in Schedule 2, which will be jointly reviewed from time to time, and subject to final approval by Graduate Studies.

1.5 Set, and collect from students, the tuition fees for the PME.

1.6 Pay to SFU a fee (the "PME Fee") equal to 20% of the gross PME tuition fees paid to FIC (exclusive of any taxes that FIC must charge and collect from its students, whether or not such taxes are separately disclosed to its students), as per clause 1(c) of the Third Schedule of the Agreement. Payment of the PME Fee to SFU will be by electronic transfer to the Office of the Vice-President, Academic, and will include a reconciliation statement of program enrolments.
2. Responsibilities of SFU

SFU agrees to:

2.1 Conditionally accept, on the recommendation of FIC and approval of the School of Mechatronics Systems Engineering, subject to approval by SFU Graduate Studies, PME applicants into the MPR. Such acceptance will be conditional upon the applicant satisfying the academic requirements approved by the SFU Senate Graduate Studies Committee (SGSC) and set out in Schedule 2, successfully completing the PME program and achieving at least a minimum 3.0 CGPA in the PME courses listed in Schedule 1.

2.2 Provide letters of offer of conditional acceptance into the MPR as contemplated by Schedule 2 on a rolling basis, within 10 days of FIC's recommendation of the applicant, as approved by SGSC.

2.3 Guarantee admission into the MPR to any student who successfully completes the FIC PME with at least a 3.0 CGPA, as approved by SGSC.

2.4 Provide classroom space and appropriate classroom resources for the delivery of the PME in accordance with clause 7(c) of the Agreement.

3. General

3.1 As per the First Schedule of the Agreement, SFU and FIC agree that the courses within the PME shall constitute Courses, the PME shall constitute a Program, and students in the PME shall constitute Students of the College.

3.2 SFU acknowledges and agrees that FIC will promote the PME to international students who meet the admissions requirements set out in Schedule 2 as a pathway to the MPR.

3.3 On an annual basis, the School of Mechatronics Systems Engineering and FIC will agree to recruitment targets for the upcoming PME intake.

3.4 SFU's School of Mechatronic Systems Engineering and FIC will review the PME collaboratively every year following the end of term for the Program. The School of Mechatronic Systems Engineering will monitor the quality of students coming through the PME program as they transition to the MPR program to ensure the quality of students introduced by FIC in future intakes.

4. Termination

This MOU may be terminated at any time by either party upon sixty (60) days' prior written notice to the other, in which case a two-semester sunset period will apply during which FIC may continue to deliver the PME to ensure any student in the PME at the time of dissolution will not be disadvantaged and may complete the PME. Unless terminated in accordance with this clause 4, this MOU will apply for the term of the Agreement.
IN WITNESS WHEREOF the parties have executed this Memorandum of Understanding.

Fraser International College Limited

PER: Beverly Hudson
Executive General Manager
Navitas North America

Date: 8 June 2016

Simon Fraser University

PER: Jonathan Driver
Vice-President, Academic and Provost
Simon Fraser University

Date: 8 June 2016
Schedule 1: Program

The FIC Pre-Master's in Engineering ("PME") is a non-credit pre-Master's preparatory program designed to prepare students for SFU's Mechatronic Product Realization Professional Master's Program ("MPR").

The curriculum for the PME has been collaboratively designed by the SFU School of Mechatronic Systems Engineering and FIC to achieve two main goals: (1) to assess students' ability to succeed in the full-time MPR; and (2) to prepare those students who gain entry into the MPR program to succeed in it. The PME curriculum is designed to achieve these goals through the development and assessment of students' (a) communication and language skills; (b) ability to work effectively in a collaborative environment; (c) critical thinking skills; and (d) maturity. The PME will help manage students' expectations regarding the rigor of the MPR program and opportunities available once completed, and will also emphasize academic integrity.

The PME shall consist of the four core courses and one capstone project outlined below. The curriculum will be delivered in small classroom settings with face-to-face, full-time instruction. Instructors will be selected by FIC in consultation with the School of Mechatronic Systems Engineering. Students will be required to complete all of the following course offerings:

- Communication Skills: Practical and Intercultural Issues
- Introduction to Quantitative Business Analytics: Statistics and Engineering Economics
- Introduction to Collaborative Work Environments
- Academic Literacy in Context: Business and Technical Writing
- Product Realization Capstone Project.

Communication Skills: Practical and Intercultural Issues

To be successful in their careers and in graduate study, students require effective communication skills. It is also important to be able to transfer and adapt their current skills to new situations. This course provides an opportunity for students to improve the communication skills that are important to graduate study in the context of a Canadian university. It explores communication through the intercultural domain, meaning that it helps students to build on and extend their current intercultural skills, while ensuring that they are equipped to respond appropriately in the varied and multicultural environments they will experience in Canadian graduate studies. During the course students will work individually and in teams to improve their verbal, non-verbal and written communication skills.

Introduction to Quantitative Business Analytics: Statistics and Engineering Economics

Today's engineers must have a basic understanding of the economic reality of the world they work in as well as basic business practices to succeed in their careers. In this course, students will be introduced to core concepts in financial accounting, designed to help students understand the "language of business". This will include understanding the purposes of the financial statements that firms use to describe and analyse the financial state of their operations, how to construct these financial statements, and some simple ratios that capture key elements of firm performance. After completing the course, students should be able to understand many of the fundamental financial accounting issues and challenges faced by
managers today. The Business Statistics module aims to give students a foundation in fundamental statistics knowledge, covering basic concepts such as distributions, standard deviations, correlations, and regression analyses. The Engineering Economics module will provide a sound introduction to key concepts in this important field.

Introduction to Collaborative Work Environments

In order to succeed in today's world, professionals must be able to work collaboratively with others. This often requires that they learn to work with people from different countries with different cultures, customs, and expectations. Further, given the nature of the MPR program, students must work effectively with others in order to succeed in the program. In this course, participants will develop their ability to work collaboratively in a team-based environment.

Academic Literacy in Context: Business & Technical Writing

This course will prepare students for the rigor and requirements of academic writing at the graduate level with a technical focus. It will make students aware of and competent in all aspects of business and technical writing, including memos, reports, briefings, and pitches. Students will practice brainstorming, outlining, researching, drafting, revising, and presenting finalized written work. They will learn to use data to support their ideas and express opinions with confidence. In this course, students must be highly engaged and prepared to interact in group discussions and peer-review as well as work independently to complete larger assignments outside of class time.

Product Realization Capstone (CCC)

This capstone course will provide a practice ground for students as they begin to explore the importance of product realization. This course will allow students to practice their skills in a supportive environment, and then present in a realistic setting. Students will have the opportunity to put all the theory they learn in the PME to practice by becoming part of a high-functioning cross-cultural team as they work together to create a functioning prototype. By engaging in this course, students will learn effective time management and presentation skills, and be able to confidently introduce their product while making sound recommendations backed up with careful research and analytics.
Schedule 2: Admissions Requirements

Students in FIC's non-credit Pre-Master's in Engineering program ("PME") are anticipated to be selected from new Canadian immigrants and/or international applicants who have industry/professional experience in a relevant engineering discipline but wish to upgrade their knowledge in the area of mechatronics product realization. It is understood that the English proficiency of applicants may fall below the direct-entry requirement of IELTS 7.0 for graduate studies at SFU. Through the FIC PME program, accepted students will have the opportunity to further develop their communication, critical thinking, and interpersonal skills. The PME coursework identified in Schedule 1 is expected to enable applicants to compensate for any English language deficiency and help with adjustment to Western academic culture, bring them up to the SFU admission standards.

Students will receive a joint Letter of Offer from FIC and SFU's School of Mechatronic Systems Engineering outlining entry into FIC's non-credit Pre-Master's in Engineering ("PME"), a pre-Master's preparatory program designed to prepare students for SFU's Mechatronic Product Realization Professional Master's Program ("MPR"), and outlining the conditions of entry into the School of Mechatronic Systems Engineering and the MPR.

Progression into the MPR will be granted to all students who are admitted to and successfully complete the PME with at least a 3.0 CGPA.

Students may only be admitted to the PME by FIC and receive a conditional offer for admission to the MPR from SFU if they have the following:

- Undergraduate degree in Mechanical Engineering, Electrical Engineering, Mechatronic Engineering, Engineering Science or related field from a recognized post-secondary institution, with the minimum academic requirement set by SFU for admission into graduate studies; and
- 6.5 IELTS overall band score (or its equivalent as determined by SFU Graduate Studies), as approved by the Senate Graduate Studies Committee.
Labour market survey results

VI.1 Survey and Results

SFU Professional Master's Degree in Advanced Manufacturing

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.
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

- Commercial & Professional Services
- Technology, Hardware & Equipment
- Energy
- Capital Goods
- Consumer Durables & Apparel
- Software & Services
- Automobiles & Components
- Food, Beverage & Tobacco
- Pharmaceuticals & Biotechnology

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
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)

[Pie chart showing distribution of responses]

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)

[Pie chart showing distribution of responses]
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.

![Pie Chart]

- 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)

![Pie Chart]

- 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? (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.
MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

RE: Full Program Proposal for the Master of Arts in Heritage Resource Management (SCUP 18-26)

DATE: October 17, 2018

TEL +1 778 782 3925
FAX +1 778 782 5876
sfu.ca/vpacademic

Simon Fraser University
Strand Hall 3100
8888 University Drive
Burnaby BC
Canada V5A 1S6

At its October 10, 2018 meeting, SCUP reviewed and approved the full program proposal for the Master of Arts in Heritage Resource Management within the Faculty of Environment, effective Fall 2019.

Motion:

That Senate approve and recommend to the Board of Governors the full program proposal for the Master of Arts in Heritage Resource Management within the Faculty of Environment, effective Fall 2019.

c: J. Driver
MEMORANDUM

ATTENTION Senate Committee on University Priorities (SCUP)
FROM Jeff Derksen,
Chair of Senate Graduate Studies Committee (SGSC)
RE: Full Program Proposal for a Master of Arts in Heritage Resource Management

DATE September 24, 2018

For approval:

At its meeting of September 11, 2018, SGSC approved full program proposal for a Master of Arts in Heritage Resource Management and is recommending it to SCUP for approval, effective Fall 2019.

Motion:
That SCUP approve and recommend to Senate the full program proposal for a Master of Arts in Heritage Resource Management within the Faculty of Environment.
To:    Dr. Jeff Derksen, Dean of Graduate Studies / Chair of SGSC

From: Dr. Dongya Yang, Associate Dean / Chair, Faculty of Environment Graduate Studies Committee

cc:    Dr. John Welch, Director, HRM Professional Graduate Program
       Dr. Jon Driver, Graduate Chair of Archaeology

Date: Sept. 4, 2018

Re:    Full Program Proposal for the Heritage Resources Management (HRM) Master’s Program
       Full Program Proposal for the Heritage Resources Management (HRM) Graduate Certificate Program

The Faculty of Environment Graduate Studies Committee has approved the full program proposal for the Heritage Resources Management (HRM) Master’s program and the full program proposal for the Heritage Resources Management (HRM) graduate certificate program from the Department of Archaeology. Please add them onto the agenda of the upcoming SGSC meeting.

Feel free to contact should you have any questions or concerns.

Dongya Yang, Ph.D.
Associate Dean, Research and Graduate Studies
Professor of Bioarchaeology
TO: Prof. Dongya Yang, Associate Dean, Faculty of Environment
FROM: JR Welch, Director, HRM Professional Graduate Program
SUBJECT: Full Program Proposal for the HRM Masters
DATE: 22 August 2018

On behalf of the Department of Archaeology I am pleased to submit the full program proposal (FPP) for the Masters in Heritage Resource Management for review and comment or approval by the FENV Graduate Committee.

The Archaeology Department Faculty intends to commence delivery of the Professional Graduate Program in Heritage Resource Management pursuant to the attached FPP, the FPP for the HRM Graduate Certificate, and the attached budget in Fall 2019.

I am on study leave for Fall 2018, but have agreed to remain the principal point of contact for the FPP review process. Contact me via welch@sfu.ca or my mobile (520-991-1739) with any questions or concerns. If I am not available to respond effectively or to participate personally, the Archaeology Graduate Chair, Prof. Driver, will do so.

SFU Archaeology's Professional Graduate Program in Heritage Resource Management trains HRM leaders to integrate ethical, legal, business, and research priorities in pursuit of desired futures for treasured pasts.
Master of Arts in Heritage Resource Management

Full Program Proposal

August 23, 2018
Department of Archaeology
PART A: Information required by the Ministry of Advanced Education

EXECUTIVE SUMMARY

Overview of the SFU’s history, mission, and academic goals

As Canada’s engaged university, Simon Fraser University is defined by its dynamic integration of innovative education, cutting-edge research and far-reaching community engagement. SFU was founded in 1965 with a mission to bring an interdisciplinary approach to learning, embrace bold initiatives, and engage with communities near and far. SFU is consistently ranked amongst Canada’s top comprehensive universities and is one of the world’s leading teaching and research institutions.

The Master of Arts in Heritage Resource Management in Simon Fraser University’s Department of Archaeology takes a global perspective on consequential issues related to material heritage. Most national governments have developed legislation and regulatory policy protecting heritage, defining what is to be preserved, and what forsaken, in the course of community and economic development. These questions and related matters of public policy, business, research, and professional practice, drive the dynamic field of heritage resource management, which today employs at least 90 percent of all archaeologists in North America. SFU Archaeology has been offering the professional graduate program in Heritage Resource Management as a cohort special arrangements program since Fall 2016. HRM program graduates are prepared to lead government, community, and industry decision making regarding the disposition of cultural heritage imperiled by land alteration and resource extraction.

Proposed credential to be awarded

Master of Arts in Heritage Resource Management

Location of program

Department of Archaeology, SFU Burnaby Campus (and via online instruction)

Academic unit(s) offering proposed program

Faculty of Environment

Anticipated program start date

Fall 2019

1 Heritage Resource Management, Cultural Resource Management, Cultural Heritage Management, and Archaeological Resource Management are often used interchangeably, albeit the first two incorporate allied fields of architecture, museum studies, object conservation, and heritage tourism. The proposed program responds to personnel demands from an industry with a largely archaeological focus. We title this program Heritage Resource Management, however, for its inclusive values, especially respect for descendant communities whose pasts are often disproportionately researched and impacted.
Anticipated completion time

The program is designed for completion in six terms (two years).

Summary of proposed program

a) Aims, goals and/or objectives of the proposed program

The Master of Arts in Heritage Resource Management (HRM-MA) exists to provide practice-proven, Bachelor’s-level HRM practitioners with opportunities to obtain the knowledge, skills, perspectives, and research-focused graduate degrees they need to advance both their individual careers and HRM policies, practices, and enterprises. The HRM program, which couples state-of-the-art online coursework with a traditional, thesis-based M.A., is designed to meet strategic objectives at societal, institutional, departmental, and disciplinary scales. On the societal level—in Canada and around the world—HRM leaders trained to work at the interface of government, industry, community, and research are needed to support good decisions regarding the disposition of cultural heritage imperiled by land alteration, resource extraction, and climate change. As Canada's engaged university, and as host for one of Canada’s top archaeological programs, SFU is positioned to mobilize existing assets to meet demands from the HRM industry for highly qualified personnel. SFU and its HRM program faculty and graduates are also prepared to embrace invitations from Indigenous and other local communities for better and more broadly informed cultural heritage research and conservation.

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

The HRM program assists in the realization of the SFU Strategic Vision, and the Faculty of Environment Academic Plan (June 2018 draft) by engaging communities of students, researchers, regulators, industry representatives, and local heritage stewards. The first two cohorts (11 students in both 2016 and 2017) have been integral in expanding the program’s community, industry, and government networks, and in creating a rich and collegial learning environment. In accord with the SFU Aboriginal Strategic Plan (2013–2018), the HRM program’s structure, content, and personnel are dedicated to creating modes of HRM practice that are informed by Indigenous values and preferences, and are dedicated to serving Indigenous peoples’ interests in learning from, making appropriate use of, and perpetuating cultural heritage places, objects, and traditions.

SFU Archaeology identifies “First Nations Heritage and Resource Management” as one of three areas of “concentrated expertise.” The department has dedicated the last two decades to crafting partnerships, training students, and customizing research to engage with the communities whose ancestors most archaeologists study. The HRM program builds on and extends this success by embracing community values centered on respect, by actively recruiting Indigenous and international students, and by featuring professional ethics and community collaboration issues in the required coursework.
c) **Linkages between the educational goals and the curriculum.**

The HRM program curriculum features a three-day on-campus orientation, four required courses—each focused on one of the four essential dimensions of the HRM field—and a traditional master’s thesis involving a data-driven analysis of a HRM problem. The efficient program design facilitates achievement of the HRM program’s twin educational goals: (1) Improve HRM practitioner knowledge and skill in HRM law and policy, practice and ethics, business management, and research design and methods; and (2) Prepare HRM leaders who deploy critical and strategic thinking to integrate broadly beneficial research, compliance, commerce, and community development outcomes.

HRM program graduates are expected to be able to do all six of the following:

1. **Identify and analyse** how personal, collective, governmental, and institutional values and interests are linked to heritage and how these values and interests influence management processes and outcomes.
2. **Recognize, describe, and practice heritage resource management** as an international, interdisciplinary profession that draws strengths and creates synergies from the integrated application of biophysical science, social science, and humanities to heritage and heritage management.
3. **Compare and apply** international, Canadian, and United States systems for heritage regulation, identification, categorization, evaluation, and treatment.
4. **Identify and engage with** individuals and groups with interests tied to particular heritage in discussions regarding the values, threats, management priorities, and investigative and interpretive opportunities presented by that heritage and its status.
5. **Plan, prepare, and deliver** the results of HRM research.
6. **Identify and put to work** reliable knowledge, skills, and expertise relating to heritage resource management law and policy, ethics and practice, business and management, and research planning and methods.

Student success in reaching these outcomes is supported by four courses designed specifically for the HRM program (not repurposed from existing graduate-level courses in archaeology or other disciplines). The courses are taught by individuals with experience in HRM in the private, public, not-for-profit and Indigenous sectors. In addition, students are encouraged to incorporate their working experiences into regular coursework assignments and weekly interactive discussions. Students thus contribute to, and benefit from, the shared professional experiences of the cohort and the instructors. Most of the in-progress theses are building upon a research project undertaken as part of the candidate’s professional lives, thus allowing the student to mobilize existing knowledge and networks in addressing a problem of consequence at the interface of research, practice, policy, and/or business dimensions of the HRM field.

d) **Potential areas/sectors of employment for graduates and/or opportunities for further study.**

See National Occupational Classification (NOC) codes 0511, 5112, and, especially, 4169. HRM-MA graduates, all of whom are already working professionals, expand the
geographical and managerial boundaries of their employability in archaeology, environmental resource management, construction and compliance support services, museums, and government regulatory and planning offices at regional, provincial, and federal levels. Graduates of this program are eligible and prepared for entry into a doctoral program.

e) Delivery methods

With three exceptions, the HRM program is delivered asynchronously online. Each of the four required courses has been designed and delivered using the Canvas learning management system and in close collaboration with the director and staff of the SFU Centre for Online and Distance Education. The exceptions are the on-campus orientation during the first week of fall term classes, the ‘virtual meetings’ held each week during the teaching terms, and the formal thesis defences required for each master’s candidate.

f) Program strengths

The HRM-MA is unique. To our knowledge, it is the only master’s program that integrates online coursework with traditional master’s thesis requirements tailored to enable career advancement for junior HRM practitioners. More broadly, the program is purpose-built by and for HRM professionals from Canada and the United States. The three-day on-campus orientation sets the tone and pace for high-quality collegial communications within the cohort and among faculty, candidates, and industry, community, and government partners. The coursework focus on Canada and the United States facilitates cross-border comparisons, professional integration, and opportunities for international practice. The theses are defined and guided by the SFU faculty supervisor and an HRM colleague to meet the standards of the Register of Professional Archaeologists (RPA) and other permit and licensure mandates. Finally, the program’s state-of-the-art online learning environments are supported by dedicated specialists and customized learning tools, including a program-specific glossary and the use of Blackboard Collaborate to engage industry specialists in coursework and thesis research.

g) An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable and plans for admissions and transfer within the British Columbia post-secondary education system.

Since 2014 and the initiation of planning for an online professional program to complement SFU Archaeology’s traditional graduate programs, consultations have occurred with over 100 individuals and representatives of government, academic, industry, Indigenous, and student groups. Formally scheduled meetings to explain the HRM-MA program purpose and design and to solicit feedback have been held with the BC Archaeology Branch, the Archaeological Survey of Alberta, the BC Association of Professional Archaeologists, Golder Associates, and Arizona State Museum (University of Arizona). Appendix 3 includes various statements from individuals (not affiliated with
MA in Heritage Resource Management

SFU) who participated in these consultations and possess knowledge of the HRM program and represent institutional interests in excellent training for future generations of HRM practitioners.


Students within the British Columbia post-secondary education system are certainly admissible and able to transfer into the program, though it bears mention that each of the HRM program’s four required courses is unique.

Program graduates are eligible for acceptance into graduate or professional school programs at other institutions. Although the program is designed for professional archaeologists, the requirement for a full thesis (rather than a project or an examination) means that graduates of this program will be eligible to enter a doctoral program in the future. The HRM program thesis requirement further assures the eligibility of graduates for registration with the Register of Professional Archaeologists (RPA). The program also satisfies all academic and formal training for licensure and permitting mandates wherever these exist in Canada and the United States.

h) Related programs in the institution or other British Columbia post-secondary institutions.

There are no similar programs on offer in British Columbia.

Contact information

Professor John R. Welch, HRM Program Director, 778-782-6726, welch@sfu.ca
PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

The target audience for the Master of Arts in Heritage Resource Management (HRM-MA) is junior level HRM practitioners, especially Bachelor's-level archaeological crew chiefs and project managers who have made career commitments to HRM and require additional credentials to optimize their potential for advancement in the field. The HRM program prepares practicing HRM professionals who lack research credentials to integrate ethical, legal, business, and research priorities in pursuit of desired futures for treasured legacies from diverse pasts.

Program requirements conform to GGR 1.7 in the Graduate General Regulations: http://www.sfu.ca/students/calendar/fees-and-regulations/grad-regulation.html. The HRM program consists of a cohort orientation on the Burnaby campus, course requirements and a thesis, for a minimum of 38 units. Students who have completed the HRM graduate certificate will receive 10 units of advance credit for course work already completed. These students are required to complete 10 additional units of graduate course work and a thesis for a minimum of 38 units. The additional units will include ARCH 591, or comparable course work, as approved by the HRM director.

All students complete each of the following:

ARCH 531 - HRM Law and Policy (5):
This course features weekly online content, weekly readings, and three instructor-evaluated weekly assignments—a reading comprehension quiz, a peer discussion, and a writing exercise.

ARCH 541 - HRM Professional Practice and Ethics (5):
This course features weekly readings, weekly blogging and peer-commentary assignments, and instructor-evaluated weekly written commentaries, as well as a multi-media response to a 'grand challenge' in the field of HRM.

ARCH 551 - HRM Business Management (5):
This course requires students to understand and solve weekly problem sets in business management grounded in HRM case studies. The final assignment requires students to gather and analyse data as the basis for a formal proposal for a management innovation in an operating HRM business.

ARCH 561 - HRM Archaeological Research Design and Methods (5)
Online lectures built around the challenges and opportunities presented by field research and laboratory and data analyses inspire students to examine and refine their full thesis proposals for presentation to their thesis supervisors.

ARCH 898 – MA Thesis (18)
Following coursework completion, students advance to candidacy and must complete a written thesis followed by a formal public defence adhering to policies and procedures of SFU Graduate regulations for Master's thesis. Candidates are encouraged to choose a thesis topic that is of particular interest to them or that relates to their recent or envisioned professional practice.
MA in Heritage Resource Management

No internship or practicum is required. All of the current candidates integrate their prior professional experience into their coursework and most use their thesis research to define and prepare for career advancement following the completion of graduate studies.

b) Admission requirements

Admission requirements must conform to GGR 1.3 in the Graduate General Regulations: http://www.sfu.ca/students/calendar/fees-and-regulations/grad-regulation.html. All applications that meet or exceed the following two requirements will be considered:

1. A Bachelor’s degree in anthropology, archaeology, museum studies, planning, or a related field; and
2. Professional experience working in heritage resource management or a related field, including at least some experience in lab work, field work, planning and consultation, and project and budget management. 1-2 years of professional employment are recommended.

c) Evidence of student interest and labour market demand

The HRM program has, in three years, attracted more than 30 applications and has registered 22 students. A master’s degree (with thesis) is the minimum requirement in many provincial (Canada) and state (USA) regulations for supervision of heritage projects involving archaeological excavation. It is also a minimum requirement for registration as a professional archaeologist (Register of Professional Archaeologists [RPA]), the emerging professional qualifications standard in the United States and internationally. The RPA standards include the following:

- “The applicant must have an advanced degree (such as an M.A., M.S., Ph.D., or D.Sc.) from an accredited institution in archaeology, anthropology, art history, classics, history, or other germane discipline with a specialization in archaeology.” [Simon Fraser University is the only research-intensive Canadian university that is accredited in the USA]
- “As part of that advanced degree, the applicant must have designed and executed an archaeological study and have reported on that research in the form of a Master’s thesis and/or Ph.D. dissertation. The thesis or dissertation must show a substantive data analysis by the applicant directed toward an explicit archeological research problem.” [The proposed MA in HRM requires a thesis]

Students take advantage of the opportunities embedded in the HRM program orientation, coursework, and thesis requirements to expand their professional networks, refine their understanding of HRM’s politico-legal contexts, ethical parameters, practical discretion, business management tools and principles, and research mandates. Program graduates will be situated to pursue unlimited upward mobility within their current jobs as consulting archaeologists and staff members for government museums and regulatory agencies, as well as to make lateral moves across HRM sectors in pursuit of emergent advancement opportunities in understaffed (by HRM) geographical areas (especially
d) Eligibility for scholarships, awards, and financial aid
Students in professional graduate programs are not eligible for Canada Student Loans/Grants, SFU bursaries through SFU Financial Aid, or awards funded from the university’s operating budget (e.g., entrance scholarships, graduate fellowships). HRM-MA candidates are eligible and encouraged to apply for funding through SFU Teaching Assistantships, SFU Endowed/Private Awards, Tricouncil Master’s Scholarships, and Mitacs Accelerate Research Internships. Between 2019 and 2022, and contingent on final funding approval, several Mitacs Accelerate research internships will be available to HRM-MA candidates. The Mitacs interns will receive up to $15,000 in stipend and research funding to work with Nlaka’pamux Nation Tribal Council and Teck Highland Valley Copper Operations representatives.

e) Program evaluation and academic/administrative oversight
All SFU academic programs are reviewed on a seven-year cycle. SFU is reviewed annually through the province of British Columbia’s accountability report and will be reviewed regularly through the province’s quality assurance process. SFU is fully accredited with the Northwest Commission on Colleges and Universities (USA), which requires regular reviews of all aspects of institutional performance on a seven-year cycle.

f) Main competitors outside BC
The HUM is, for the reasons stated above, unique and effectively peerless on a global scale. The only clearly comparable program in Canada, the Master of Arts, Applied Archaeology at the University of Western Ontario, includes a four-term residential requirement and a single course, Principles of Applied Archaeology, specifically designed for HRM practitioners. That program, and the approximately 20 comparable programs based at universities in the United States, either include three or more terms of on-campus intensive coursework or neglect the requirement for a written, formally examined thesis (online programs) or both. Only SFU Archaeology’s HRM program has been custom-designed and effectively implemented to serve the needs of working HRM professionals around the world who are willing and able to excel in online coursework and in the preparation of a master’s thesis on a problem in the broad field of HRM.

RESOURCES

a) Enrolment Plan
The best data available to support enrolment projections are statistics from the program’s initial years as a cohort special arrangements offering. The Master of Arts in Heritage Resource Management (HRM-MA) has succeeded as a professional graduate program through an initial two years, attracting more than 30 applications and enrolling 22
students. Of these 22, 20 have advanced to candidacy; 1 has completed all MA program requirements and graduated; 1 has completed all coursework requirements and opted for the HRM Graduate Certificate; and one has suspended pursuit of the MA (maternity).

Although the quantity and quality of student applications to join the 2018 cohort have not been sufficient to run the coursework for the 2018–19 academic year, five of the 2018 applicants have agreed transfer their applications for consideration in 2019. A three-year communications plan is in place to use student and faculty blogs, social media, Google Ads, person-to-person recruitment, podcasts, and other tools to boost the quality and quantity of applicants in future years.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments

Simon Fraser University is a well-established institution with excellent library and IT support. SFU also has a long history of providing distance education, and the well-staffed Centre for Online and Distance Education has proved an able and dedicated partner in the development of the HRM program’s unique online teaching and learning environments. SFU’s Teaching and Learning Centre has also supported the HRM program director and instructors in the innovation of context-appropriate HRM pedagogy and evidence-based research. No additional Library nor IT resources are required to run the proposed program. The Department of Archaeology has 19 faculty members. Most have already taken on supervision of HRM student theses and are willing to continue to do so. If necessary, HRM students will have ready access to department equipment, research collections, and laboratory space. Although no new faculty or other resources are required to implement the HRM-MA, SFU Archaeology has recognized the importance of the HRM field to both undergraduate and graduate programs and has identified an HRM archaeologist as a top hiring priority in the Faculty Renewal Plan. Resources generated from the program will support the hiring of part-time staff. Should the program grow we anticipate being able to hire a professor of professional practice.

There is no specific plan for the HRM program to affect the Archaeology Department’s “traditional” MA program. The HRM program serves a different set of potential students who are seeking advanced education relevant to their profession. This represents a response by the department to the changing needs of archaeologists in North America.

The only long-term impact on faculty resources is the commitment to provide the program director with a one course release from teaching.

Faculty members’ teaching/supervision
A large majority of the Department of Archaeology’s 19 faculty members are actively engaged in supporting the HRM program through teaching, planning-advising, and thesis supervising:
With the exception of Dr. Dore, who is adjunct and is compensated for his contributions to the HRM program on an annual contractual basis, the substantial investments required to create and deliver the HRM program through its first two full years have required faculty with requisite specializations to contribute in ways that exceed normal teaching-service workloads. Once the program moves out of the “Special Arrangements” format the workload will become part of the assigned teaching for faculty members.

Faculty involvement in the HRM program is otherwise having no appreciable effect on SFU faculty responsibilities in other programs. Appendix 5 provides the abbreviated CVs for the four faculty members currently serving as course instructors.

c) Proposed tuition and other program fees including a justification

Tuition will continue to be charged on a program basis, term-by-term. Tuition for 2019/2020 entry in the HRM master’s is $4598 CAD per term, for six consecutive terms ($27,588 CAD total tuition). Subject to approval by SFU’s Board of Governors, the tuition is programmed to undergo a 2% annual increase. (Note that under the “Cohort
Special Arrangements” program the tuition is spread over 5 semesters. Our experience indicates that students need longer to complete the program, so we propose spreading the total tuition fee over six semesters, resulting in a per-semester fee that is less than the fee charged to students in the special arrangements program.

The revenues generated from the program in excess of the costs of HRM program administration and implementation will be used in support of Department of Archaeology research and teaching infrastructures.

PART C: Appendices

Appendix 1 Calendar entry
See attached revised SFU Calendar entry, submitted for approval in June 2018.

Appendix 2 New courses
Not applicable. The four required courses have received prior approval.

Appendix 3 Letters of support
See attached statements from non-SFU commentators, each and all of which support the institutionalization of the HRM program. The letters in Appendix 3 include statements from Society for American Archaeology President Susan Chandler, PhD; Register of Professional Archaeologists President Christopher Dore, PhD; Alberta Archaeological Survey Manager Darryl Bereziuk; University of Maryland curriculum consultant Carol Ellick; and Golder Associates Principal Andrew Mason; American Cultural Resources Association President Kim Redman; Stó:lō Research and Resource Management Centre Director David Schaepe; and University of California Berkeley Assistant Professor William White. Statements have been invited from the BC Association of Professional Consulting Archaeologists President and from the BC Provincial Archaeology Branch Manager Paula Thorogood.

Appendix 4 Details of program steering committee (if applicable)
John R. Welch, Professor of Archaeology and HRM Program Director
David V. Burley, Professor of Archaeology
Jonathan Driver, Professor of Archaeology

Appendix 5 Abbreviated curriculum vitae for faculty
See attached abbreviated standardized CVs from each of the four course instructors (Welch, Nicholas, Dore, Maxwell), summarizing their positions, credentials, research interests, and recent publications, grants and graduate supervision.
Heritage Resource Management

MASTER OF ARTS

Description of Program
The master's in heritage resource management (HRM) is a professional graduate program that prepares HRM archaeologists to integrate ethical, legal, business, and research priorities in pursuit of desired futures for treasured legacies from diverse pasts. In addition to the thesis, the program consists of an orientation on the Burnaby campus and four online courses that provide intensive preparation in the essential dimensions of HRM archaeology:

• law and policy
• ethics and practice
• business management
• and research design and methods

For further information, visit http://www.sfu.ca/archaeology/hrm.html

Admission Requirements
Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar. Applications to the program will be accepted from candidates who:

• Hold a bachelor's degree (or equivalent) in anthropology, archaeology, museum studies, planning, or a related field;
• Obtained a cumulative undergraduate GPA of at least 3.0;
• Professional experience working in heritage resource management or a related field, including at least some experience in lab work, field work, planning and consultation, and project and budget management. 1-2 years of professional employment are recommended.

The archaeology graduate admissions committee may offer, at its discretion, MA admission to exceptional students without an undergraduate degree in archaeology, anthropology, or a related field. Minimally we require demonstrated competence in field archaeology or a cognate domain of professional practice in heritage resource management.

Students who do not have the proper background in heritage resource management are advised to obtain this background through participation in heritage resource management activities and programs, especially heritage site identification, significance assessment, and impact avoidance or reduction.

Students may transfer from the HRM graduate certificate to the HRM master's following the completion of ARCH 531 and ARCH 541 with a minimum GPA of 3.0 and the approval of the HRM program director.

Program Requirements
This program consists of a cohort orientation program on the Burnaby campus, course requirements and a thesis for a minimum of 38 units.

Students complete all of
ARCH 531 - HRM Law and Policy (5)
ARCH 541 - HRM Professional Practice and Ethics (5)
ARCH 551 - HRM Business Management (5)
ARCH 561 - HRM Archaeological Research Design and Methods (5)

and a thesis
ARCH 898 - MA Thesis (18)

Program Length
Students are expected to complete the program requirements in six terms.

Other Information
Course Work
Students who have completed the HRM graduate certificate will receive 10 units of advance credit for course work already completed, and are required to complete 10 additional units of graduate course work and a thesis for a minimum of 38 units. The additional units will include ARCH 591, or comparable course work, as approved by the HRM director.

Thesis
After completion of the four required courses, students advance to candidacy and complete and defend the thesis. The defence topic should be the thesis itself and related matters. It should be focused on problem-oriented research in the heritage resource management field, involving the conceptualization of an archaeological problem, and the collection, analysis, interpretation and presentation of data.

Academic Requirements within the Graduate General Regulations
All graduate students must satisfy the academic requirements that are specified in the Graduate General Regulations, as well as the specific requirements for the program in which they are enrolled.
August 24, 2018

Dr. John Welch
Department of Archaeology and School of Resource and Environmental Management
Simon Fraser University
Burnaby, Unceded Coast Salish Territory, BC, Canada V5A 1S6

Dear Dr. Welch,

On behalf of the American Cultural Resources Association (ACRA), I am pleased to provide comments on the Simon Fraser University proposed Master Program in Heritage Resource Management. The SFU Master’s and Certificate program goes beyond a traditional advanced degree and highlights real-world topics not covered in traditional programs, but highly valued by employers of HRM professionals.

The field of Cultural Resource Management (or Heritage Resource Management as you prefer) is highly diverse and dynamic. As an industry, we recognize the need for educational programs that prepare potential employees, managers, and owners for the non-technical aspects of our fields. Technical skills, which are the focus in traditional programs and often learned through experience, are highly important. However, technical skills and traditional programs rarely prepare students for the realities of working in a business environment. In the CRM business environment, cultural (or heritage) resources, client needs, regulatory requirements, permit stipulations, and the business itself are forces that guide everyday activity. Traditional Master’s programs prepare students for the technical aspects of our field, but very few programs require students to understand business and how to ethically and properly balance the variety of forces that effect CRM practitioners. The SFU Master’s program is one of very few programs that is bridging the gap between the technical, ethical, and business needs of our industry.

I hope that the SFU program will continue to develop and grow. Further, I hope that I have the opportunity to hire a graduate!

Sincerely,

Kim Redman,
President, ACRA
August 13, 2018

To Whom It May Concern:

Subject: Professional Master's in Heritage Resource Management

Please accept this letter which conveys my endorsement of the Professional Master's in Heritage Resource Management program offered by the Department of Archaeology, Faculty of Environment, Simon Fraser University (SFU). This program offers one of few opportunities in North America for students and working professionals to obtain a post-graduate degree that focuses specifically on the field of Cultural Resource Management (CRM). From the perspective of archaeological resource management in Alberta, the availability of such a program is considered both timely and relevant. CRM field programs conducted on behalf of industrial or commercial developers represent more than 90% of the archaeological work undertaken on an annual basis in Alberta. This has led to the development of a multi-million dollar CRM industry that employs hundreds of heritage professionals. Growing cohorts of students choose to pursue careers as professional CRM archaeologists following completion of undergraduate studies. The SFU Heritage Resource Management program provides these students with pertinent instruction in the practical, regulatory, legal and ethical aspects of CRM and places them in good stead to perform with competence in the field. As in many other jurisdictions, Alberta requires practicing archaeologists to have completed a thesis-based, post-graduate degree in archaeology or anthropology. The SFU Master's program fulfills this thesis requirement at high academic standards, most commonly focusing on research topics of direct practical relevance to the conduct of CRM archaeology in Alberta contexts. It is my opinion that the SFU program surpasses in both content and achievement the increasingly popular, short-term Master's degree programs in CRM offered by European institutions. We support SFU's Professional Master's in Heritage Resource Management program because it will contribute to the development of highly-qualified, locally-trained individuals to serve the future needs of Alberta's archaeological resource management programs and initiatives.

Yours truly,

Darryl Bereziuk
Director,
Archaeological Survey of Alberta,
Historic Resources Management Branch
August 9, 2018

John R. Welch, Ph.D., RPA
Department of Archaeology and
School of Resource and Environmental Management
Simon Fraser University
Burnaby, BC, Canada V5A 1S6

Dear John:

Thank you for allowing me the opportunity to write a letter in support of the Heritage Resource Management (HRM) Program becoming a Full Program Plan (FPP) and an ongoing fixture in the SFU calendar.

In 2015, I was hired as a consultant by the University of Maryland’s Department of Anthropology to explore the idea of creating an on-line or hybrid professional track graduate degree program in Cultural and Heritage Resource Management. The initial step was to research current cultural resource management (CRM) and heritage resource management (HRM) programs and to identify knowledge and skills that employers felt was lacking in most new employees. Based on the findings, the Department of Anthropology decided that there was in fact a niche to be filled and we moved forward with the development of a proposal to create a cultural and heritage resource management (CHRM) program.

During our research, we found that the vast majority of CRM or HRM programs were housed on-campus, were aimed at traditional students, and that the curriculums didn’t vary much from a traditional archaeology degree. The programs were based on what the traditional academically trained professors identified as necessary for entering the profession of CRM, as opposed to what the employers actually wanted and needed.

There were very few exceptions to this model and the only university of similar standing to the University of Maryland was SFU. When the information on the SFU HRM program was reviewed during a meeting, some of my academic colleagues got a bit nervous about program development and the potential for meeting the minimum enrollment requirements. One person referred to the SFU program as the “Cadillac” of HRM programs and felt that there was no way we could compete with their standard.

My career started in CRM in 1979. I have worked on countless projects for agencies, CRM firms, and CRM programs housed within academic institutions. I serve on the Board of Directors for the American Cultural Resources Association. There are more than 1,300 CRM and HRM firms in the U.S., employing more than 10,000 individuals and for the most part, those individuals have had to learn the business of CRM on the job.

As a project director, I’ve witnessed the struggle employees have with understanding how what they do fits within the context of a CRM project. It is essential that academic institutions provide those entering CRM and HRM with the knowledge and skills of the profession. SFU’s HRM program does this. Their students graduate with knowledge and skills that satisfy employment needs, professional standards, and will hopefully be able to move the profession forward in North America. By SFU making the HRM Program a Full Program Plan (FPP) and an ongoing fixture in the SFU calendar, you will again set the standard for academic institutions.

Best,

Carol J. Ellick, M.A., RPA
Executive Director
Archaeological and Cultural Education Consultants
26 July 2018

Dr. John Welch, Professor and Director
Professional Graduate Program in Heritage Resource Management
Simon Fraser University
Department of Archaeology and School of Resource and Environmental Management
Burnaby, BC, Canada
V5A 1S8

SFU ARCHAEOLOGY - HERITAGE RESOURCE MANAGEMENT PROGRAM

Dear John:

Thank you for sharing your news concerning the SFU Department of Archaeology's intention to submit a Full Program Plan (FPP) for the Heritage Resource Management (HRM) Program. Golder Associates is pleased to offer our support for this initiative.

As you are aware, Golder has benefited directly from the HRM Program through the involvement of Casey O'Neill from our Whitby, Ontario, office. The HRM Program will allow Casey to take the next important step in his career, and he already has shared many insights and learnings from the HRM Program with his colleagues at Golder. I am equally pleased to see a number of archaeologists from government (e.g., BC Oil & Gas Commission) and from Crown Corporations such as BC Hydro participating in the program.

The HRM Program addresses a critical gap in education and will undoubtedly raise the level of professionalism in commercial heritage management circles. This will benefit the discipline of archaeology, practitioners, project proponents, government, and most importantly, descendant communities. Institutionalization of the HRM Program is an important step of which we are fully supportive.

We wish you continued success.

Golder Associates Ltd.

Andrew (Andy) Mason, MA, RPCA
Principal, Cultural Heritage Specialist
Dr. John R. Welch  
Director, Professional Graduate Program in Heritage Resource Management  
Simon Fraser University  
Burnaby, BC, Canada  
V5A 1S6

RE: Support for Master of Arts in Heritage Resource Management Full Program Proposal

Dear Dr. Welch:

It is my pleasure to write this letter in support of full program approval for the Master of Arts in Heritage Resource Management. I'm writing this letter as a consultant working for Heritage Business International (HBI), a firm that provides industry data and business support for heritage organizations. I've also served as the President of the American Cultural Resources Association and am currently the President of the Register of Professional Archaeologists—positions through which I've gained knowledge of applied archaeology and industry economics.

First, it must be recognized that over the last 50 years heritage has been privatized in the Americas and around the world. Today, heritage compliance is a $2 billion (U.S.) dollar industry globally and more than half of that value is represented by Canada and the U.S. Non-compliance archaeological work (traditional grant-funded research) in Canada and the U.S. is valued at only $30 million, or about three percent. The non-compliance sectors of the heritage industry are even larger (over $200 billion in the U.S. alone). Approximately 82 percent of professional archaeologists in North America work outside of academia.

Despite the economic data, few academic programs have responded to the radical changes that have occurred to archaeology as a profession. Simon Fraser University's program is one of a very few that has responded, and responded in innovative ways that meet the needs and realities of working heritage professionals who need additional education and skills to advance in a privatized archaeology. As an example, and one that HBI obviously cares about, Arch 551 Heritage Business and Management is the only class that I know of at any university in the world that provides true business education tailored to the heritage industry. Regardless of how proficient students are at "doing" archaeology, they won't have a successful career in a privatized profession if they can't return financial value to their employer. For good or for bad, this is the new reality of working heritage professionals in a privatized archaeology.

SFU's Master of Arts in Heritage Resource Management is leading academia in providing archaeologists trained for a 21st century archaeology. I encourage you to support continuing this program and granting it full program approval.

Sincerely,

Christopher D. Dore, Ph.D., M.B.A., RPA 10331
August 6, 2018

John R. Welch, Registered Professional Archaeologist 10227
Professor and Director, Professional Graduate Program in Heritage Resource Management
Department of Archaeology and School of Resource and Environmental Management
Simon Fraser University
Burnaby, Unceded Coast Salish Territory, BC, Canada V5A 1S6

Dear Dr. Welch:

The Society for American Archaeology (SAA) is pleased to provide this letter of support for the Department of Archaeology and School of Resource and Environmental Management’s submission of a Full Program Plan for the Heritage Resource Management (HRM) Program at Simon Fraser University (SFU).

SAA is an international organization that, since its founding in 1934, has been dedicated to the research about and interpretation and protection of the archaeological heritage of the Americas. With more than 7,000 members, SAA represents professional archaeologists in colleges and universities, museums, government agencies, and the private sector. SAA has members throughout the United States and Canada as well as many other nations around the world. SAA’s 2015 most recent needs assessment survey, conducted in 2015, indicates that 25 percent of our members are employed in the private HRM sector and another 16 percent are employed as federal, state, or tribal archaeologists. Despite the increasing prevalence of heritage resource management as the career path for professional archaeologists, traditional academic programs are not tailored to meet the needs of these HPM professionals.

The HRM Program at SFU thus fills an important niche in the education of archaeologists, providing necessary instruction in leadership, community engagement, strategic and critical thinking, and project management. The Law and Policy, Practice and Ethics, Business Management, and Research Design and Methods courses offered provide students with an in-depth education of the most important topics facing HRM professionals—courses that are not offered in traditional archaeology graduate programs. The required Master’s thesis is another critical component of the HRM Program. It requires students to demonstrate their proficiency in both research and writing. Furthermore, a thesis-based Masters degree is the required degree to hold HRM archaeology permits or licenses in many Canadian jurisdictions. The SFU MA also satisfies the U.S. Secretary of the Interior’s guidelines for supervising HRM projects on federal lands in the United States. Furthermore, SFU graduates who write a thesis as part of their program will be eligible upon graduation to become Registered Professional Archaeologists (RPA) as well as to obtain professional standing in the Institute of Archaeology (IFA). In short, SFU graduates of the MA HRM program will have all the tools necessary to craft successful careers in the diverse and dynamic HRM industry.
August 6, 2018
Welch, page 2

On a personal note, I owned an HRM consulting firm for 30 years (Alpine Archaeological Consultants, Inc., founded in 1987). Alpine found it challenging to hire a sufficient number of professional archaeologists with Master’s degrees. It was also extremely difficult for our staff with Bachelor’s degrees to complete a Master’s degree while living in rural Colorado. The few who were able to do so without leaving our employ completed their education through the University of Leicester. Had the HRM Program at SFU been in place, we would have certainly encouraged our employees to enroll there.

Sincerely,

[Signature]

Susan M. Chandler, Register of Professional Archaeologists #11282
President, Society for American Archaeology
August 22, 2018

Dr. John R. Welch, Professor and Director
Professional Graduate Program in Heritage Resource Management
Simon Fraser University
Department of Archaeology
Burnaby, BC, Canada
V5A 1S6

RE: Heritage Resource Management Program Proposal

Dear John;

It is my pleasure as the director of the Stó:lō Research and Resource Management Centre to endorse the SFU Department of Archaeology's Full Program Plan (FPP) for the Heritage Resource Management (HRM) Program. Our Centre is dedicated to the conservation-focused management of the Lower Fraser River Watershed and adjacent areas, a mission that requires attention to diverse land and resource stewardship issues and concerns, including heritage resource management. It has been exciting to participate in discussions since 2015 regarding the planning and implementation of the HRM Program, and it is gratifying to learn that the program is to be considered for continuing status. We give our full support for the program.

The HRM Program serves a perpetually underserved audience of junior archaeologists and HRM practitioners and has already been successful in boosting professionalism in heritage management. The program curriculum’s focus on policy and ethics, as well as management and research, is particularly appropriate for and attractive to Indigenous archaeologists and those who work for and with Native communities. Systematic training for archaeologists and heritage managers in the international and practical contexts of HRM will benefit the archaeology, employers, governments, and Native communities. As per our various discussions, the Centre intends to facilitate the enrollment of at least two members of our staff in the HRM Program in the next three years.

With all best wishes for success with the Full Program Proposal,

Dr. David Schaepe, Director
Stó:lō Research and Resource Management Centre
August 22, 2018

John R. Welch, Registered Professional Archaeologist 10227  
Professor and Director, Professional Graduate Program in Heritage Resource Management  
Department of Archaeology and School of Resource and Environmental Management  
Simon Fraser University  
Burnaby, Unceded Coast Salish Territory, BC, Canada V5A 1S6

Dear Dr. Welch,

I am writing to state my support for the Department of Archaeology and School of Resource and Environmental Management’s submission of a Full Program Plan for the Heritage Resource Management (HRM) Program at Simon Fraser University. As an archaeologist who has practiced cultural resource management (CRM) in the United States since 2002, I can honestly say this is the sort of program that is sorely needed in North America.

As an undergraduate, HRM and/or CRM were never mentioned in any of my anthropology classes. I had no idea how to get a job in archaeology or how American archaeology was practiced outside academia when I graduated. It was not until I started a Master’s program that I learned about the world of CRM. While my Master’s program provided opportunities for graduate students to work on CRM projects, there was little discussion of business practices or the mechanics of the industry. I earned a Master’s but was not prepared for the industry. I completed my Master’s in 2005 and, after months of interviewing and applying, landed my first CRM position in Seattle. My first few years in the industry were spend struggling to complete fieldwork within tight budgets while also doing quality work and adhering to state and national historic preservation regulations. The learning curve was steep as, at the time, the only way to learn how to do CRM was by doing CRM. Sadly, this is the way it has been in CRM since its inception.

Simon Fraser’s HRM Program is what the industry needs to train tomorrow’s CRM archaeologists. It also comes at the perfect time. In the United States, historic and environmental preservation regulations are under attack. Part of the argument against preservation is its cost. Project proponents feel like compliance work is too expensive. At the same time, indigenous and descendant groups are advocating for the preservation of their heritage, and local communities are doing what they can to foster heritage-related industries. The tension between developers, government agencies, and communities is strained all the more when CRM companies are unable to hire new employees who understand regulatory contexts and market forces while also adhering to archaeological codes of ethics.
After reviewing HRM Program curriculum, the instructors' professional backgrounds, and speaking with other cultural resource management professionals not affiliated with Simon Fraser, I can see that this program is one of the best able to train the cultural resource management archaeologists needed to do the complicated work our communities deserve. The program is designed to cover the regulatory and business fundamentals necessary to manage cultural resources archaeology projects. The program courses also introduce students to collaboration with descendant communities in ethical, pragmatic ways. Program graduates will meet the qualifications to become Registered Professional Archaeologists upon completion, which is a valuable asset to those who go on to continue their careers in HRM/CRM. Most importantly, the program is largely online and accepts students from the United States, which makes it more accessible to a wider range of individuals including non-traditional or professional students who may not be able to attend courses in a traditional program.

The HRM Program at Simon Fraser has been in operation for only a short time but I believe it is landmark. It has the potential to influence programs at other universities in the United States and Canada. The Program's structure and content were designed to meet the needs of the HRM/CRM industry and communities in which CRMers practice. This is the program I wish had existed when I was a Master's student.

Again, I highly support the Full Program Plan for the HRM Program at Simon Fraser University. Please, feel free to contact me at (206) 501-6667 (wawhite@berkeley.edu) if you have any questions.

Sincerely,

William A. White, III
RPA Number 15769
Assistant Professor
Department of Anthropology
University of California, Berkeley
John R. Welch, PhD, Registered Professional Archaeologist 10227
Professor & Director of the Professional Master's Program in Heritage Resource Management
Department of Archaeology & School of Resource and Environmental Management
Simon Fraser University welch@sfu.ca - http://www.sfu.ca/rem/people/profiles/welch.html

EDUCATION
1996 Ph.D. Anthropology, University of Arizona, Tucson, U.S.
1985 M.A. Anthropology, University of Arizona, Tucson, U.S.
1983 A.B. Anthropology (Honors), Spanish, Hamilton College, Clinton, New York, U.S.

CURRENT COURSE PORTFOLIO
HRM Law & Policy
Cultural Heritage Management
Social Science of Resource Management
Environmental Law in Indian Country

CURRENT EMPLOYMENT
April 2005–Current Professor & Director of the Professional Graduate Program in Heritage Resource Management, jointly appointed in the Department of Archaeology and School of Resource and Environmental Management, Simon Fraser University

RECENT FUNDING FOR RESEARCH & SCHOLARLY PURSUITS (Since 2014)


Curriculum Vitae

John R. Welch, RPA

5. **Grant: Publication Grant Awarded:** 2016  **Period:** 2016–2017  
**Project Title:** Digital Publication of the SFU Archaeology Press Catalogue  
**Funding:** SFU Scholarly Digitization Fund  
**Total:** $4960  
**Involvement:** Principal Investigator  
**Collaboration:** Facilitate creation of a comprehensive online compendium of the 31 books published by SFU Archaeology Press.

6. **Grant: Research Grant**  
**Period:** 2016  
**Project Title:** ‘Ground Truthing’ of Ancestral Pueblo Settlement of the Southern and Western Flanks of Arizona’s White Mountains, White Mountain Apache Tribe Lands, Arizona.  
**Funding:** Arizona Archaeological and Historical Society  
**Total:** $500  
**Involvement:** Project Director  
**Collaboration:** I led seven colleagues on a mobile symposium to visit and boost documentation for 16 Ancestral Pueblo villages.

7. **Contract: Professional Consulting Services**  
**Period:** 2016  
**Project Title:** San Carlos Apache Strike Team  
**Funding:** San Carlos Apache Tribe, Arizona  
**Total:** $19,650  
**Involvement:** Cultural heritage consultant  
**Collaboration:** I supported the Apache Strike Team’s opposition to the Proposed Resolution Copper Mine by conducting historical research and preparing strategic assessments of documents and plans prepared by the mining company, U.S. Forest Service, and their consultants.

8. **Contract/Grant: Research and Exhibition / Outreach**  
**Period:** 2015–2016  
**Project Title:** Scowlitz Virtual Museum Companion Project  
**Funding:** SFU Community Engagement Fund  
**Total:** $10,000  
**Involvement:** Co-Principal Investigator  
**Collaboration:** I support Kate Hennessy (SFU SIAT) and David Schaepe in developing and installing twin exhibits—in the SFU Museum of Archaeology and Ethnology and the Sto:lo Research and Resource Management Centre—to expand the reach of the Virtual Museum of Canada website dedicated to the Scowlitz ancestral village site.

9. **Contract/Grant: Professional Consulting Services**  
**Period:** 2015–2016  
**Project Title:** A Cultural Heritage Program for the San Carlos Apache  
**Funding:** Resolution Copper Mining Corporation, Arizona  
**Total:** $10,578  
**Involvement:** Cultural heritage consultant  
**Collaboration:** I supported Statistical Research Inc. Foundation and Apache colleagues in creating a values-based program to protect and perpetuate Apache cultural heritage in the face of changing social, economic and biophysical environments.

10. **Grant: Curriculum Development Research**  
**Period:** 2015–2016  
**Project Title:** Assessment of a Required Graduate Course, *Social Science of Resource Management: Theories of Cooperation* (REM 601)  
**Funding:** SFU Teaching and Learning Center  
**Total:** $5000  
**Involvement:** Project Director  
**Collaboration:** I worked with Soudeh Jamshidian and other SFU colleagues to survey students and refine REM 601, the social science core course in the Master’s of Resource Management (MRM) program.

11. **Grant: Curriculum and Credential Development**  
**Period:** 2015–2016  
**Project Title:** A Professional Online MA Program in Heritage Resource Management (HRM)  
**Funding:** SFU Professional Online Scholarship and Training (POST) grant  
**Total:** $100,000  
**Involvement:** Program Director  
**Collaboration:** I facilitated SFU and HRM industry collaborations to create and deliver a new Master’s program, starting fall 2016.

12. **Grant: Research Grant**  
**Period:** 2015–2017  
**Project Title:** Trails of the Apache  
**Funding:** SSHRC Small Institutional  
**Total:** $6950  
**Involvement:** Principal Investigator  
**Collaboration:** I directed landscape-scale efforts to document ancient Apache activity hubs using least-cost path GIS analyses to identify trails and the residential, agricultural, and foraging localities they connect.
Curriculum Vitae

John R. Welch, RPA

RECENT PEER-REVIEWED CONTRIBUTIONS (Since 2014)


Curriculum Vitae


CURRENT GRADUATE STUDENT SUPERVISION (Committee Chair)

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Project / Thesis</th>
<th>Start–Finish</th>
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<tbody>
<tr>
<td>Campbell, Michael</td>
<td>M.A.</td>
<td>TBA</td>
<td>2017–</td>
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<td>(HRM)</td>
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<td>Johnson, Meghan</td>
<td>M.A.</td>
<td>Replication of a Clovis Stone Tool Cache</td>
<td>2017–</td>
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<td>(HRM)</td>
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<td>McKillops, Vanessa</td>
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<td>Modeling Pleistocene-Holocene Coastal Occupation of the Nova Scotia Coast</td>
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<td>(HRM)</td>
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<td>Owens, Camille</td>
<td>M.A.</td>
<td>Engaging Public Archaeology Protocols in the Interpretation of Museum Collections</td>
<td>2017–</td>
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<td>(HRM)</td>
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<td>Pitul, Michael</td>
<td>M.A.</td>
<td>A Policy Framework for Underwater Archaeology in Ontario</td>
<td>2017–</td>
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<td>(HRM)</td>
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<td>O’Neil, Casey</td>
<td>M.A.</td>
<td>Policy and Practice Recommendations for Chance Finds Management in British Columbia</td>
<td>2016–</td>
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<td></td>
<td>(HRM)</td>
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<td>Gauer, Viviane</td>
<td>M.R.M.</td>
<td>Climate Change Adaptation Planning if Two Native-Owned Conservation Organizations</td>
<td>2016–</td>
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<td>Huck, Michael</td>
<td>M.R.M.</td>
<td>Community-Based Climate Change Adaptation Planning in Limberly, B.C.</td>
<td>2015–</td>
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<td>Hogg, Erin</td>
<td>Ph.D.</td>
<td>Archaeological Contributions to Land Claims</td>
<td>2014–</td>
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<td>Jamshidian, Soudeh</td>
<td>Ph.D.</td>
<td>Effects of Top-Down Environmental Management in Post-Conflict Settings</td>
<td>2007–</td>
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<td>Aaron Naumann</td>
<td>Ph.D.</td>
<td>University of Washington / Indigenous Archaeology Revisited</td>
<td>2016–</td>
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CURRENT SERVICE RELEVANT TO HRM

2017–2019 Registrar, Register of Professional Archaeologists
2015–2019 Member, Editorial Board, Advances in Archaeological Practice
2014–2018 Co-Chair, Amity Pueblo Task Force, Society for American Archaeology
2007–2018 Member and Board Secretary, Fort Apache Heritage Foundation Board of Directors

Update: July 17, 2018
GEORGE P. NICHOLAS, PH.D.
Professor and Chair, Department of Archaeology, Simon Fraser University
Director, Intellectual Property Issues in Cultural Heritage (IPinCH) Project
Web: http://www.sfu.ca/archaeology/dept/fac_bio/nicholas/index.htm
IPinCH Project: http://www.sfu.ca/IPinCulturalHeritage

Education
1990 PhD, University of Massachusetts-Amherst.
1979 MA, University of Missouri-Columbia.
1975 BA. (Magna cum laude with Honors in Anthropology), Franklin Pierce College, Rindge, NH.

Current Service
2017–2020 Chair, Department of Archaeology, SFU
2008–2016 Director, Intellectual Property Issues in Cultural Heritage (IPinCH) Project
2015– Chair, Repatriation Committee, Department of Archaeology, Simon Fraser University
2016–2019 Chair, Committee on Native American Relations, Society for American Archaeology

Grants
2017 (and J. Driver). SFU Teaching and Learning Development Program grant for “Assessing the Need for Professional Training Modules for Archaeology Students.” ($6,000).
2015 SSHRC Connections Grant for “DNA and Indigeneity: Exploring the (Re)-Construction of Identity at the Interface of Biology and Culture.” ($20,410).

Publications (Selected Since 2014)

Books/Special Publications

Book Chapters


**Journal Articles**


**Declarations**


**Short Articles, Essays, Encyclopedia Entries, and Blogs**


2018 "It’s taken thousands of years, but Western science is finally catching up to Traditional Knowledge." *The Conversation*. [https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291](https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291)

2017 "Threats to Bear Ears and other Indigenous sacred sites are a violation of human rights. *The


Videos and Video Interviews


2014 “Why Heritage is Not Just About Things.” TEDx Yellowknife, in conjunction with Itaa Yati Traditional Knowledge Symposium. Yellowknife, NWT. https://www.youtube.com/watch?v=HbPLXTJwVMY&list=PLjMPDThr8hYk3cIX-Xa00FR3uAde6VnK6

2014 Scientific Reasoning, and Intangible Heritage Protection.” Itaa Yati Traditional Knowledge Symposium. Yellowknife, NWT. https://www.youtube.com/channel/U CfDRl9a9E0QmpYMPg1jH2_vw

Current Graduate Students Supervised
Chelsea Meloche (Ph.D.). “What Happens After Repatriation?”


Josh Fontaine (MA) “Archaeological Evidence of Changing Land-Use Patterns and Environmental Degradation on the Salmon River, British Columbia.”


Christopher D. Dore, PhD, Registered Professional Archaeologist 10331
Adjunct Professor of Archaeology
Department of Archaeology
Simon Fraser University  c.dore@sfu.ca

EDUCATION
2007 M.B.A. Business Administration, University of Arizona, Tucson, U.S.
1996 Ph.D. Anthropology, University of New Mexico, Albuquerque, U.S.
1982 B.A. Anthropology, Washington State University, Pullman, U.S.

CURRENT COURSE PORTFOLIO
HRM Business and Management

CURRENT EMPLOYMENT
2013–Current Consultant, Heritage Business International, L3C
2016–Current Adjunct Professor, Department of Archaeology, Simon Fraser University.
2004–Current Adjunct Professor, School of Anthropology, University of Arizona.

RECENT FUNDING FOR RESEARCH & SCHOLARLY PURSUITS (Since 2014)
None

RECENT PEER-REVIEWED CONTRIBUTIONS (Since 2014)

CURRENT GRADUATE STUDENT SUPERVISION (Committee Chair)
None

SERVICE RELEVANT TO HRM (Since 2014)
2016–2019 President/President-elect, Register of Professional Archaeologists. Baltimore, MD, U.S.
Curriculum Vitae


2014–2016 Treasurer, Archaeology Southwest, Tucson, AZ., U.S.

AWARDS (Since 2014)

2014 Asa T. Hill Memorial Award for outstanding contributions to Plains archaeology, Nebraska State Historical Society, Lincoln, NE., U.S.
David Maxwell, Ph.D.

Lecturer, Department of Archaeology, Simon Fraser University

EDUCATION

1989  Master of Arts, Archaeology, July 1989, Simon Fraser University, Burnaby, British Columbia.
1986  Bachelor of Arts, Archaeology, June 1986, Simon Fraser University, Burnaby, British Columbia.

CURRENT COURSE PORTFOLIO

Ancient Peoples and Places
Reconstructing the Human Past
Prehistory of Religion
Archaeology of the New World
Cultural Heritage Management
Maya Archaeology
Archaeological Resource Management
Research Design in Heritage Resource Management

CURRENT EMPLOYMENT

September 2017 – present: Lecturer, Department of Archaeology, Simon Fraser University, Burnaby, BC
September 2013 – August 2017: Limited-Term Lecturer, Department of Archaeology, Simon Fraser University, Burnaby, BC
May 2016 – April 2017: Instructor, Fraser International College, Burnaby, BC

RECENT FUNDING FOR RESEARCH AND SCHOLARLY PURSUITS

2018  GRANT: COURSE DEVELOPMENT GRANT  PERIOD: 2018-2019  PROJECT TITLE: Drowning in Garbage? Archaeology, Solid Waste, and Recycling at SFU  FUNDING: Teaching & Learning Development Grant  TOTAL: $6,000  INVOLVEMENT: Project Director  COLLABORATION: I will oversee the development of a new lab-based undergraduate course in archaeology, designed to study the effects and effectiveness of recycling and waste disposal practices at Simon Fraser University.
REVIEWED PUBLICATIONS (SINCE 2014)


MEMORANDUM

ATTENTION: Senate

FROM: Peter Keller, Vice-President, Academic and Provost, and Chair, SCUP

RE: Full Program Proposal for the Graduate Certificate in Heritage Resource Management (SCUP 18-27)

DATE: October 17, 2018

At its October 10, 2018 meeting, SCUP reviewed and approved the full program proposal for the Graduate Certificate in Heritage Resource Management within the Faculty of Environment, effective Fall 2019.

Motion:

That Senate approve and recommend to the Board of Governors the full program proposal for the Graduate Certificate in Heritage Resource Management within the Faculty of Environment, effective Fall 2019.

c: J. Driver
MEMORANDUM

ATTENTION: Senate Committee on University Priorities (SCUP)

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

RE: Full Program Proposal for a Graduate Certificate in Heritage Resource Management

DATE: September 24, 2018

For approval:

At its meeting of September 11, 2018, SGSC approved full program proposal for a Graduate Certificate in Heritage Resource Management and is recommending it to SCUP for approval, effective Fall 2019.

Motion:
That SCUP approve and recommend to Senate the full program proposal for a Graduate Certificate in Heritage Resource Management within the Faculty of Environment.
To: Dr. Jeff Derksen, Dean of Graduate Studies / Chair of SGSC

From: Dr. Dongya Yang, Associate Dean / Chair, Faculty of Environment Graduate Studies Committee

cc: Dr. John Welch, Director, HRM Professional Graduate Program
    Dr. Jon Driver, Graduate Chair of Archaeology

Date: Sept. 4, 2018

Re: Full Program Proposal for the Heritage Resources Management (HRM) Master’s Program
    Full Program Proposal for the Heritage Resources Management (HRM) Graduate Certificate Program

The Faculty of Environment Graduate Studies Committee has approved the full program proposal for the Heritage Resources Management (HRM) Master’s program and the full program proposal for the Heritage Resources Management (HRM) graduate certificate program from the Department of Archaeology. Please add them onto the agenda of the upcoming SGSC meeting.

Feel free to contact should you have any questions or concerns.

Dongya Yang, Ph.D.
Associate Dean, Research and Graduate Studies
Professor of Bioarchaeology
TO: Prof. Dongya Yang, Associate Dean, Faculty of Environment
FROM: JR Welch, Director, HRM Professional Graduate Program
SUBJECT: Full Program Proposal for the HRM Masters
DATE: 22 August 2018

On behalf of the Department of Archaeology I am pleased to submit the full program proposal (FPP) for the Masters in Heritage Resource Management for review and comment or approval by the FENV Graduate Committee.

The Archaeology Department Faculty intends to commence delivery of the Professional Graduate Program in Heritage Resource Management pursuant to the attached FPP, the FPP for the HRM Graduate Certificate, and the attached budget in Fall 2019.

I am on study leave for Fall 2018, but have agreed to remain the principal point of contact for the FPP review process. Contact me via welch@sfu.ca or my mobile (520-991-1739) with any questions or concerns. If I am not available to respond effectively or to participate personally, the Archaeology Graduate Chair, Prof. Driver, will do so.
Graduate Certificate in Heritage Resource Management

Full Program Proposal

August 23, 2018
Department of Archaeology
Executive Summary

The SFU Department of Archaeology is proposing the Graduate Certificate in Heritage Resource Management in tandem with, and as the coursework-only subsidiary to, the Master of Arts in Heritage Resource Management. The professional graduate program in heritage resource management (HRM program), which consists of the Master of Arts in Heritage Resource Management (HRM-MA) and the Graduate Certificate in Heritage Resource Management (HRM-GC), takes a global perspective on consequential issues related to material heritage. Most national governments have developed legislation and regulatory policy protecting heritage, defining what is to be preserved, and what forsaken, in the course of community and economic development. These questions and related matters of public policy, business, research, and professional practice, drive the dynamic field of heritage resource management, which today employs at least 90 percent of all archaeologists in North America. SFU Archaeology has been offering the HRM-MA and the HRM-GC as the professional online graduate program in HRM via cohort special arrangements since Fall 2016. Program graduates are prepared to lead government, community, and industry decision making regarding the disposition of cultural heritage imperiled by land alteration and resource extraction.

The HRM-MA and HRM-GC share a developmental history at SFU and the four courses for the HRM program have been designed specifically to meet the interests of the target audience of practicing HRM professionals. These four core courses—in HRM law and policy, ethics and professional practice, business management, and research design and methods—are available exclusively to HRM program students. The HRM-GC complements and adds value and dimension to the HRM-MA by providing a point of entry into the HRM-MA for students who are hesitant to commit to the rigors of a thesis-based graduate program. All four students who have enrolled in the HRM-GC have sought entry into the HRM-MA (one was not successful).

PART A

Proposed credential to be awarded

Graduate Certificate in Heritage Resource Management.

Location of program

Department of Archaeology, SFU Burnaby Campus (and via online instruction)

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1 Heritage Resource Management, Cultural Resource Management, Cultural Heritage Management, and Archaeological Resource Management are often used interchangeably, albeit the first two incorporate allied fields of architecture, museum studies, object conservation, and heritage tourism. The proposed program responds to personnel demands from an industry with a largely archaeological focus. We title this program Heritage Resource Management, however, for its inclusive values, especially respect for descendant communities whose pasts are often disproportionately researched and impacted.
Academic unit(s) offering proposed program
Department of Archaeology in the Faculty of Environment

Anticipated program start date
Fall 2019

Anticipated completion time
Two terms

Summary of proposed program

a) Aims, goals and/or objectives of the proposed program

The Graduate Certificate in Heritage Resource Management (HRM-GC) exists to provide practice-proven, Bachelor's-level HRM practitioners with opportunities to obtain knowledge, skills, and perspectives required to advance both their individual careers and HRM policies, practices, and enterprises. The HRM-GC features state-of-the-art online coursework designed to meet strategic objectives at societal, institutional, departmental, and disciplinary scales. On the societal level—in Canada and around the world—HRM leaders trained to work at the interface of government, industry, community, and research are needed to support good decisions regarding the disposition of cultural heritage imperiled by land alteration, resource extraction, and climate change. As Canada's engaged university, and as host for one of Canada's top archaeological programs, SFU is ideally positioned to mobilize existing assets to meet demands from the HRM industry for highly qualified personnel. SFU and its HRM program faculty and graduates are also well prepared to embrace invitations from Indigenous and other local communities for better and more broadly informed cultural heritage research and conservation.

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

The HRM program, which consists of the HRM-GC and the HRM-MA, assists in the realization of the SFU Strategic Vision, and the Faculty of Environment Academic Plan (June 2018 draft) by engaging communities of students, researchers, regulators, industry representatives, and local heritage stewards. The first two HRM program cohorts have been integral in expanding the program's community, industry, and government networks, and in creating a rich and collegial learning environment. In accord with the SFU Aboriginal Strategic Plan (2013–2018), the HRM program's structure, content, and personnel are dedicated to creating modes of HRM practice that are both informed by Indigenous values and preferences, and dedicated to serving Indigenous peoples' interests in learning from, making appropriate use of, and perpetuating cultural heritage places, objects, and traditions.
SFU Archaeology identifies “First Nations Heritage and Resource Management” as one of three areas of “concentrated expertise.” The department has dedicated the last two decades to crafting partnerships, training students, and customizing research to engage with the communities whose ancestors most archaeologists study. The HRM program builds on and extends this success by embracing community values centered on respect, by actively recruiting Indigenous and international students, and by featuring professional ethics and community collaboration issues in the required coursework.

c) Potential sectors of employment for graduates and opportunities for further study.
HRM-GC graduates, all of whom are already working professionals, expand the geographical and managerial range of their employability in archaeology, environmental resource management, construction and compliance support services, museums, and government regulatory and planning offices at regional, provincial, and federal levels. Those who distinguish themselves in the first term of coursework in the HRM-GC are able to transfer to the HRM-MA, complete the final two courses, and commence thesis research with no additional coursework requirements. The HRM-GC also prepares students for graduate studies in applied archaeology, applied anthropology, and HRM at other universities.

d) Delivery methods
The HRM-GC coursework is delivered online, asynchronously via the Canvas learning management system with two exceptions (1) the on-campus orientation during the first week of fall term classes, (2) weekly ‘virtual meetings’ held during the teaching terms. The three-day on-campus orientation sets the tone and pace for high-quality collegial communications within the cohort and among faculty, candidates, and industry, community, and government partners. The coursework focus on Canada and the United States facilitates cross-border comparisons, professional integration, and opportunities for international practice. The program’s state-of-the-art online learning environments are supported by dedicated specialists and customized learning tools, including a program-specific glossary and the use of Blackboard Collaborate to engage industry specialists in coursework and thesis research.

e) Related programs in the institution or other British Columbia post-secondary institutions.
To our knowledge, the HRM-GC is the only graduate certificate (or comparable) program that provides online coursework tailored to enable career advancement for junior HRM professionals. There are no similar programs on offer in British Columbia.

Contact information
Professor John R. Welch, HRM Program Director, 778-782-6726, welch@sfu.ca

Full Program Proposal, Graduate Certificate in Heritage Resource Management
PART B

PROGRAM DETAILS

a) Graduation requirements, target audience

The target audience for the Graduate Certificate in Heritage Resource Management (HRM-GC) is junior level HRM practitioners, especially Bachelor's-level archaeological crew chiefs and project managers who have made career commitments to HRM and require additional credentials to optimize their potential for advancement in the field.

Program requirements conform to GGR 1.7 in the Graduate General Regulations: http://www.sfu.ca/students/calendar/fees-and-regulations/grad-regulation.html. The HRM-GC consists of a cohort orientation on the Burnaby campus and four required courses, for a total of 20 units. No internship or practicum is required. Students who receive the HRM-GC and wish to then enter either of SFU Archaeology's master's programs—HRM or traditional—will receive 10 units of advance credit for their HRM-GC coursework. To complete the HRM-MA, these students must then complete 10 additional units of graduate coursework and a thesis, for a minimum of 38 units. The additional units will include ARCH 591, or comparable course work, as approved by the HRM director. HRM-GC students are eligible to transfer into the HRM-MA prior to the completion of the HRM-GC coursework with no additional course requirements.

All HRM-GC students must complete the following—

ARCH 531 - HRM Law and Policy (5):
This course features weekly online content, weekly readings, and three instructor-evaluated weekly assignments—a reading comprehension quiz, a peer discussion, and a writing exercise.

ARCH 541 - HRM Professional Practice and Ethics (5):
This course features weekly readings, weekly blogging and peer-commentary assignments, and instructor-evaluated weekly written commentaries, as well as a multi-media response to a ‘grand challenge’ in the field of HRM.

ARCH 551 - HRM Business Management (5):
This course requires students to understand and solve weekly problem sets in business management grounded in HRM case studies. The final assignment requires students to gather and analyse data as the basis for a formal proposal for a management innovation in an operating HRM business.

ARCH 561 - HRM Archaeological Research Design and Methods (5)
Online lectures built around the challenges and opportunities presented by field research and laboratory and data analyses inspire students to examine and refine their full thesis proposals for presentation to their thesis supervisors.
b) Admission requirements

Admission requirements conform to GGR 1.3 in the Graduate General Regulations: http://www.sfu.ca/students/calendar/fees-and-regulations/grad-regulation.html. Applications that meet or exceed the following requirements will be considered:

1. A Bachelor’s degree in anthropology, archaeology, museum studies, planning, or a related field; and
2. A cumulative undergraduate GPA of at least 2.5; and
3. Professional experience working in heritage resource management or a related field, including at least some experience in lab work, field work, planning and consultation, and project and budget management. 1-2 years of professional employment are recommended.

c) Evidence of student interest and labour market demand

The best and most relevant data regarding student interest is the fact that the HRM program has, in three years, attracted more than 30 applications and has registered 22 students. Four of the 22 applicants have applied for the HRM-GC; 18 for the HRM-MA.

Regarding labour demand, significant recent growth in the market for master’s-level HRM practitioners is paralleling continental-scale surges in mineral and energy extraction and transport industries. Program graduates are positioned for upward mobility (1) in their current work environments as consulting archaeologists and staff members for government museums and regulatory agencies and (2) through lateral moves into HRM sectors in understaffed geographical areas (especially Africa and Asia) and organizational forms (especially non-profits and Indigenous governmental and nongovernmental entities). Both HRM-GC and HRM-MA students take advantage of the many opportunities embedded in the HRM program orientation, coursework, and communications to expand their professional networks, refine their understanding of HRM’s politico-legal contexts, ethical parameters, practical discretion, business management tools and principles, and research mandates.

d) Eligibility for scholarships, awards, and financial aid

Students in SFU’s professional graduate programs are not eligible for Canada Student Loans/Grants. Neither are the HRM-GC and HRM-MA students eligible for SFU bursaries through SFU Financial Aid or for awards funded from the university’s operating budget (e.g., entrance scholarships, graduate fellowships). HRM-GC candidates interested in transferring to the HRM-MA will be encouraged to apply for funding through SFU Teaching Assistantships, SFU Endowed/Private Awards, Tricouncil Master’s Scholarships, and Mitacs Accelerate Research Internships. Between 2019 and 2022, and contingent on final funding approval from Mitacs, several Mitacs Accelerate research internships will be available to HRM-MA candidates. The Mitacs interns will receive up to $15,000 in stipend and research funding to work with Nlaka'pamux Nation Tribal Council and Teck Highland Valley Copper Operations representatives.
RESOURCES

a) Enrolment Plan

The HRM program’s three application cycles have attracted more than 30 applications and enrolled 22 students. Four of these 22 students have entered the HRM program as graduate certificate candidates. Of these four, one student has completed the HRM-GC and three have transferred into the HRM-MA. In many provincial (Canada) and state (USA) regulations a master’s degree with thesis is the minimum requirement for supervision of heritage projects involving archaeological excavation. It is also a minimum requirement for registration as a professional archaeologist (Register of Professional Archaeologists [RPA]), the emerging professional qualifications standard in the United States and internationally.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments

Simon Fraser University is a well-established institution with excellent library and IT support. SFU also has a long history of providing distance education, and the well-staffed Centre for Online and Distance Education has proved an able and dedicated partner in the development of the HRM program’s unique online teaching and learning environments. SFU’s Teaching and Learning Centre has also supported the HRM program director and instructors in the innovation of context-appropriate HRM pedagogy and evidence-based research. No additional Library nor IT resources are required to run the proposed program. The Department of Archaeology has 19 faculty members. Most have already taken on supervision of HRM student theses and are willing to continue to do so. If necessary, HRM students will have ready access to department equipment, research collections, and laboratory space. Although no new faculty or other resources are required to implement the HRM-MA, SFU Archaeology has recognized the importance of the HRM field to both undergraduate and graduate programs and has identified an HRM archaeologist as a top hiring priority in the Faculty Renewal Plan. Resources generated from the program will support the hiring of part-time staff. Should the program grow we anticipate being able to hire a professor of professional practice.

There is no specific plan for the HRM program to affect the Archaeology Department’s “traditional” MA program. The HRM program serves a different set of potential students who are seeking advanced education relevant to their profession. This represents a response by the department to the changing needs of archaeologists in North America.

The only long-term impact on faculty resources is the commitment to provide the program director with a one course release from teaching.
c) Faculty member’s teaching/supervision

The HRM-GC’s four core courses are delivered by two full professors (Nicholas and Welch), a senior lecturer (Maxwell), and an adjunct (Dore):

<table>
<thead>
<tr>
<th>Faculty, Title</th>
<th>Specialty</th>
<th>Roles</th>
<th>Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Dore, Adjunct Professor</td>
<td>HRM Business Management</td>
<td>Instructor for ARCH 551</td>
<td>~10% (no thesis supervision)</td>
</tr>
<tr>
<td>D. Maxwell, Senior Lecturer</td>
<td>Zooarchaeology</td>
<td>Instructor for ARCH 561</td>
<td>~10% (no thesis supervision)</td>
</tr>
<tr>
<td>G. Nicholas, Professor</td>
<td>Indigenous &amp; wetlands archaeology</td>
<td>Instructor for ARCH 541, Thesis supervision</td>
<td>~20% (3 MA candidates in progress)</td>
</tr>
<tr>
<td>J. Welch, Professor and Program Director</td>
<td>Heritage Resource Management</td>
<td>Program direction, Thesis supervision, Instructor for ARCH 531</td>
<td>~45% (5 MA candidates in progress)</td>
</tr>
</tbody>
</table>

With the exception of Dr. Dore, who is adjunct and is compensated for his contributions to the HRM program on an annual contractual basis, the substantial investments required to create and deliver the HRM program through its first two full years have required faculty with requisite specializations to contribute in ways that exceed normal teaching-service workloads. Once the program moves out of the “Special Arrangements” format the workload will become part of the assigned teaching for faculty members.

Faculty involvement in the HRM program is otherwise having no appreciable effect on SFU faculty responsibilities in other programs. Appendix 5 provides the abbreviated CVs for the four faculty members currently serving as course instructors.

d) Proposed tuition and other program fees including a justification

The tuition for the HRM-GC continue to be charged on a per credit unit basis. The proposed 2019/2020 tuition is $726.93 per unit, or $3634.65 for each of the four, 5-unit courses.

Note (1) applications for the HRM-GC have varied (4 in 2017/18 and 0 in 2019/20); (2) all of those enrolled in the HRM-GC have sought to transfer entry into the HRM-MA; (3) HRM-GC revenues and costs are thus inextricably embedded in the budget for the HRM-MA. Any HRM program revenues in excess of the costs of HRM program delivery will be used in support of Department of Archaeology research and teaching infrastructures.

PART C: Appendices

Appendix 1 Calendar entry
Appendix 2 New courses

Not applicable. The four required courses have received prior approval.

Appendix 3 Letters of support

See attached statements from non-SFU commentators, each and all of which offer support for the institutionalization of the HRM program. The letters in Appendix 3 include statements from Society for American Archaeology President Susan Chandler, PhD; Register of Professional Archaeologists President Christopher Dore, PhD; Alberta Archaeological Survey Manager Darryl Bereziuk; University of Maryland curriculum consultant Carol Ellick; and Golder Associates Principal Andrew Mason; American Cultural Resources Association President Kim Redman; and University of California Berkeley Assistant Professor William White. Statements have been invited from the BC Association of Professional Consulting Archaeologists President and from the BC Provincial Archaeology Branch Manager Paula Thorogood.

Appendix 4 Abbreviated curriculum vitae for non-SFU faculty

See attached abbreviated standardized CVs from each of the four course instructors (Welch, Nicholas, Dore, Maxwell), summarizing their positions, credentials, research interests, and recent publications, grants and graduate supervision.
Heritage Resource Management

GRADUATE CERTIFICATE

Description of Program
The graduate certificate in heritage resource management (HRM) is a professional graduate program that prepares HRM archaeologists to integrate ethical, legal, business, and research priorities in pursuit of desired futures for treasured legacies from diverse pasts. The program consists of an orientation on the Burnaby campus and four online courses that provide intensive preparation in the essential dimensions of HRM archaeology:

- law and policy
- ethics and practice
- business management
- research design and methods

For further information, visit [www.sfu.ca/archaeology/hrm.html](http://www.sfu.ca/archaeology/hrm.html)

Admission Requirements
Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar. Applications to the program will be accepted from candidates who:

- Hold a bachelor’s degree (or equivalent) in anthropology, archaeology, museum studies, planning, or a related field;
- Obtained a cumulative undergraduate GPA of at least 2.5;
- Professional experience working in heritage resource management or a related field, including at least some experience in lab work, field work, planning and consultation, and project and budget management. 1-2 years of professional employment are recommended.

Program Requirements
This program consists of course requirements for a minimum of 20 units.

Students complete all of
ARCH 531 - HRM Law and Policy (5)
ARCH 541 - HRM Professional Practice and Ethics (5)
ARCH 551 - HRM Business Management (5)
ARCH 561 - HRM Archaeological Research Design and Methods (5)

Program Length
Students are expected to complete the program requirements in two terms.

Other Information
The certificate will be awarded to students who participate in the cohort orientation and complete the four required courses within three years of enrollment with a minimum CGPA of 3.0.

Transfer to Master’s Program
Students may transfer from the HRM graduate certificate to the HRM master’s following the completion of ARCH 531 and ARCH 541 with a minimum CGPA of 3.3 and the approval of the HRM program director.
Academic Requirements within the Graduate General Regulations
All graduate students must satisfy the academic requirements that are specified in the [Graduate General Regulations](#), as well as the specific requirements for the program in which they are enrolled.
August 24, 2018

Dr. John Welch
Department of Archaeology and School of Resource and Environmental Management
Simon Fraser University
Burnaby, Unceded Coast Salish Territory, BC, Canada  V5A 1S6

Dear Dr. Welch,

On behalf of the American Cultural Resources Association (ACRA), I am pleased to provide comments on the Simon Fraser University proposed Master Program in Heritage Resource Management. The SEU Master’s and Certificate program goes beyond a traditional advanced degree and highlights real-world topics not covered in traditional programs, but highly valued by employers of HRM professionals.

The field of Cultural Resource Management (or Heritage Resource Management as you prefer) is highly diverse and dynamic. As an industry, we recognize the need for educational programs that prepare potential employees, managers, and owners for the non-technical aspects of our fields. Technical skills, which are the focus in traditional programs and often learned through experience, are highly important. However, technical skills and traditional programs rarely prepare students for the realities of working in a business environment. In the CRM business environment, cultural (or heritage) resources, client needs, regulatory requirements, permit stipulations, and the business itself are forces that guide everyday activity. Traditional Master’s programs prepare students for the technical aspects of our field, but very few programs require students to understand business and how to ethically and properly balance the variety of forces that effect CRM practitioners. The SFU Master’s program is one of very few programs that is bridging the gap between the technical, ethical, and business needs of our industry.

I hope that the SFU program will continue to develop and grow. Further, I hope that I have the opportunity to hire a graduate!

Sincerely,

Kim Redman
President, ACRA
August 13, 2018

To Whom It May Concern:

Subject: Professional Master's in Heritage Resource Management

Please accept this letter which conveys my endorsement of the Professional Master's in Heritage Resource Management program offered by the Department of Archaeology, Faculty of Environment, Simon Fraser University (SFU). This program offers one of few opportunities in North America for students and working professionals to obtain a post-graduate degree that focuses specifically on the field of Cultural Resource Management (CRM). From the perspective of archaeological resource management in Alberta, the availability of such a program is considered both timely and relevant. CRM field programs conducted on behalf of industrial or commercial developers represent more than 90% of the archaeological work undertaken on an annual basis in Alberta. This has led to the development of a multi-million dollar CRM industry that employs hundreds of heritage professionals. Growing cohorts of students choose to pursue careers as professional CRM archaeologists following completion of undergraduate studies. The SFU Heritage Resource Management program provides these students with pertinent instruction in the practical, regulatory, legal and ethical aspects of CRM and places them in good stead to perform with competence in the field. As in many other jurisdictions, Alberta requires practicing archaeologists to have completed a thesis-based, post-graduate degree in archaeology or anthropology. The SFU Master's program fulfills this thesis requirement at high academic standards, most commonly focusing on research topics of direct practical relevance to the conduct of CRM archaeology in Alberta contexts. It is my opinion that the SFU program surpasses in both content and achievement the increasingly popular, short-term Master's degree programs in CRM offered by European institutions. We support SFU's Professional Master's in Heritage Resource Management program because it will contribute to the development of highly-qualified, locally-trained individuals to serve the future needs of Alberta's archaeological resource management programs and initiatives.

Yours truly,

[Signature]

Darryl Bereziuk
Director,
Archaeological Survey of Alberta,
Historic Resources Management Branch
Archaeological and Cultural Education Consultants

August 9, 2018

John R. Welch, Ph.D., RPA
Department of Archaeology and
School of Resource and Environmental Management
Simon-Fraser University
Burnaby, BC, Canada V5A 1S6

Dear John:

Thank you for allowing me the opportunity to write a letter in support of the Heritage Resource Management (HRM) Program becoming a Full Program Plan (FPP) and an ongoing fixture in the SFU calendar.

In 2015, I was hired as a consultant by the University of Maryland’s Department of Anthropology to explore the idea of creating an on-line or hybrid professional track graduate degree program in Cultural and Heritage Resource Management. The initial step was to research current cultural resource management (CRM) and heritage resource management (HRM) programs and to identify knowledge and skills that employers felt was lacking in most new employees. Based on the findings, the Department of Anthropology decided that there was in fact a niche to be filled and we moved forward with the development of a proposal to create a cultural and heritage resource management (CHRM) program.

During our research, we found that the vast majority of CRM or HRM programs were housed on-campus, were aimed at traditional students, and that the curriculums didn’t vary much from a traditional archaeology degree. The programs were based on what the traditional academically trained professors identified as necessary for entering the profession of CRM, as opposed to what the employers actually wanted and needed.

There were very few exceptions to this model and the only university of similar standing to the University of Maryland was SFU. When the information on the SFU HRM program was reviewed during a meeting, some of my academic colleagues got a bit nervous about program development and the potential for meeting the minimum enrollment requirements. One person referred to the SFU program as the “Cadillac” of HRM programs and felt that there was no way we could compete with their standard.

My career started in CRM in 1979. I have worked on countless projects for agencies, CRM firms, and CRM programs housed within academic institutions. I serve on the Board of Directors for the American Cultural Resources Association. There are more than 1,300 CRM and HRM firms in the U.S., employing more than 10,000 individuals and for the most part, those individuals have had to learn the business of CRM on the job.

As a project director, I’ve witnessed the struggle employees have with understanding how what they do fits within the context of a CRM project. It is essential that academic institutions provide those entering CRM and HRM with the knowledge and skills of the profession. SFU’s HRM program does this. Their students graduate with knowledge and skills that satisfy employment needs, professional standards, and will hopefully be able to move the profession forward in North America. By SFU making the HRM Program a Full Program Plan (FPP) and an ongoing fixture in the SFU calendar, you will again set the standard for academic institutions.

Best,

Carol J. Ellick, M.A., RPA
Executive Director
Archaeological and Cultural Education Consultants

P.O. Box 69245 • Tucson, AZ • 85737 • USA • (405) 308-0225 • cje@aceconsultants.com
26 July 2018

Dr. John Welch, Professor and Director
Professional Graduate Program in Heritage Resource Management
Simon Fraser University
Department of Archaeology and School of Resource and Environmental Management
Burnaby, BC, Canada
V5A 1S6

SFU ARCHAEOLOGY - HERITAGE RESOURCE MANAGEMENT PROGRAM

Dear John:

Thank you for sharing your news concerning the SFU Department of Archaeology's intention to submit a Full Program Plan (FPP) for the Heritage Resource Management (HRM) Program. Golder Associates is pleased to offer our support for this initiative.

As you are aware, Golder has benefited directly from the HRM Program through the involvement of Casey O'Neill from our Whitby, Ontario, office. The HRM Program will allow Casey to take the next important step in his career, and he already has shared many insights and learnings from the HRM Program with his colleagues at Golder. I am equally pleased to see a number of archaeologists from government (e.g., BC Oil & Gas Commission) and from Crown Corporations such as BC Hydro participating in the program.

The HRM Program addresses a critical gap in education and will undoubtedly raise the level of professionalism in commercial heritage management circles. This will benefit the discipline of archaeology, practitioners, project proponents, government, and most importantly, descendant communities. Institutionalization of the HRM Program is an important step of which we are fully supportive.

We wish you continued success.

Golder Associates Ltd.

Andrew (Andy) Mason, MA, RPCA
Principal, Cultural Heritage Specialist
24 July 2018

Dr. John R. Welch
Director, Professional Graduate Program in Heritage Resource Management
Simon Fraser University
Burnaby, BC, Canada V5A 1S6

RE: Support for Master of Arts in Heritage Resource Management Full Program Proposal

Dear Dr. Welch:

It is my pleasure to write this letter in support of full program approval for the Master of Arts in Heritage Resource Management. I’m writing this letter as a consultant working for Heritage Business International (HBI), a firm that provides industry data and business support for heritage organizations. I’ve also served as the President of the American Cultural Resources Association and am currently the President of the Register of Professional Archaeologists—positions through which I’ve gained knowledge of applied archaeology and industry economics.

First, it must be recognized that over the last 50 years heritage has been privatized in the Americas and around the world. Today, heritage compliance is a $2 billion (U.S.) dollar industry globally and more than half of that value is represented by Canada and the U.S. Non-compliance archaeological work (traditional grant-funded research) in Canada and the U.S. is valued at only $30 million, or about three percent. The non-compliance sectors of the heritage industry are even larger (over $200 billion in the U.S. alone). Approximately 82 percent of professional archaeologists in North America work outside of academia.

Despite the economic data, few academic programs have responded to the radical changes that have occurred to archaeology as a profession. Simon Fraser University’s program is one of a very few that has responded, and responded in innovative ways that meet the needs and realities of working heritage professionals who need additional education and skills to advance in a privatized archaeology. As an example, and one that HBI obviously cares about, Arch 551 Heritage Business and Management is the only class that I know of at any university in the world that provides true business education tailored to the heritage industry. Regardless of how proficient students are at "doing" archaeology, they won’t have a successful career in a privatized profession if they can’t return financial value to their employer. For good or for bad, this is the new reality of working heritage professionals in a privatized archaeology.

SFU’s Master of Arts in Heritage Resource Management is leading academia in providing archaeologists trained for a 21st century archaeology. I encourage you to support continuing this program and granting it full program approval.

Sincerely,

Christopher D. Dore, Ph.D., M.B.A., RPA 10331
Dear Dr. Welch:

The Society for American Archaeology (SAA) is pleased to provide this letter of support for the Department of Archaeology and School of Resource and Environmental Management’s submission of a Full Program Plan for the Heritage Resource Management (HRM) Program at Simon Fraser University (SFU).

SAA is an international organization that, since its founding in 1934, has been dedicated to the research about and interpretation and protection of the archaeological heritage of the Americas. With more than 7,000 members, SAA represents professional archaeologists in colleges and universities, museums, government agencies, and the private sector. SAA has members throughout the United States and Canada as well as many other nations around the world. SAA’s 2015 most recent needs assessment survey, conducted in 2015, indicates that 25 percent of our members are employed in the private HRM sector and another 16 percent are employed as federal, state, or tribal archaeologists. Despite the increasing prevalence of heritage resource management as the career path for professional archaeologists, traditional academic programs are not tailored to meet the needs of these HPM professionals.

The HRM Program at SFU thus fills an important niche in the education of archaeologists, providing necessary instruction in leadership, community engagement, strategic and critical thinking, and project management. The Law and Policy, Practice and Ethics, Business Management, and Research Design and Methods courses offered provide students with an in-depth education of the most important topics facing HRM professionals—courses that are not offered in traditional archaeology graduate programs. The required Master's thesis is another critical component of the HRM Program. It requires students to demonstrate their proficiency in both research and writing. Furthermore, a thesis-based Masters degree is the required degree to hold HRM archaeology permits or licenses in many Canadian jurisdictions. The SFU MA also satisfies the U.S. Secretary of the Interior’s guidelines for supervising HRM projects on federal lands in the United States. Furthermore, SFU graduates who write a thesis as part of their program will be eligible upon graduation to become Registered Professional Archaeologists (RPA) as well as to obtain professional standing in the Institute of Archaeology (IFA). In short, SFU graduates of the MA HRM program will have all the tools necessary to craft successful careers in the diverse and dynamic HRM industry.
On a personal note, I owned an HRM consulting firm for 30 years (Alpine Archaeological Consultants, Inc., founded in 1987). Alpine found it challenging to hire a sufficient number of professional archaeologists with Master’s degrees. It was also extremely difficult for our staff with Bachelor’s degrees to complete a Master’s degree while living in rural Colorado. The few who were able to do so without leaving our employ completed their education through the University of Leicester. Had the HRM Program at SFU been in place, we would have certainly encouraged our employees to enroll there.

Sincerely,

Susan M. Chandler, Register of Professional Archaeologists #11282
President, Society for American Archaeology
August 22, 2018

Dr. John R. Welch, Professor and Director  
Professional Graduate Program in Heritage Resource Management  
Simon Fraser University  
Department of Archaeology  
Burnaby, BC, Canada  
V5A 1S6

RE: Heritage Resource Management Program Proposal

Dear John;

It is my pleasure as the director of the Stó:lō Research and Resource Management Centre to endorse the SFU Department of Archaeology's Full Program Plan (FPP) for the Heritage Resource Management (HRM) Program. Our Centre is dedicated to the conservation-focused management of the Lower Fraser River Watershed and adjacent areas, a mission that requires attention to diverse land and resource stewardship issues and concerns, including heritage resource management. It has been exciting to participate in discussions since 2015 regarding the planning and implementation of the HRM Program, and it is gratifying to learn that the program is to be considered for continuing status. We give our full support for the program.

The HRM Program serves a perpetually underserved audience of junior archaeologists and HRM practitioners and has already been successful in boosting professionalism in heritage management. The program curriculum's focus on policy and ethics, as well as management and research, is particularly appropriate for and attractive to Indigenous archaeologists and those who work for and with Native communities. Systematic training for archaeologists and heritage managers in the international and practical contexts of HRM will benefit the archaeology, employers, governments, and Native communities. As per our various discussions, the Centre intends to facilitate the enrollment of at least two members of our staff in the HRM Program in the next three years.

With all best wishes for success with the Full Program Proposal,

Dr. David Schaepe, Director  
Stó:lō Research and Resource Management Centre
August 22, 2018

John R. Welch, Registered Professional Archaeologist 10227
Professor and Director, Professional Graduate Program in Heritage Resource Management
Department of Archaeology and School of Resource and Environmental Management
Simon Fraser University
Burnaby, Unceded Coast Salish Territory, BC, Canada V5A 1S6

Dear Dr. Welch,

I am writing to state my support for the Department of Archaeology and School of Resource and Environmental Management’s submission of a Full Program Plan for the Heritage Resource Management (HRM) Program at Simon Fraser University. As an archaeologist who has practiced cultural resource management (CRM) in the United States since 2002, I can honestly say this is the sort of program that is sorely needed in North America.

As an undergraduate, HRM and/or CRM were never mentioned in any of my anthropology classes. I had no idea how to get a job in archaeology or how American archaeology was practiced outside academia when I graduated. It was not until I started a Master’s program that I learned about the world of CRM. While my Master’s program provided opportunities for graduate students to work on CRM projects, there was little discussion of business practices or the mechanics of the industry. I earned a Master’s but was not prepared for the industry. I completed my Master’s in 2005 and, after months of interviewing and applying, landed my first CRM position in Seattle. My first few years in the industry were spent struggling to complete fieldwork within tight budgets while also doing quality work and adhering to state and national historic preservation regulations. The learning curve was steep as, at the time, the only way to learn how to do CRM was by doing CRM. Sadly, this is the way it has been in CRM since its inception.

Simon Fraser’s HRM Program is what the industry needs to train tomorrow’s CRM archaeologists. It also comes at the perfect time. In the United States, historic and environmental preservation regulations are under attack. Part of the argument against preservation is its cost. Project proponents feel like compliance work is too expensive. At the same time, indigenous and descendant groups are advocating for the preservation of their heritage, and local communities are doing what they can to foster heritage-related industries. The tension between developers, government agencies, and communities is strained all the more when CRM companies are unable to hire new employees who understand regulatory contexts and market forces while also adhering to archaeological codes of ethics.
After reviewing HRM Program curriculum, the instructors’ professional backgrounds, and speaking with other cultural resource management professional not affiliated with Simon Frasier, I can see that this program is one of the best able to train the cultural resource management archaeologists needed to do the complicated work our communities deserve. The program is designed to cover the regulatory and business fundamentals necessary to manage cultural resources archaeology projects. The program courses also introduce students to collaboration with descendant communities in ethical, pragmatic ways. Program graduates will meet the qualifications to become Registered Professional Archaeologists upon completion, which is a valuable asset to those who go on to continue their careers in HRM/CRM. Most importantly, the program is largely online and accepts students from the United States, which makes it more accessible to a wider range of individuals including non-traditional or professional students who may not be able to attend courses in a traditional program.

The HRM Program at Simon Frasier has been in operation for only a short time but I believe it is landmark. It has the potential to influence programs at other universities in the United States and Canada. The Program’s structure and content were designed to meet the needs of the HRM/CRM industry and communities in which CRMers practice. This is the program I wish had existed when I was a Master’s student.

Again, I highly support the Full Program Plan for the HRM Program at Simon Frasier University. Please, feel free to contact me at (206) 501-6667 (wawhite@berkeley.edu) if you have any questions.

Sincerely,

William A. White, III
RPA Number 15769
Assistant Professor
Department of Anthropology
University of California, Berkeley
John R. Welch, PhD, Registered Professional Archaeologist 10227
Professor & Director of the Professional Master’s Program in Heritage Resource Management
Department of Archaeology & School of Resource and Environmental Management
Simon Fraser University  welch@sfu.ca – http://www.sfu.ca/rem/people/profiles/welch.html

EDUCATION
1996 Ph.D. Anthropology, University of Arizona, Tucson, U.S.
1985 M.A. Anthropology, University of Arizona, Tucson, U.S.
1983 A.B. Anthropology (Honors), Spanish, Hamilton College, Clinton, New York, U.S.

CURRENT COURSE PORTFOLIO
HRM Law & Policy
Cultural Heritage Management
Social Science of Resource Management
Environmental Law in Indian Country

CURRENT EMPLOYMENT
April 2005–Current  Professor & Director of the Professional Graduate Program in Heritage Resource Management, jointly appointed in the Department of Archaeology and School of Resource and Environmental Management, Simon Fraser University

RECENT FUNDING FOR RESEARCH & SCHOLARLY PURSUITS (Since 2014)

Project Title: A Forensic Sedimentology Toolkit and Training Guide for the Investigation and Prosecution of Archaeological Resource Crime  Funding: Bureau of Indian Affairs, Arizona  Total: $22,500  Involvement: Toolkit development consultant  Collaboration: I support and serve as liaison between the core team of US Federal Government personnel (land management and law enforcement) and the technical team of research and forensic scientists.

3. Grant: Graduate Research Fellowship Grant  Period: 2017–2018  Project Title: Climate Change Adaptation Planning in Two Indigenous Conservation Organizations  Funding: Pacific Institute for Climate Studies  Total: $5000  Involvement: Project Director  Collaboration: I direct and support master’s research by Vivian Gauer with the Fort Apache Heritage Foundation and the Stolo Research and Resource Management Centre.

5. **Grant:** Publication Grant **Awarded:** 2016  **Period:** 2016–2017  **Project Title:** Digital Publication of the SFU Archaeology Press Catalogue  **Funding:** SFU Scholarly Digitization Fund  **Total:** $4960  **Involvement:** Principal Investigator  **Collaboration:** Facilitate creation of a comprehensive online compendium of the 31 books published by SFU Archaeology Press.

6. **Grant:** Research Grant  **Period:** 2016  **Project Title:** ‘Ground Truthing’ of Ancestral Pueblo Settlement of the Southern and Western Flanks of Arizona’s White Mountains, White Mountain Apache Tribe Lands, Arizona.  **Funding:** Arizona Archaeological and Historical Society  **Total:** $500  **Involvement:** Project Director  **Collaboration:** I led seven colleagues on a mobile symposium to visit and boost documentation for 16 Ancestral Pueblo villages.

7. **Contract:** Professional Consulting Services  **Period:** 2016  **Project Title:** San Carlos Apache Strike Team  **Funding:** San Carlos Apache Tribe, Arizona  **Total:** $19,650  **Involvement:** Cultural heritage consultant  **Collaboration:** I supported the Apache Strike Team’s opposition to the Proposed Resolution Copper Mine by conducting historical research and preparing strategic assessments of documents and plans prepared by the mining company, U.S. Forest Service, and their consultants.

8. **Contract/Grant:** Research and Exhibition / Outreach  **Period:** 2015–2016  **Project Title:** Scowlitz Virtual Museum Companion Project  **Funding:** SFU Community Engagement Fund  **Total:** $10,000  **Involvement:** Co-Principal Investigator  **Collaboration:** I support Kate Hennessey (SFU SIAT) and David Schaepe in developing and installing twin exhibits—in the SFU Museum of Archaeology and Ethnology and the Sto:lo Research and Resource Management Centre—to expand the reach of the Virtual Museum of Canada website dedicated to the Scowlitz ancestral village site.

9. **Contract/Grant:** Professional Consulting Services  **Period:** 2015–2016  **Project Title:** A Cultural Heritage Program for the San Carlos Apache  **Funding:** Resolution Copper Mining Corporation, Arizona  **Total:** $10,578  **Involvement:** Cultural heritage consultant  **Collaboration:** I supported Statistical Research Inc. Foundation and Apache colleagues in creating a values-based program to protect and perpetuate Apache cultural heritage in the face of changing social, economic and biophysical environments.

10. **Grant:** Curriculum Development Research  **Period:** 2015–2016  **Project Title:** Assessment of a Required Graduate Course, Social Science of Resource Management: Theories of Cooperation (REM 601)  **Funding:** SFU Teaching and Learning Center  **Total:** $5000  **Involvement:** Project Director  **Collaboration:** I worked with Soudeh Jamshidian and other SFU colleagues to survey students and refine REM 601, the social science core course in the Master’s of Resource Management (MRM) program.

11. **Grant:** Curriculum and Credential Development  **Period:** 2015–2016  **Project Title:** A Professional Online MA Program in Heritage Resource Management (HRM)  **Funding:** SFU Professional Online Scholarship and Training (POST) grant  **Total:** $100,000  **Involvement:** Program Director  **Collaboration:** I facilitated SFU and HRM industry collaborations to create and deliver a new Master’s program, starting fall 2016.

12. **Grant:** Research Grant  **Period:** 2015–2017  **Project Title:** Trails of the Apache  **Funding:** SSHRC Small Institutional  **Total:** $6950  **Involvement:** Principal Investigator  **Collaboration:** I directed landscape-scale efforts to document ancient Apache activity hubs using least-cost path GIS analyses to identify trails and the residential, agricultural, and foraging localities they connect.
Curriculum Vitae

John R. Welch, RPA

RECENT PEER-REVIEWED CONTRIBUTIONS (Since 2014)


CURRENT GRADUATE STUDENT SUPERVISION (Committee Chair)

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Project / Thesis</th>
<th>Start–Finish</th>
</tr>
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<tbody>
<tr>
<td>Campbell, Michael</td>
<td>M.A. (HRM)</td>
<td>TBA</td>
<td>2017–</td>
</tr>
<tr>
<td>Gauer, Viviane</td>
<td>M.R.M.</td>
<td>Climate Change Adaptation Planning if Two Native-Owned Conservation Organizations</td>
<td>2016–</td>
</tr>
<tr>
<td>Huck, Michael</td>
<td>M.R.M.</td>
<td>Community-Based Climate Change Adaptation Planning in Limberly, B.C.</td>
<td>2015–</td>
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<tr>
<td>Hogg, Erin</td>
<td>Ph.D.</td>
<td>Archaeological Contributions to Land Claims</td>
<td>2014–</td>
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<tr>
<td>Jamshidian, Soudeh</td>
<td>Ph.D.</td>
<td>Effects of Top-Down Environmental Management in Post-Conflict Settings</td>
<td>2007–</td>
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<tr>
<td>Aaron Naumann</td>
<td>Ph.D.</td>
<td>University of Washington / Indigenous Archaeology Revisited</td>
<td>2016–</td>
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</table>

CURRENT SERVICE RELEVANT TO HRM

<table>
<thead>
<tr>
<th>Year</th>
<th>Service</th>
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</thead>
<tbody>
<tr>
<td>2017–2019</td>
<td>Registrar, Register of Professional Archaeologists</td>
</tr>
<tr>
<td>2015–2019</td>
<td>Member, Editorial Board, Advances in Archaeological Practice</td>
</tr>
<tr>
<td>2014–2018</td>
<td>Co-Chair, Amity Pueblo Task Force, Society for American Archaeology</td>
</tr>
<tr>
<td>2007–2018</td>
<td>Member and Board Secretary, Fort Apache Heritage Foundation Board of Directors</td>
</tr>
</tbody>
</table>
GEORGE P. NICHOLAS, PH.D.
Professor and Chair, Department of Archaeology, Simon Fraser University
Director, Intellectual Property Issues in Cultural Heritage (IPinCH) Project
Web: http://www.sfu.ca/archaeology/dept/fac_bio/nicholas/index.htm
IPinCH Project: http://www.sfu.ca/IPinCulturalHeritage

Education
1990 PhD, University of Massachusetts-Amherst.
1979 MA, University of Missouri-Columbia.
1975 BA. (Magna cum laude with Honors in Anthropology), Franklin Pierce College, Rindge, NH.

Current Service
2017-2020 Chair, Department of Archaeology, SFU
2008-2016 Director, Intellectual Property Issues in Cultural Heritage (IPinCH) Project
2015- Chair, Repatriation Committee, Department of Archaeology, Simon Fraser University
2016-2019 Chair, Committee on Native American Relations, Society for American Archaeology

Grants
2017 (and J. Driver). SFU Teaching and Learning Development Program grant for “Assessing the Need for Professional Training Modules for Archaeology Students.” ($6,000).
2015 SSHRC Connections Grant for “DNA and Indigeneity: Exploring the (Re)-Construction of Identity at the Interface of Biology and Culture.” ($20,410).

Publications (Selected Since 2014)
Books/Special Publications

Book Chapters

G. Nicholas: Short CV, July 2018


**Journal Articles**


**Declarations**


**Short Articles, Essays, Encyclopedia Entries, and Blogs**


2018 “It’s taken thousands of years, but Western science is finally catching up to Traditional Knowledge.” *The Conversation*. [https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291](https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291)

2017 “Threats to Bear Ears and other Indigenous sacred sites are a violation of human rights. *The


Videos and Video Interviews


2014 “Why Heritage is Not Just About Things.” TEDx Yellowknife, in conjunction with Itaa Yati Traditional Knowledge Symposium. Yellowknife, NWT. https://www.youtube.com/watch?v=HbPLXTJwVMY&list=PLjMPDTlr8hYk3cIx-Xa00FR3uAde6VnK6

2014 Scientific Reasoning, and Intangible Heritage Protection.” Itaa Yati Traditional Knowledge Symposium. Yellowknife, NWT. https://www.youtube.com/channel/UCfDRla9E0QmpYMPg1jH2_yw

Current Graduate Students Supervised
Chelsea Meloche (Ph.D.). “What Happens After Repatriation?”


Josh Fontaine (MA) “Archaeological Evidence of Changing Land-Use Patterns and Environmental Degradation on the Salmon River, British Columbia.”


Christopher D. Dore, PhD, Registered Professional Archaeologist 10331
Adjunct Professor of Archaeology
Department of Archaeology
Simon Fraser University  c.dore@sfu.ca

EDUCATION
2007 M.B.A. Business Administration, University of Arizona, Tucson, U.S.
1996 Ph.D. Anthropology, University of New Mexico, Albuquerque, U.S.
1982 B.A. Anthropology, Washington State University, Pullman, U.S.

CURRENT COURSE PORTFOLIO

HRM Business and Management

CURRENT EMPLOYMENT
2013–Current Consultant, Heritage Business International, L3C
2016–Current Adjunct Professor, Department of Archaeology, Simon Fraser University.
2004–Current Adjunct Professor, School of Anthropology, University of Arizona.

RECENT FUNDING FOR RESEARCH & SCHOLARLY PURSUITS (Since 2014)
None

RECENT PEER-REVIEWED CONTRIBUTIONS (Since 2014)

CURRENT GRADUATE STUDENT SUPERVISION (Committee Chair)
None

SERVICE RELEVANT TO HRM (Since 2014)
2016–2019 President/President-elect, Register of Professional Archaeologists. Baltimore, MD, U.S.
Curriculum Vitae

Christopher D. Dore, RPA 10331


2014–2016 Treasurer, Archaeology Southwest, Tucson, AZ., U.S.

AWARDS (Since 2014)

2014 Asa T. Hill Memorial Award for outstanding contributions to Plains archaeology, Nebraska State Historical Society, Lincoln, NE., U.S.
David Maxwell, Ph.D.
Lecturer, Department of Archaeology, Simon Fraser University

EDUCATION

1989    Master of Arts, Archaeology, July 1989, Simon Fraser University, Burnaby, British Columbia.
1986    Bachelor of Arts, Archaeology, June 1986, Simon Fraser University, Burnaby, British Columbia.

CURRENT COURSE PORTFOLIO

Ancient Peoples and Places
Reconstructing the Human Past
Prehistory of Religion
Archaeology of the New World
Cultural Heritage Management
Maya Archaeology
Archaeological Resource Management
Research Design in Heritage Resource Management

CURRENT EMPLOYMENT

September 2017 – present: Lecturer, Department of Archaeology, Simon Fraser University, Burnaby, BC
September 2013 – August 2017: Limited-Term Lecturer, Department of Archaeology, Simon Fraser University, Burnaby, BC
May 2016 – April 2017: Instructor, Fraser International College, Burnaby, BC

RECENT FUNDING FOR RESEARCH AND SCHOLARLY PURSUITS

2018    GRANT: COURSE DEVELOPMENT GRANT  PERIOD: 2018-2019  PROJECT TITLE: Drowning in Garbage? Archaeology, Solid Waste, and Recycling at SFU  Funding: Teaching & Learning Development Grant Total: $6,000  Involvement: Project Director Collaboration: I will oversee the development of a new lab-based undergraduate course in archaeology, designed to study the effects and effectiveness of recycling and waste disposal practices at Simon Fraser University.
David Maxwell, Ph.D.

REVIEWED PUBLICATIONS (SINCE 2014)


MEMORANDUM

ATTENTION: Senate
FROM: Wade Parkhouse, Chair
Senate Committee on Undergraduate Studies
RE: Program Changes

DATE: September 14, 2018
PAGES: 1/2

For information:

Acting under delegated authority at its meeting of September 13, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

a. Faculty of Applied Sciences (SCUS 18-54)

1. The Sustainable Energy Engineering Program
   (i) Admission requirements for post-secondary (external) and internal transfers (Fall 2019)

b. Beedie School of Business (SCUS 18-55)

   (i) Requirement changes to the Certificate in Innovation & Entrepreneurship
   (ii) Renaming and moving admission sections of the calendar
   (iii) Changes to course access for non-majors
   (iv) Changes to the Business – Major admission requirements

c. Faculty of Communication, Art and Technology (SCUS 18-56)

1. School of Interactive Arts and Technology
   (i) Upper division requirement changes to the BA, BA Honours, BSc and BSc Honours programs
   (ii) Lower division requirement changes to the BA Honours program and the BSc Honours program
c. Faculty of Health Sciences (SCUS 18-57)

(i) Upper division requirement changes to the Health Sciences Philosophy joint major - Bachelor of Arts (FASS) and the Health Sciences Philosophy joint major – Bachelor of Arts (FHS)

(ii) Upper division requirement changes to the Health Sciences Major – Bachelor of Arts and the Health Sciences Honours – Bachelor of Arts programs

(iii) Upper division requirement changes to the Health Sciences Major – Bachelor of Science – Life Sciences concentration and the Health Sciences Honours – Bachelor of Science – Life Sciences concentration programs

(iv) Upper division requirement changes to the Health Sciences Major – Bachelor of Science – PQHS concentration and the Health Sciences Honours – Bachelor of Science – PQHS concentration programs

d. Faculty of Science (SCUS 18-58)

1. Department of Molecular Biology and Biochemistry

(i) Upper division requirement changes to the MBB Minors program

(ii) Change format of upper division requirement course options for MBB Honours program

(iii) Addition of MBB 498 to the list of Research and Directed Readings options for the MBB Honours and Majors programs

(iv) Format changes to the list of Research and Directed Reading options for the MBB Honours and Majors programs (Fall 2019)
Calendar Entry Change  
Sustainable Energy Engineering (SEE) Major, Faculty of Applied Sciences

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining admission requirements for post-secondary (external) and internal transfers to the SEE program.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
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</thead>
<tbody>
<tr>
<td>Fall 2019</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE major</td>
</tr>
</tbody>
</table>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: **example.** All additions should be marked by a **bold.**

**Admission Requirements**

Admission is competitive. A supplemental application, along with related documentation, may be required for specific entry routes. For specific admission requirements, visit http://www.sfu.ca/students/admission-requirements.html.

For more information, contact an Applied Sciences Advisor.

**External Transfer from Another Post-Secondary Institution**

Admission is competitive and all SFU General Requirements apply. (see: [http://www.sfu.ca/students/admission/admission-requirements](http://www.sfu.ca/students/admission/admission-requirements))

In addition to the general requirements, the following are required:

- A minimum of 24 units of transferable coursework, including courses that are accepted by SFU as equivalents to the following:
  - One MATH course from: MATH 152, 232, or 240
  - One CMPT course from: CMPT 130, 128, 135 or (both CMPT 125 and 127)
  - One CHEM course from: CHEM 121, 120
  - One PHYS course from: PHYS 140, 141, 120, or 121
- Meeting all SEE program high school admission requirements

A supplemental application, along with related documentation, may be required.

April 2016
Internal Transfer from Another Simon Fraser University Program

Admission is competitive, with the following minimum requirements:

- Minimum CGPA of 2.67
- Registration in at least 12 units in the term prior to admission
- No more than 5 repeats
- Meeting all SEE program high school admission requirements

A supplemental application, along with related documentation, may be required.
Calendar Entry Change
Beedie School of Business Undergraduate Program

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The course FPA 489 was added to the certificate, but then that course was replaced by CA 489, which should not be applicable to the certificate and should be removed from the list of options.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2019</td>
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</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
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<tbody>
<tr>
<td>Certificate in Innovation &amp; Entrepreneurship</td>
</tr>
</tbody>
</table>

**Calendar Change:** "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold.**

**Program Requirements**
Students must complete the following, including foundational business courses, a capstone course, and additional coursework from a variety of disciplines.

Students will complete all of:

- BUS 238 - Introduction to Entrepreneurship and Innovation (3)
- BUS 314 - Resourcing New Ventures (3)
- BUS 338 - Foundations of Innovation (3)
- BUS 361 - Project Management (3)
- And one of*:
  - BUS 477 - Startup Experience (4)
  - CA 489 - Interdisciplinary Project in FPA (5)
  - ENV 495 - Environmental Capstone (4)**
  - HSCI 495 - Applied Health Science Project (4)
  - IAT 430 - Business of Design III: Refinement and Production (3) and BUS 476 - Business of Design IV - Promotion, Packaging and Launch - Launching a Design-Led Business (4)
  - IAT 499 - Graduation Project (6)
  - MSE 410 - Capstone Design Technical Project I (3)^^ and MSE 411W - Capstone Design Technical Project II (3)^^

Students# will complete two of*:

- BUS 339 - Business of Design II - Iteration and Prototyping (4)
- BISC 373 - Brewing Science (2) or BISC 374 - Brewing Science with Lab (3)
- BUS 406 - Startup Accelerator (3)

---

* April 2016
**BUS 443 - New Product Development and Design (3)**
**BUS 450 - Managing Emerging Opportunities (3)**
**BUS 453 - Sustainable Innovation (3)**
**BUS 490 - Selected Topics in Business Administration (3)***
**BUS 491 - Selected Topics in Business Administration (3)***
**BUS 492 - Selected Topics in Business Administration (3)***
**BUS 493 - Selected Topics in Business Administration (3)***
**BUS 494 - Selected Topics in Business Administration (3)***
**BUS 495 - Selected Topics in Business Administration (3)***
**BUS 496 - Selected Topics in Business Administration (5)***
**CA 381 - Thriving as a Cultural Entrepreneur (3)**
**CMNS 425 - Applied Communication for Social Issues (4)**
**CMPT 120 - Introduction to Computing Science and Programming I (3)**
**CMPT 320 - Social Implications - Computerized Society (3)**
**HSCI 130 - Foundations of Health Science (4)**
**HSCI 305 - The Canadian Health System (3)**
**HSCI 312 - Health Promotion: Individuals and Communities (3)**
**IAT 330 - Business of Design I: Introduction (3)**
**IAT 333 - Interaction Design Methods (3)**
**IAT 431 - Speculative Design (3)**
**IAT 481 - Special Topics in Interactive Arts and Technology (Science) (3)**
**MSE 110 - Mechatronics Design I (3) or MSE 111 - Mechatronics for non-Engineers (3)**
**POL 150 - Science, Policy, and Innovation (3)**
**POL 457W - Technology and Innovation Policy (4)**
**PUB 101 - Publication of Self in Everyday Life (3)**
**PUB 201 - The Publication of Professional Self (3)**
**PUB 212 - Public Relations and Public Engagement (3)**
**PUB 456 - Institutional and International Event Planning and Management (4)**

# Students completing a Bachelor of Business Administration may not use BUS 406, BUS 443, BUS 450, BUS 453, or BUS 49X to meet the requirements of this section.

* Substitutions with appropriate course content may be possible with permission from the Beedie School of Business.

** ENV 495 will only count toward this certificate when offered as part of Change Lab. Students are to consult with a Faculty of Environment advisor before enrolling in this course.

*** When offered as a selected topics course in Innovation and Entrepreneurship.

^ Business of Design

^^ Technology Entrepreneurship @ SFU

April 2016
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Renaming this section of the calendar will make the information easier for students to locate in the calendar. This new title better reflects the contents of this section.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:

http://www.sfu.ca/students/calendar/2018/fall/areas-of-study/business.html

This change would also see the Admissions information moved into its own section/page in the calendar, while the course access and other information remains where it is.

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business

Business faculty members

Admission requirements for Beedie and other important faculty notes

Beedie undergraduate program admission information

Course access information, grade requirements, and other important notes

April 2016
Calendar Entry Change
Name of Program or Name of Faculty

Rationale for change:
Renaming & moving the admissions section of the calendar will make the information easier for students to locate in the calendar.

Admission requirements tend to be for prospective students, whereas the other information is more focused at current students, so separating them seems logical.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:

http://www.sfu.ca/students/calendar/2018/fall/faculties-research/faculty-business.html

We would like to move the following sections into a unique Beedie Undergraduate Admissions page (see Part 1 of this same change for more information).

- Major admission requirements
- Joint major admission requirements
- Minor admission requirements
- Double degree admission requirements

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Departments & Programs Offered

Beedie School of Business

Undergraduate Programs
Major Admission Requirements
Joint Major Admission Requirements
Minor Admission Requirements

April 2016
Double Degree Admission Requirements
Non-Majors' Information About Access to Business Courses
Grade Requirements

Student Responsibility

It is the responsibility of each student to be aware of faculty regulations as stated in this Calendar. Departmental and faculty advisors and staff are available for advice and guidance. However, the ultimate responsibility for completeness and correctness of course selection, for compliance with and completion of program and degree requirements and for observance of regulations and deadlines rests with the student.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:

This language makes our course access policies clearer for students. These course access items have been used in practice, and are coded and listed in SIMS and are now being reflected in the Calendar for more clarity to students.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:

http://www.sfu.ca/students/calendar/2018/fall/faculties-research/faculty-business.html

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Non-Majors’ Information About Access to Business Courses

200 DIVISION BUSINESS COURSE ENROLLMENT RESTRICTIONS

Students other than those accepted into a program in business may enroll in 200 division business courses, except for the following courses, which are reserved for students in a business program and do not open up at any time: BUS 201, 202, 217W.

300 AND 400 DIVISION BUSINESS COURSE ENROLLMENT RESTRICTIONS

Students other than those accepted into a program in business administration may enroll in selected 300 and 400 division business administration courses from the day before the term begins until the end of the first week of classes, contingent upon:

- space available in the course during the period indicated
- meeting all prerequisites for the requested course
- required minimum overall SFU Business course GPA of 2.30

Registration in BUS 320 & 360W is limited to students who are approved in a business major, joint major, honours, or joint honours program, or as indicated below.

ACCOUNTING STUDENTS

April 2016
Only business students admitted to the Accounting concentration will be permitted to enroll in upper division (300- and 400-level) accounting courses required for this concentration (with the exception of BUS 320).

**BUSINESS MINOR STUDENTS**

Only students admitted to the Business minor will be permitted to enroll in upper division Business minor courses (BUS 311, 340, 341, and 401).

**ACTUARIAL SCIENCE STUDENTS**

Actuarial Science majors and honours students have access to BUS 312, 315, 316, 360W, 410, 413 & 419.

**DATA SCIENCE STUDENTS**

Data Science majors and honours students have access to BUS 217W, 343, 360W, 439, & 445.

**MANAGEMENT SYSTEMS SCIENCE STUDENTS**

Management Systems Science majors and honours students have access to BUS 343, 360W, 361, 440 & 473.

**CERTIFICATE IN CORPORATE ENVIRONMENTAL AND SOCIAL SUSTAINABILITY**

Students in the Certificate in Corporate Environmental and Social Sustainability program have access to BUS 303, 393, 449, 453, 475 & 489.

**CERTIFICATE IN INNOVATION & ENTREPRENEURSHIP**

Students in the Certificate in Innovation & Entrepreneurship program have access to BUS 314, 338, 339, 361, 406, 443, 450, 453 & 477.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:

This language is being updated to better reflect the application requirements and to be clearer for students applying to the Beedie School of Business.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:

Business – Major Admission Requirements

http://www.sfu.ca/students/calendar/2018/fall/faculties-research/faculty-business.html

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Major Admission Requirements

For admission to the major program within the Beedie School of Business, students will be competitively selected from one of the following four streams.

DIRECT FROM SECONDARY SCHOOL (CATEGORY-1)

Secondary school graduates, or students with less fewer than 24 units of transferable coursework from another post-secondary institution, will be competitively selected for admission in the fall and spring terms (only), based on the general Simon Fraser University admission requirements, faculty specific admission requirements, and a supplemental application. The supplemental application may include:

An explanation of extra-curricular experience (i.e. in the areas of: athletics, arts, community leadership/involvement, work experience, and/or entrepreneurship)
Short answer questions
Online video interview
Reference, with at least one being academic in nature

EXTERNAL TRANSFER – DIRECT FROM A RECOGNIZED POST-SECONDARY INSTITUTION (CATEGORY-2)
A portion of the annual admission will be competitively selected from students transferring from a recognized post-secondary institutions who meet the university admission requirements and have completed all of the eight required lower division courses required for admission.** (except BUS 207, BUS 217W and BUS 254 which may be completed after faculty admission) and submitted a supplemental application form. Students may also be required to submit a supplemental application for consideration. Of the required courses, a maximum of 2 of the 8 courses may be repeated one time each for admission.

The supplemental application may include:

- An explanation of extra-curricular experience (i.e. in the areas of: athletics, arts, community leadership/involvement, work experience, and/or entrepreneurship)
- Short answer questions
- Online video interview
- References, with at least one being academic in nature

INTERNAL TRANSFER - ALL COURSES AT SIMON FRASER UNIVERSITY OR A COMBINATION OF SIMON FRASER UNIVERSITY AND OTHER POST-SECONDARY COURSES (CATEGORY 3)

A portion of the annual admission will be competitively selected from students who have completed all of their courses at Simon Fraser University, including the required eight lower division courses required for admission.** (except BUS 201/202, 207, 217W and 254 which may be completed after faculty admission), and submitted a supplemental application form. Students may also be required to submit a supplemental application for consideration. Of the required courses, a maximum of 2 of the 8 courses may be repeated one time each for admission.

[blank line added here] The supplemental application may include:

- An explanation of extra-curricular experience (i.e. in the areas of: athletics, arts, community leadership/involvement, work experience, and/or entrepreneurship)
- Short answer questions
- Online video interview
- References, with at least one being academic in nature

Please note that students must meet minimum GPA requirements in order to be considered for admission to the Beedie School of Business. These requirements are listed on the internal transfer website. Prospective students should also review and meet the Beedie School of Business grade requirements, which are listed at the bottom of this page.

INTERNAL TRANSFER — SOME SIMON FRASER UNIVERSITY AND OTHER POST-SECONDARY COURSES (CATEGORY 4)

April 2016
A portion of the annual admission will be competitively selected from students who have completed some courses at Simon Fraser University and some courses at another post-secondary institution(s), including the required eight lower division courses** (except BUS 201/202, 207, 217W and 254 which may be completed after faculty admission) and submitted a supplemental application form. Of the required courses, a maximum of 2 of the 8 courses may be repeated for admission. The supplemental application may include:

- An explanation of extra-curricular experience (i.e. in areas of: athletics, arts, community leadership/involvement, work experience, and/or entrepreneurship)
- Short answer questions
- Online video interview
- References, with at least one being academic in nature

Please note that students must meet minimum GPA requirements in order to be considered for admission to the Beedie School of Business. These requirements are listed on the internal transfer website. Prospective students should also review the Beedie School of Business grade requirements, which are listed at the bottom of this page.

**The eight required lower division courses required for admission are as follows:
- BUS 237-3 Introduction to Business Technology Management
- BUS 251-3 Financial Accounting I
- BUS 272-3 Behaviour in Organizations
- ECON 103-4 Principles of Microeconomics
- ECON 105-4 Principles of Macroeconomics

and one of:
- BUEC 232-4 Data and Decisions I
- STAT 270-3 Introduction to Probability and Statistics

and one of:
- MATH 150-4 Calculus I with Review
- MATH 151-3 Calculus I
- MATH 154-3 Calculus I for the Biological Sciences
- MATH 157-3 Calculus I for the Social Sciences

and one of ^:
- ENGL 111W-3 Literary Classics in English
- ENGL 112W-3 Literature Now
- ENGL 113W-3 Literature and Performance
- ENGL 114W-3 Language and Purpose

April 2016
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ENGL 115W-3</td>
<td>Literature and Culture</td>
</tr>
<tr>
<td>ENGL 199W-3</td>
<td>Introduction to University Writing</td>
</tr>
<tr>
<td>PHIL 100W-3</td>
<td>Knowledge and Reality</td>
</tr>
<tr>
<td>PHIL 105-3</td>
<td>Critical Thinking</td>
</tr>
<tr>
<td>PHIL 120W-3</td>
<td>Moral Problems</td>
</tr>
<tr>
<td>WL 101W-3</td>
<td>Writing About Literature</td>
</tr>
<tr>
<td>WL 103W-3</td>
<td>Pre-Modern World Literature</td>
</tr>
<tr>
<td>WL 104W-3</td>
<td>Modern World Literature</td>
</tr>
</tbody>
</table>

Any one of these courses may be replaced by any three unspecified transfer units in English or in ENGL-Writing at the 100- or 200-level.

APPLICATION PROCEDURES
Students applying directly from a secondary school (Category 1) or an external post-secondary institution (Category 2) should apply to the faculty at the same time that they apply for admission to the University. The supplemental application can be found on Beedie's website.

Internal transfer (Category 3 or 4) applicants should apply to the faculty during the term in which the admission requirements are completed. The supplemental application can be found on Beedie's website.

Students not accepted upon initial application may reapply. Unsuccessful applicants are permitted to make appeal through the faculty admissions appeals committee.

APPLICATION DEADLINES
Visit [http://beedie.sfu.ca/bba/apply](http://beedie.sfu.ca/bba/apply) for application deadlines.

April 2016
Calendar Entry Change
Name of Program or Name of Faculty

Rationale for change:

IAT 330 and 430 are new courses in the School of Interactive Arts and Technology and contain valuable content for the BA requirements in the program.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:

BA


Calendar Change: "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements

A major in Interactive Arts in Technology requires 30 upper division IAT units. Of these, students must take

IAT 309W - Writing Methods for Research (3)

and at least two 400-level courses of at least 3 units each, excluding directed studies.

Of the total of 44 upper division units required to their degree, students must complete a total of 24 units chosen from the following arts courses to satisfy the BA requirements:

IAT 312 - Foundations of Game Design (3)
IAT 313 - Narrative and New Media (3)
IAT 320 - Body Interface (3)
IAT 330 – Business of Design I (3)
IAT 334 - Interface Design (3)
IAT 343 - Animation (3)
IAT 344 - Moving Images (3)
IAT 380 - Special Topics in Interactive Arts and Technology (Arts) (3)
IAT 430 – Business of Design III (3)
IAT 431 - Speculative Design (3)
IAT 438 - Interactive Objects and Environments (3)

April 2016
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAT 443</td>
<td>Interactive Video</td>
<td>(3)</td>
</tr>
<tr>
<td>IAT 445</td>
<td>Immersive Environments</td>
<td>(3)</td>
</tr>
<tr>
<td>IAT 480</td>
<td>Special Topics in Interactive Arts and Technology (Arts)</td>
<td>(3)</td>
</tr>
<tr>
<td>IAT 499</td>
<td>Graduation Project</td>
<td>(6)</td>
</tr>
</tbody>
</table>
Calendar Entry Change
Name of Program or Name of Faculty

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAT 330 and 430 are new courses in the School of Interactive Arts and Technology and contain valuable content for the BA Honours requirements in the program.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective term and year: Summer 2019</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA Honours</td>
</tr>
</tbody>
</table>

**Calendar Change:** "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold**.

**Upper Division Requirements**

An Honours, Bachelor of Arts in Interactive Arts and Technology requires 48 upper division IAT units. Of these, students must take

- IAT 309W - Writing Methods for Research (3)
- and at least two 400-level IAT courses of at least 3 units each, excluding directed studies
- and
- six (6) IAT units selected from Designated Honours courses from Route 1 OR Route 2:

**Route 1**

- One of
  - IAT 801 - Qualitative Research Methods and Design (3)
  - IAT 802 - Quantitative Research Methods and Design (3)
  - IAT 806 - Interdisciplinary Design Approaches to Computing (3)

- One of

  - IAT 490 - Honours Project 1 (3)
IAT 491 - Honours Project II (3)

OR

Route 2

IAT 490 - Honours Project I (3)
IAT 491 - Honours Project II (3)

To satisfy the BA requirements of this program students complete a total of 24 units chosen from the following arts courses:

IAT 312 - Foundations of Game Design (3)
IAT 313 - Narrative and New Media (3)
IAT 320 - Body Interface (3)
**IAT 330 - Business of Design I (3)**
IAT 334 - Interface Design (3)
IAT 340 - Sound Design (3)
IAT 343 - Animation (3)
IAT 344 - Moving Images (3)
IAT 380 - Special Topics in Interactive Arts and Technology (Arts) (3)
**IAT 430 - Business of Design III (3)**
IAT 431 - Speculative Design (3)
IAT 438 - Interactive Objects and Environments (3)
IAT 443 - Interactive Video (3)
IAT 445 - Immersive Environments (3)
IAT 480 - Special Topics in Interactive Arts and Technology (Arts) (3)
Calendar Entry Change
Name of Program or Name of Faculty

Rationale for change:

IAT 330 and 430 are new courses in the School of Interactive Arts and Technology and contain valuable content for the BSc requirements in the program.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:

BSc


Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements

A major in Interactive Arts and Technology requires 30 upper division IAT units. Of these, students must take

IAT 309W - Writing Methods for Research (3)

and at least two 400-level courses of at least 3 units each, excluding directed studies.

Of the total of 44 upper division units required to their degree, students must complete a total of 24 units chosen from the following science courses to satisfy the BSc requirements:

**IAT 330 – Business of Design I (3)**
IAT 333 - Interaction Design Methods (3)
IAT 336 - Materials in Design (3)
IAT 351 - Advanced Human-Computer Interaction (3)
IAT 352 - Internet Computing Technologies (3)
IAT 355 - Introduction to Visual Analytics (3)
IAT 381 - Special Topics in Interactive Arts and Technology (Science) (3)
IAT 410 - Advanced Game Design (3)

**IAT 430 – Business of Design III (3)**
IAT 432 - Design Evaluation (3)
IAT 437 - Representation and Fabrication (3)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAT 452</td>
<td>Developing Design Tools</td>
<td>3</td>
</tr>
<tr>
<td>IAT 455</td>
<td>Computational Media</td>
<td>3</td>
</tr>
<tr>
<td>IAT 481</td>
<td>Special Topics in Interactive Arts and Technology (Science)</td>
<td>3</td>
</tr>
<tr>
<td>IAT 499</td>
<td>Graduation Project</td>
<td>6</td>
</tr>
</tbody>
</table>
Calendar Entry Change
Name of Program or Name of Faculty

Rationale for change:

IAT 330 and 430 are new courses in the School of Interactive Arts and Technology and contain valuable content for the BSc Honours requirements in the program.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:

BSc Honours

Calendar Change: "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements

An Honours, Bachelor of Science in Interactive Arts and Technology requires 48 upper division IAT units. Of these, students must take

IAT 309W - Writing Methods for Research (3)
and at least two 400-level IAT courses of at least 3 units each, excluding directed studies

and

six (6) IAT units selected from Designated Honours courses from Route 1 OR Route 2:

Route 1

One of

IAT 801 - Qualitative Research Methods and Design (3)
IAT 802 - Quantitative Research Methods and Design (3)
IAT 806 - Interdisciplinary Design Approaches to Computing (3)

One of

IAT 490 - Honours Project I (3)

April 2016
IAT 491 - Honours Project II (3)

OR

Route 2

IAT 490 - Honours Project I (3)
IAT 491 - Honours Project II (3)

To satisfy the BSc requirements of this program students will complete a total of 24 units chosen from the following science courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAT 330</td>
<td>Business of Design I (3)</td>
</tr>
<tr>
<td>IAT 333</td>
<td>Interaction Design Methods (3)</td>
</tr>
<tr>
<td>IAT 336</td>
<td>Materials in Design (3)</td>
</tr>
<tr>
<td>IAT 351</td>
<td>Advanced Human-Computer Interaction (3)</td>
</tr>
<tr>
<td>IAT 352</td>
<td>Internet Computing Technologies (3)</td>
</tr>
<tr>
<td>IAT 355</td>
<td>Introduction to Visual Analytics (3)</td>
</tr>
<tr>
<td>IAT 359</td>
<td>Mobile Computing (3)</td>
</tr>
<tr>
<td>IAT 381</td>
<td>Special Topics in Interactive Arts and Technology (Science) (3)</td>
</tr>
<tr>
<td>IAT 410</td>
<td>Advanced Game Design (3)</td>
</tr>
<tr>
<td>IAT 430</td>
<td>Business of Design III (3)</td>
</tr>
<tr>
<td>IAT 432</td>
<td>Design Evaluation (3)</td>
</tr>
<tr>
<td>IAT 437</td>
<td>Representation and Fabrication (3)</td>
</tr>
<tr>
<td>IAT 452</td>
<td>Developing Design Tools (3)</td>
</tr>
<tr>
<td>IAT 455</td>
<td>Computational Media (3)</td>
</tr>
<tr>
<td>IAT 481</td>
<td>Special Topics in Interactive Arts and Technology (Science) (3)</td>
</tr>
</tbody>
</table>

April 2016
### Calendar Entry Change
Name of Program or Name of Faculty

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPT 102 and CMPT 130 fulfill Lower Division Requirements for the IAT BA and BSc already and should similarly fulfill Lower Division Requirements for the IAT BA and BSc Honours.</td>
</tr>
</tbody>
</table>

| Effective term and year: Summer 2019 |

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA Honours</td>
</tr>
</tbody>
</table>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: *sample.* All additions should be marked by a **bold.**

### Lower Division Requirements

<table>
<thead>
<tr>
<th>CMPT 166 - An Animated Introduction to Programming (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>or an equivalent introductory programming course (CMPT 102, 120, 125, 126, or 128, or 130)</td>
</tr>
</tbody>
</table>
**Calendar Entry Change**

**Name of Program or Name of Faculty**

<table>
<thead>
<tr>
<th>Rationale for change:</th>
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<tr>
<td>CMPT 102 and CMPT 130 fulfill Lower Division Requirements for the IAT BA and BSc already and should similarly fulfill Lower Division Requirements for the IAT BA and BSc Honours.</td>
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</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
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</thead>
<tbody>
<tr>
<td>Summer 2019</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc Honours</td>
</tr>
</tbody>
</table>

**Calendar Change**: "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold**.

**Lower Division Requirements**

<table>
<thead>
<tr>
<th>CMPT 166 - An Animated Introduction to Programming (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>or an equivalent introductory programming course (CMPT <strong>102</strong>, 120, 125, 126, or 128, <strong>or</strong> 130)</td>
</tr>
</tbody>
</table>
Calendar Entry Change
Joint Major: Health Sciences & Philosophy

Rationale for change: Health Sciences Philosophy joint major – Bachelor of Arts

The Council for Education in Public Health, the accrediting body for our undergraduate programs requires a “a cumulative, integrative and scholarly or applied experience or inquiry project that serves as a capstone to the education experience”, which we are meeting by requiring a Directed Studies course, HSCI 488, for the joint majors in Health Sciences and Philosophy.

We are also including STAT 302 or STAT 305 in the required upper division course list since it a pre-requisite for HSCI 330 and this makes the requirements to complete the joint major more transparent.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:
Health Sciences Philosophy joint major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample- All additions should be marked by a bold.

Upper Division Health Sciences Requirements

Students complete a minimum of 21 upper division health sciences units, including all of
HSCI 305 - The Canadian Health System (3)
HSCI 319W - Applied Health Ethics (3)
HSCI 327 - Global Health Ethics (3)
HSCI 330 - Exploratory Strategies in Epidemiology (3)
HSCI 340 - Social Determinants of Health (3)
HSCI 488 - Directed Studies: Public Health Ethics Capstone (3)

and one of
STAT 302 - Analysis of Experimental and Observational Data (3)
STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)

(Recommended course is STAT 305)
and at least one 400-level health sciences course.
Calendar Entry Change
Name of Program or Name of Faculty – Faculty of Health Sciences – BA Program

Rationale for change:
Changes to the Health Sciences major programs are necessary to indicate that the upper-division W course must be in the student's major subject. In the case of Health Sciences, HSCI 319W is the only upper division W course and should be listed as a mandatory course.

Due to changes in course equivalencies for STAT 305 and STAT 302, the Faculty of Health Sciences indicates that though STAT 305 is the recommended course, the STAT 302 course will also be acceptable. Without this change, the APR tool will incorrectly indicate to students that STAT 302 is unsatisfactory.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:

Health Sciences Major – Bachelor of Arts
Health Sciences Honours – Bachelor of Arts

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Students complete all of

HSCI 304 - Perspectives on Human Health and the Environment (3)
HSCI 305 - The Canadian Health System (3)
HSCI 307 - Research Methods in Health Sciences (3)
HSCI 312 - Health Promotion: Individuals and Communities (3)
**HSCI 319W - Applied Health Ethics (3)**
HSCI 330 - Exploratory Strategies in Epidemiology (3)
HSCI 340 - Social Determinants of Health (3)
STAT 305—Introduction to Biostatistical Methods for Health Sciences (3)

and one of

HSCI 319W—Applied Health Ethics (3)
HSCI 327—Global Health Ethics (3)

February 2016
and one of

STAT 302 - Analysis of Experimental and Observational Data (3)
STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)

(Recommended course is STAT 305)

and at least 12 additional upper division HSCI units.
Calendar Entry Change  
Name of Program or Name of Faculty – Faculty of Health Sciences – BSc Program

**Rationale for change:**
Changes to the Health Sciences major programs are necessary to indicate that the upper-division W course must be in the student's major subject. In the case of Health Sciences, HSCI 319W is the only upper division W course and should be listed as a mandatory course.

**Effective term and year:** Summer 2019

The following program(s) will be affected by these changes:

- Health Sciences Major – Bachelor of Science – Life Sciences concentration
- Health Sciences Honours – Bachelor of Science – Life Sciences concentration

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold**.

<table>
<thead>
<tr>
<th>Students complete all of</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI 305 - The Canadian Health System (3)</td>
</tr>
<tr>
<td><strong>HSCI 319W - Applied Health Ethics (3)</strong></td>
</tr>
<tr>
<td>HSCI 321 - Human Pathophysiology (3)</td>
</tr>
<tr>
<td>HSCI 324 - Human Population Genetics and Evolution (3)</td>
</tr>
<tr>
<td>HSCI 330 - Exploratory Strategies in Epidemiology (3)</td>
</tr>
<tr>
<td>MBB 331 - Molecular Biology (4)</td>
</tr>
</tbody>
</table>

and one of

<table>
<thead>
<tr>
<th>and one of</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 302 - Analysis of Experimental and Observational Data (3)</td>
</tr>
<tr>
<td>STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)</td>
</tr>
</tbody>
</table>

and one of

<table>
<thead>
<tr>
<th>and one of</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI 319W - Applied Health Ethics (3)</td>
</tr>
<tr>
<td>HSCI 327 - Global Health Ethics (3)</td>
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</tbody>
</table>
Calendar Entry Change
Name of Program or Name of Faculty – Faculty of Health Sciences – BSc Program

Rationale for change:
Changes to the Health Sciences major programs are necessary to indicate that the upper-division W course must be in the student's major subject. In the case of Health Sciences, HSCI 319W is the only upper division W course and should be listed as a mandatory course.

To strengthen the quantitative component of the PQHS curriculum, there will be a requirement to complete two instead of only one designated population health quantitative course. To allow for more flexibility in course options, students will be able to select from a broader range of upper division HSCI courses while still maintaining the same number of total upper division units required previously.

Effective term and year: **Summer 2019**

The following program(s) will be affected by these changes:

**Health Sciences Major – Bachelor of Science- PQHS concentration**
**Health Sciences Honours- Bachelor of Science- PQHS concentration**

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold**.

Students complete all of

HSCI 305 - The Canadian Health System (3)
HSCI 307 - Research Methods in Health Sciences (3)
**HSCI 319W - Applied Health Ethics (3)**
HSCI 324 - Human Population Genetics and Evolution (3)
HSCI 330 - Exploratory Strategies in Epidemiology (3)

and one of

STAT 302 - Analysis of Experimental and Observational Data (3)
STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)

and one of

HSCI 319W – Applied Health Ethics (3)
HSCI 327 — Global Health Ethics (3)

and at least six of the following courses, which include a minimum of one as indicated by +

BISC 441 — Evolution of Health and Disease (3)
BISC 422 — Population Genetics (3)
HSCI 304 — Perspectives on Human Health and the Environment (3)
HSCI 340 — Social Determinants of Health (3)
HSCI 410 — Exploratory Data Analysis (3) +
HSCI 416 — Health Services Research (4) +
HSCI 424 — Strategic Applications of GIS in Health (4) +
HSCI 431 — The Global HIV/AIDS Epidemic (3)
HSCI 432 — Seminar in Epidemiology (3) +
HSCI 478 — Seminar in Molecular Epidemiology of Infectious Diseases (3) +
HSCI 484 — Senior Seminar in Social Health Science (3)
HSCI 483 — Senior Seminar in Environmental Health (3)
HSCI 484 — Senior Seminar in Population Health Research (3) +
HSCI 485 — Senior Seminar in Mental Health and Addictions (3)
HSCI 486 — Senior Seminar in Global Health (3)
MBB 441 — Bioinformatics (3)
REM 412 — Environmental Modeling (3)
SA 355 — Quantitative Methods (S) (4) +

and at least two of the following courses
HSCI 410 — Exploratory Data Analysis (3)
HSCI 416 — Health Services Research (4)
HSCI 424 — Strategic Applications of GIS in Health (4)
HSCI 432 — Seminar in Epidemiology (3)
HSCI 478 — Seminar in Molecular Epidemiology of Infectious Diseases (3)
HSCI 484 — Senior Seminar in Population Health Research (3)

and at least 12 additional upper division HSCI units.
Calendar Entry Change: Revise upper division course requirements for MBB Minors.
Name of Program or Name of Faculty: MBB

Rationale for change: Requirements are out of date - there are no course combinations that will add up to 14 units and MBB 400 is no longer offered. MBB Minors are permitted to take a 3- or 5-unit Individual Research Semester (ISS) course (MBB 491-5 or 498-3) but other ISS courses are reserved for Honors students.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:
MBB Minors

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements
Students complete a total of 14-18 units, consisting a minimum of five upper division MBB courses (and any some of which may have lower division prerequisites), which may include one of MBB 491 or 498 but excludes MBB 400, 471, 481, 482, 483 and 492.
Calendar Entry Change: Change format of Upper Division Requirements course options so that hyperlinks can be added for each course.

Name of Program or Name of Faculty: MBB

Rationale for change: Format change for list of Research and Directed Readings course options so that hyperlinks can be added (MBB 491, MBB 498).

Effective term and year: Fall 2019

The following program(s) will be affected by these changes:
MBB Honours

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements

Students complete a minimum of five upper division MBB courses (some of which may have lower division prerequisites), which may include one of MBB 491 or 498.

MBB 491 - Individual Study Semester (5)
MBB 498 - Individual Study Semester (3)

but excludes MBB 471, 481, 482, 483 and 492.
Calendar Entry Change: add MBB 498 to list of Research and Directed Readings options
Name of Program or Name of Faculty: MBB

Rationale for change: MBB 498-3 (Individual Study Semester) is a new research course that should be added to the list of Research and Directed Readings course options.

Effective term and year: Summer 2019

The following program(s) will be affected by these changes:
MBB Honors

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Research and Directed Reading Courses
For honours degree credit, students are limited to 18 undergraduate research courses and/or directed reading units. These include courses such as MBB 471, 481, 482, 483, 490, 491, 492, 498 and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499).
Calendar Entry Change: add MBB 498 to list of Research and Directed Readings options
Name of Program or Name of Faculty: MBB

<table>
<thead>
<tr>
<th>Rationale for change: MBB 498-3 (Individual Study Semester) is a new research course that should be added to the list of Research and Directed Readings course options.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective term and year: Summer 2019</td>
</tr>
<tr>
<td>The following program(s) will be affected by these changes: MBB Majors</td>
</tr>
</tbody>
</table>

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Research and Directed Reading Courses
For degree credit, students are limited to nine undergraduate research and/or directed reading units. These include MBB 471, 481, 482, 483, 490, 491, 492, 498 and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499). If students complete more than nine units of these courses, they may not apply the extra units toward the degree total (120 units).
Calendar Entry Change: Change format of Research and Directed Reading Course options so that hyperlinks can be added for each course.

Name of Program or Name of Faculty: MBB

Rationale for change: Format change for list of Research and Directed Readings course options so that hyperlinks can be added for each MBB course (471, 481, 482, 483, 490, 491, 492, 498).

Effective term and year: Fall 2019

The following program(s) will be affected by these changes:
MBB Honours

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Research and Directed Reading Courses

For honours degree credit, students are limited to 18 undergraduate research courses and/or directed reading units. These include courses such as MBB 471, 481, 482, 483, 490, 491, 492, 498

MBB 471 - Undergraduate Colloquium (1)
MBB 481 - Individual Study Semester - Honours Thesis (5)
MBB 482 - Individual Study Semester - Honours Research Performance (5)
MBB 483 - Individual Study Semester - Honours Thesis Defense (5)
MBB 490 - Directed Readings in Molecular Biology and Biochemistry (2)
MBB 491 - Individual Study Semester (5)
MBB 492 - Individual Study Semester (10)
MBB 498 - Individual Study Semester (3)

and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499). If students complete more than 18 units of these courses, they may not apply the extra units toward the degree total (124 for honours). In addition, honours students may not complete more than 15 research and/or reading units in one term.
Calendar Entry Change: Change format of Research and Directed Reading Course options so that hyperlinks can be added for each course; remove MBB 481, 482, 483 and 492 as options.

Name of Program or Name of Faculty: MBB

Rationale for Change: Format change for list of Research and Directed Readings course options so that hyperlinks can be added for each MBB course (471, 490, 491, 498). Remove MBB 481, 482, 483 and 492 from this list as these courses are only available to Honours students.

Effective term and year: Fall 2019

The following program(s) will be affected by these changes:
MBB Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Research and Directed Reading Courses

For degree credit, students are limited to nine undergraduate research and/or directed reading units. These include MBB 471, 481, 482, 483, 490, 491, 492, 498.

MBB 471 - Undergraduate Colloquium (1)
MBB 490 - Directed Readings in Molecular Biology and Biochemistry (2)
MBB 491 - Individual Study Semester (5)
MBB 498 - Individual Study Semester (3)

and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499). If students complete more than nine units of these courses, they may not apply the extra units toward the degree total (120 units).
For information:

Acting under delegated authority at its meeting of September 13, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

a. Beedie School of Business (SCUS 18-52)

   (i) New Course Proposal: BUS 415-3, Applied Portfolio Management (Spring 2020)

b. Faculty of Health Sciences (SCUS 18-53)

   (i) New Course Proposal: HSCI 496-3, Special Topics in Experiential Global Health Learning
COURSE SUBJECT BUS
NUMBER 415

COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation
Applied Portfolio Management

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation
Applied Portfolio Management

CAMPUS where course will be normally taught: □ Burnaby □ Surrey □ Vancouver □ Great Northern Way □ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don’t include WQB or prerequisites info in this description box.
Explores how investment selections can be used to form different portfolios, how to assess the ex-ante risk of those portfolios, and how to analyze portfolio performance. There will be a strong emphasis on ethics, development of investment policy, and integration of environmental, social, and governance in portfolio management.

REPEAT FOR CREDIT □ YES □ NO How many times? □ □ Within a term? □ YES □ NO

LIBRARY RESOURCES
NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that serves as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

Library review done? □ Yes - no further resources are required

RATIONALE FOR INTRODUCTION OF THIS COURSE
This class was offered in Spring 2018 as a special topics course. It is taken by the BEAM (Beedie Endowment Asset Management) group of students who are engaged in investing $7 million of the Beedie Endowment Funds at SFU. The students are undergraduate students who have applied for and been admitted to the BEAM Group after an extensive interview process. The students commit to be part of the BEAM Group for two years.

Following four years where BEAM was supported by a single academic course, the second class was added in 2018. The second class was added to adapt to the asset management industry's move toward a more quantitative approach to portfolio formation and analysis. The second class also reinforces the emphasis on sustainability in investment, which has become more important for the industry.

The second class has enhanced the professionalism of the BEAM program. It should continue as permanent part of the Undergraduate Program.
NEW COURSE PROPOSAL

SCHEDULING AND ENROLLMENT INFORMATION

Term and year course would first be offered (e.g. FALL 2016): Spring 2020

Term in which course will typically be offered: [ ] Spring [ ] Summer [ ] Fall

Will this be a required or elective course in the curriculum? [ ] Required [ ] Elective

What is the probable enrollment when offered? Estimate: 10 students

UNITS
Indicate number of units: 3
Indicate no. of contact hours: [ ] Lecture 3 [ ] Seminar [ ] Tutorial [ ] Lab [ ] Other; explain below

OTHER

FACULTY
Which of your present CFL faculty have the expertise to offer this course?

Derek Yee, Peter Klein

WQB DESIGNATION
(attach approval from Curriculum Office)

PREREQUISITE AND / OR COREQUISITE
BUS 318, BUS 360W, 60 units.

EQUIVALENT COURSES
Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses?

Students who have taken BUS 493 when the subject of the course was Portfolio Management may not take this course for further credit.

September 2016
FEES
Are there any proposed student fees associated with this course other than tuition fees?  

COURSE - LEVEL EDUCATIONAL GOALS (OPTIONAL)

RESOURCES
List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

OTHER IMPLICATIONS
Final exam required  

Criminal Record Check required  

OVERLAP CHECK
Checking for overlap is the responsibility of the Associate Dean.
Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

Stephen Spector
COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

Special Topics in Experiential Global Health Learning

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

Experiential Global Health

CAMPUS where course will be normally taught:

☐ Burnaby  ☐ Surrey  ☐ Vancouver  ☒ Great Northern Way  ☒ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don't include WQB or prerequisites info in this description box.

A focus on inter-disciplinary approaches to understanding and addressing the global burden of disease and health inequities in socially and culturally diverse global settings. The intensive format is designed to foster hands-on, experiential learning in key principles and practices of global health, preparing students for research and practice.

REPEAT FOR CREDIT

☑ YES  ☐ NO  Total completions allowed 2  Within a term?

☐ YES  ☒ NO

LIBRARY RESOURCES

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that serves as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

RATIONALE FOR INTRODUCTION OF THIS COURSE

This intensive course is designed to provide advanced undergraduate and graduate students with experiential mentorship in health sciences research and practice in a global context. It is designed to meet the priority for high quality, ethical and socially responsible international learning experiences identified by the Faculty of Health Sciences, SFU’s International Engagement Strategy, and increasing demand and interest from FHS students in international and experiential learning opportunities to complement the didactic instruction currently offered on-campus. This course would also support FHS program accreditation by the Council for Education on Public Health (CEPH) by increasing opportunities for experiential education. It aims to prepare students for research and practice by providing a hands-on, intensive, experiential learning experience in which students will learn and apply key practices and principles of global health within socially and culturally diverse contexts and communities (e.g., South Africa, the Mexico-U.S. border region).

Prior versions of the proposed field course have been offered in South Africa in 2016, 2017, and 2018 (Instructors: Kaida, Steinberg) as well as at the Mexico-U.S. border in 2018 (Instructor: Goldenberg). These initiatives have been highly successful, attracting high-caliber senior undergraduate seeking applied training within global settings. Student feedback regarding these experiences has consistently demonstrated their unique value in supporting experiential, hands-on, and applied learning for students.
SCHEDULING AND ENROLLMENT INFORMATION
Term and year course would first be offered (e.g. FALL 2016) SUMMER 2019

Term in which course will typically be offered ✔ Spring ✔ Summer ✔ Fall
Other (describe) Course is designed to run in an intensive 7-14 day format

Will this be a required or elective course in the curriculum? □ Required ✔ Elective

What is the probable enrollment when offered? Estimate: 20

UNITS
Indicate number of units: 3
Indicate no. of contact hours: Lecture 20 Seminar 10 Tutorial Lab 16 Other; explain below

OTHER
Field-based activities in the community (e.g., visits to community groups and agencies)

FACULTY
Which of your present CFL faculty have the expertise to offer this course?

Angela Kaida, Shira Goldenberg, Malcolm Steinberg, John O'Neil

WQB DESIGNATION
(attach approval from Curriculum Office)

PREREQUISITE AND / OR COREQUISITE
HSCI 160, or equivalent and HSCI 330, or equivalent. An introductory language course may be a requirement for some course locations (SPAN-102/103 or equivalent for Mexico). Students enrolled in the course are required to register with the SFU International Travel Safety Program (https://pathfinder.sfu-horizons.symplicity.com/index.php?au=&ck=%26amp%3Bquot%3B) and to attend an
EQUIVALENT COURSES [For more information on equivalency, see Equivalency Statements under Information about Specific Course components.]

1. SEQUENTIAL COURSE [is not hard coded in the student information management system (SIMS).]

Students who have taken (place relevant course(s) in the blank below (ex: STAT 100)) first may not then take this course for further credit.

2. ONE-WAY EQUIVALENCY [is not hard coded in SIMS.]

(Place relevant course(s) in the blank below (ex: STAT 100)) will be accepted in lieu of this course.

3. TWO-WAY EQUIVALENCY [is hard coded and enforced by SIMS.]

Students with credit for (place relevant course(s) in the blank below (ex: STAT 100)) may not take this course for further credit.

Does the partner academic unit agree that this is a two-way equivalency?  □ YES  □ NO

Please also have the partner academic unit submit a course change form to update the course equivalency for their course(s).

4. SPECIAL TOPICS PRECLUSION STATEMENT [is not hard coded in SIMS.]

FEES

Are there any proposed student fees associated with this course other than tuition fees?  □ YES  □ NO

COURSE - LEVEL EDUCATIONAL GOALS [OPTIONAL]

EXPECTED OUTCOMES: Upon completion of this course, students should be able to:
• Describe interdisciplinary aspects of current prevention, treatment, and care initiatives for key infectious and non-infectious diseases of global public health priority
• Describe how complex, intersecting inequities and processes fuel one or more infectious or non-infectious conditions of global public health priority
• Critically assess the connections between health inequities, social and structural determinants, and access to and outcomes of public health interventions in the global south
• Cultivate a global academic and professional network
• Develop skills in community engagement and cultural sensitivity
RESOURCES
List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

OTHER IMPLICATIONS
Final exam required □ YES ☑ NO
Criminal Record Check required □ YES ☑ NO

OVERLAP CHECK
Checking for overlap is the responsibility of the Associate Dean.
Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator
Angela Kaida & Shira Goldenberg
MEMORANDUM

ATTENTION

FROM

RE:

Senate
Wade Parkhouse, Chair
Senate Committee on
Undergraduate Studies
Course Changes (SCUS 18-51)

DATE
September 14, 2018

PAGES
1/2

For information:

Acting under delegated authority at its meeting of September 13, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

a. Faculty of Applied Sciences

1. School of Mechatronic Systems Engineering

   (i) Description change for MSE 211
   (ii) Prerequisite change for MSE 220, 312, 410, 411 and 450
   (iii) Title change for MSE 425

b. Beedie School of Business

   (i) Description change for BUS 425
   (ii) Prerequisite change for BUS 217W, 345, 360W, 362, 401, 437, 439, 440, 445, 470

c. Faculty of Communication, Art and Technology

1. School of Communication

   (i) Description change for CMNS 496

2. School of Interactive Arts and Technology

   (i) Description change for IAT 375

d. Faculty of Education

   (i) Prerequisite change for EDUC 382 and 441

Page 1
e. Faculty of Health Sciences

   (i) Equivalent Statement change for HSCI 460
   (ii) Description change for HSCI 452

f. Faculty of Science

1. Department of Biomedical Physiology and Kinesiology

   (i) Prerequisite change for BPK 307 (Spring 2019)

2. Department of Molecular Biology and Biochemistry

   (i) Prerequisite change for MBB 302-B(s) (Fall 2019)
   (ii) Prerequisite change for MBB 342 and 432

3. Department of Statistics and Actuarial Science

   (i) Prerequisite change for STAT 430 (Fall 2019)
COURSE SUBJECT  MSE  NUMBER  211  TITLE  Computational Method for Engineers

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- [ ] Course number
- [ ] Units
- [ ] Prerequisite
- [ ] Title
- [X] Description
- [ ] Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

REPEAT FOR CREDIT RULES:

Total Units Allowed: 9-3

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

SUMMER 2019

November 2016
RATIONALE (must be included)

This is to correct the typo error for the total number of units allowed to repeat. To be aligned with the University policy on the number of times a student may repeat a course which is one (1).
COURSE SUBJECT | MSE | NUMBER 220 | TITLE | Engineering Materials

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

- Course number [ ]
- Units [ ]
- Prerequisite [X]
- Title [ ]
- Description [ ]
- Equivalent Statement [ ]

**WORDING/DESCRIPTION EDITS.** Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Prerequisite: CHEM 120 or 121; PHYS 140 or [120 121]. Students with credit for ENSC 231 or ENSC 330 may not take MSE 220 for further credit.

**EFFECTIVE TERM AND YEAR FOR CHANGES**
Fall, Spring, Summer and year (please enter in textbox)

**SUMMER 2019**
RATIONALE (must be included)

Typo is corrected.
COURSE SUBJECT  MSE   NUMBER  312   TITLE  Mechatronics Design II

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- □ Course number
- □ Units
- □ Prerequisite  X
- □ Title
- □ Description
- □ Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Prerequisite: MSE 110 (or ENSC 182), MSE 320 (or ENSC 382), MSE 380 (or ENSC 381). MSE 320 and MSE 380 may be taken concurrently. Students with credit for ENSC 384 may not take MSE 312 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

MSE 320 and MSE 380 are not offered in the same semester.
<table>
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<tbody>
<tr>
<td>MSE</td>
<td>410</td>
<td>Capstone Design Technical Project 1</td>
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**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite: ☒
- Title
- Description
- Equivalent Statement

**WORDING/DESCRIPTION EDITS.** Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Prerequisite: 100 units and completion of two co-op terms (MSE 293/294 and MSE 394). Completion of at least 24 credit units from the upper division list of MSE curriculum courses and completion of two co-op terms (MSE 293/294 and MSE 393/394). Must not be taken concurrently with MSE 493/MSE 494. Students with credit for ENSC 444 405W may not take this course for further credit.

**EFFECTIVE TERM AND YEAR FOR CHANGES**

Fall, Spring, Summer and year (please enter in textbox)

- Summer 2019

November 2016
RATIONALE (must be included)

The prerequisite list is refined to ensure that students have completed sufficient number of course before taking Capstone project course. Also, students must not concurrently take this course with the co-op course.
COURSE SUBJECT MSE NUMBER 411 TITLE Capstone Design Technical Project II

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite
- Title
- Description
- Equivalent

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Prerequisite: MSE 410: Capstone Design Technical Project I. Must not be taken concurrently with MSE 493/MSE 494. Students with credit for ENSC 440 may not take MSE 411 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONALE (must be included)

The additional requirement is to ensure that students do not register concurrently for a co-op and MSE 411.
COURSE SUBJECT  MSE  NUMBER  450  TITLE  Real-Time and Embedded Control Systems

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  ☐  Units  ☐  Prerequisite  ☒
Title  ☐  Description  ☐  Equivalent Statement  ☐

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strikethrough, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Prerequisite: Completion of at least 90 units including MSE 352 and MSE 381 (or ENSC 383) and a minimum of 80 credits. Students who have taken, or are currently enrolled in ENSC 351 or ENSC 451 cannot take MSE 450 for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

□ Summer 2019
RATIONALE (must be included)

The segment "minimum of 80 credits" is redundant and we propose to remove it.
COURSE SUBJECT  MSE  NUMBER  425  TITLE  Nano Manufacturing for Nano-scale Devices

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- [ ] Course number
- [X] Units
- [ ] Prerequisite
- [ ] Title
- [X] Description
- [ ] Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Nano Manufacturing for Nano-scale Devices

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

The instructor of the course has requested to change the title of this course to reflect its actual content.
COURSE SUBJECT  BUS  NUMBER  425  TITLE  Co-op Practicum V

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

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<tr>
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<th>Prerequisite</th>
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This is the fifth term of work experience for students in the Co-operative Education Program. It provides an opportunity to integrate theory and practice. This course is open only to co-op students. The co-op program co-ordinator must be contacted at the beginning of the term prior to enrollment for this course. Units for this course do not count towards the units required for an SFU degree. **This course may be repeated for credit.**

**EFFECTIVE TERM AND YEAR FOR CHANGES**
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONAL

Students sometimes complete additional Co-op work terms and there is currently no way to indicate this on the transcript using a 400-level course. The 400-level course indicates that it was an additional (6th) Co-op completed later in the degree program.
<table>
<thead>
<tr>
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<th>NUMBER</th>
<th>217W</th>
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**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):  

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<th>Units</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Equivalent Statement</th>
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Examine and review today's global economy through critical analysis of differing perspectives. Develop and improve critical thinking and communication skills appropriate to the business environment. Prerequisite: BUS 201 and 15 units; OR 45 units and corequisite: BUS 202; OR approved Business Administration joint major, joint honours, or double degrees students with 45 units; OR Data Science majors with 15 units. Writing.

**EFFECTIVE TERM AND YEAR FOR CHANGES**  
Fall, Spring, Summer and year (please enter in textbox)  

Summer 2019

November 2016
RATIONALE (must be included)

When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students. Some edits have been made for consistency with other business course prerequisites (removing the word "approved").
COURSE MODIFICATION FORM

COURSE SUBJECT | BUS | NUMBER | 345 | TITLE | Marketing Research

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number ☐  Units  ☐  Prerequisite  ☒
Title  ☐  Description  ☐  Equivalent Statement  ☐

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

A course in the management of marketing research. The basics of the design, conduct, and analysis of marketing research studies. Prerequisite: BUS 343, 336; 45 units; OR Data Science majors with BUS 343 and 45 units. Students with credit for BUS 442 may not complete this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.
COURSE SUBJECT: BUS 360W
TITLE: Business Communication

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite
- Title
- Description
- Equivalent
- Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

This course is designed to assist students to improve their written and oral communication skills in business settings. The theory and practice of business communication will be presented. Topics include analysis of communication problems, message character, message monitoring, message media. Exercises in individual and group messages and presentations will be conducted. Prerequisite: This course is only open to students admitted prior to Fall 2014 to the Business Administration major, honours, or second degree program and who have 45 units, OR to students admitted Fall 2014 - Summer 2017 to the Business Administration major, honours, or second degree program and who have 45 units and BUS 130 or 201 or 202 or 301, OR to students admitted Fall 2017 - onwards to the Business Administration major, honours, or second degree program and who have 45 units and BUS 130 or 201 or 202 or 301 and BUS 217W, OR to approved Business Administration joint major, joint honours, or double degree students with 45 units, OR to approved Management Systems Science or Actuarial Science majors with 45 units OR to Data Science majors with BUS 217W and 45 units. Students who have taken BUS 360 may not take this course for further credit. Writing.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.

Some edits have been made for consistency with other business course prerequisites (removing the word "approved").

There is also a typo letter (a missing "s") that should be added.

November 2016
COURSE MODIFICATION FORM

COURSE SUBJECT: BUS  NUMBER: 362  TITLE: Business Process Analysis

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite

- Title
- Description
- Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Prepares students to model, analyze and propose improvements to business processes. In the major project, students analyze a process within an organization and use current techniques and tools to propose changes and a supporting information system. Prerequisite: BUS 237; 45 units; OR Data Science majors with 45 units. Students with credit for BUS 394 may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.

November 2016
COURSE SUBJECT | BUS  | NUMBER | 401 | TITLE | Developing Organizational Opportunities

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

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Prerequisite: Bus BUS 311 OR BUS 254 and 312, Bus BUS 340, BUS 341, and 60 units. The course is only open to students in the Business Minor program.

**EFFECTIVE TERM AND YEAR FOR CHANGES**
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONALE (must be included)

Students who take BUS 254 & BUS 312 before they get into the Business Minor receive a waiver for BUS 311 (and can take this pair of courses in place of BUS 311), so we would like to recognize this possibility in the BUS 401 prerequisite. This will also make it clear that students need both of BUS 254 & 312 to replace BUS 311 (not just one or the other).

We have also capitalized "BUS" in the prerequisites to be consistent in the calendar (it is capitalized in other course prereqs).
COURSE SUBJECT  BUS  NUMBER 437  TITLE Decision Analysis in Business

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  X

Title  □  Description  □  Equivalent Statement  □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

A seminar in the use of Bayesian techniques in business decisions. Prerequisite: BUS 336, 360W; 60 units; OR Data Science majors with BUS 360W and 60 units.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.
## COURSE MODIFICATION FORM

**COURSE SUBJECT** | **BUS**  
**NUMBER** | **439**  
**TITLE** | **Analytics Project**

### TYPE OF CHANGES

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<tr>
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### WORDING/DESCRIPTION EDITS

Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Examines complex, real-world decision making issues using an evidence-based approach that employs decision making strategies involving statistics, data management, analytics, and decision theory. Through a major decision making project within the community, students will experience first-hand the process of consultation, data acquisition, analysis, and recommendation. Prerequisite: BUS 345 or BUS 440, BUS 360W, BUS 437 or BUS 441, BUS 445, BUS 462, and BUS 464; BUS 345 or BUS 440, 90 units; OR Data Science majors with BUS 360W, BUS 445, and 90 units.

### EFFECTIVE TERM AND YEAR FOR CHANGES

Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students. Other changes are to provide consistency among prerequisite language on Business courses.
COURSE SUBJECT  BUS  NUMBER  440  TITLE  Simulation in Management Decision-making

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

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<th>Course number</th>
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WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Development and use of simulation models as an aid in making complex management decisions. Hands on use of business related tools for computer simulation. Issues related to design and validation of simulation models, the assessment of input data, and the interpretation and use of simulation output. Prerequisite: BUS 336, 360W, 60 units; OR Data Science majors with BUS 360W, 60 units.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.
COURSE MODIFICATION FORM

COURSE SUBJECT | BUS | NUMBER | 445 | TITLE | Customer Analytics

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number □ | Units □ | Prerequisite XV

Title □ | Description □ | Equivalent Statement □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Exposes students to the art of using analytic tools from across the spectrum of data mining and modeling to provide powerful competitive advantage in business. Students will learn to recognize when a method should or should not be used, what data is required, and how to use the software tools. Areas covered include database marketing, geospatial marketing and fundamental strategic and tactical decisions such as segmentation, targeting and allocating resources to the marketing mix. Prerequisite: BUS 343, 336, 360W, 60 units; OR Data Science majors with BUS 343, 360W and 60 units.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)
Summer 2019

November 2016
When the Data Science program was created, we discussed course access and prerequisite waivers for a number of business courses for their students, but these were not updated in the calendar. We are now adding these adjusted prerequisites to the calendar to provide clearer messaging for students.
**COURSE SUBJECT** | **BUS**  
**NUMBER** | **470**  
**TITLE** | Business Applications of Game Theory

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

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<th>Course number</th>
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Game theory is the systematic study of the strategic interactions between economic entities. This course introduces students to the basic concepts of game theory in strategic decision making in a business setting. Games with increasing complexity will be analyzed, with the emphasis on developing a student’s ability to think analytically and recognize strategic interactions in strategic management scenarios. Prerequisite: 60 units; BUS 207 or ECON 201, BUS 360W.

**EFFECTIVE TERM AND YEAR FOR CHANGES**
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

Students in Business programs may take either BUS 207 or ECON 201 for their degree requirements, and for the purposes of a Business program either of these courses may satisfy the prerequisites on Business courses.
An optional 5th term of work experience for students in the School of Communication Co-operative Education Program. Units from this course do not count towards the units required for an SFU degree. Prerequisite: CMNS 495. Graded as pass/fail (P/F).

This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

[Summer 2019]

RATIONALE (must be included)

In some circumstances, students may be completing additional CMNS co-op work term(s) beyond the final course available.
COURSE MODIFICATION FORM

COURSE SUBJECT | IAT | NUMBER | 375 | TITLE | Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- [ ] Course number
- [ ] Units
- [x] Prerequisite
- [ ] Title
- [x] Description
- [ ] Equivalent

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Optional fifth term of work experience for students in the SIAT Co-operative Education Program. Units from this course do not count towards completion of an SFU degree. Graded as pass/fail. Prerequisite: IAT 374 (or WKT M400). This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

- Summer 2019

RATIONALE (must be included)

In some instances, students may complete additional co-op work terms beyond the final course available.

November 2016
Prerequisite: 60 units. Students who have received credit for EDUC 441, cannot take EDUC 382 for further credit.

Edc 382 and Educ 441 are two distinct courses with different content. It does not make sense to prevent students from taking both.
TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  X
Title  □  Description  □  Equivalent  □  Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Prerequisite: EDUC 401/402 or corequisite EDUC 403, or EDUC 100, or EDUC 230, or EDUC 240 or EDUC 250. Students with credit for EDUC 382: Diversity in Education: Theories, Policies, Practices may not take this course for further credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

RATIONALE (must be included)

Educ 382 and Educ 441 are two distinct courses with different content. It does not make sense to prevent students from taking both.
## Course Modification Form

**Course Subject:** HSCI  
**Number:** 460  
**Title:** Population and Public Health Advocacy

### Type of Changes

Please type 'X' for the appropriate revision(s):

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<thead>
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<td>Equivalent Statement</td>
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### Wording/Description Edits

Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

**Students with credit for HSCI 471 under the title "Special Topics: Public Health Advocacy" may not take this course for further credit.**

### Effective Term and Year for Changes

Fall, Spring, Summer and year (please enter in textbox)

- Summer, 2019
RATIONALE (must be included)

The revision identifies preclusions for students who have taken prior editions of this course as a special topics.
COURSE MODIFICATION FORM

COURSE SUBJECT  HSCI  NUMBER  452  TITLE  Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite
- Title
- Description
- Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
COURSE SUBJECT | BPK | NUMBER | 307 | TITLE | Human Physiology III

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- □ Course number
- □ Units
- □ Prerequisite ☒
- □ Title
- □ Description
- □ Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

**BPK 307 - Human Physiology III (3)**

A detailed examination of the physiology and pathophysiology of the gastrointestinal, renal, endocrine, immune and reproductive systems. The course focuses on integration of physiological mechanisms at the molecular, cellular and systems levels. Prerequisite: BPK 305. Corequisite: BPK 306; however, students who took BPK 306 prior to Fall 2017, cannot take this course. Majors from outside BPK require BPK 205 (or BISC 305), MBB 231 (or 201), MATH 155 or 152 plus permission of the instructor.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Spring 2019

RATIONALE (must be included)

When BPK 307 was created the content of BPK 306 was also changed. The new version of BPK 306 (Fall 2017 onwards) was designed to be the prerequisite course for BPK 307. The old version of BPK 306 (prior to Fall 2017) is not adequate as a prerequisite for BPK 307 due the substantial content change.

November 2016
COURSE SUBJECT MBB  NUMBER 302-B(S)  TITLE Energy: From Cells to Society (3)

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  X
Title  □  Description  □  Equivalent Statement  □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Energy sustains life, from early cells, through molecular machines and ecosystems, to industrial society. Social issues, such as the search for extraterrestrial life, obesity, death and climate change will provide context for understanding the science of energy. Energy flow drove the origin of life and is required to sustain life. From molecular machines to ecosystems, the capture and flow of energy defines life. Human use of fossil fuels is explored as a transformative evolutionary development. This course is only open to students in the Faculties of Applied Sciences, Arts and Social Sciences, Communication, Art and Technology, Education, Beedie School of Business and Health Sciences (Bachelor of Arts Degree Program only). Prerequisite: 45 units. Breadth - Science.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Fall 2019

RATIONALE (must be included)

The description has been revised for a more focused course, and to restrict enrolment. As a Science Breadth course, MBB 302 was originally open to all students. In the first offering (Summer 2018), approximately half the class were MBB or Biology Majors and half were non-Science students. The huge disparity in knowledge between the MBB/Biology students and non-Science students made it challenging to sustain the interests of all students and to provide assignments that could be graded fairly. Restricting this course to non-Science Majors who do not typically take life sciences courses will solve this problem and will improve the learning experience for these students.

November 2016
COURSE SUBJECT: MBB
NUMBER: 342-3
TITLE: Introductory Genomics and Bioinformatics

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number □ Units □ Prerequisite X
Title □ Description □ Equivalent Statement □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Major topics in genomics and bioinformatics, with integrated discussion of associated ethical/legal/social issues. An overview of laboratory and computer-based methods to study genomes, and their applications. Hands-on computer lab session providing an opportunity to use and experiment with bioinformatics software and databases utilized in genomics and bioinformatics research. Prerequisite: MBB 231, BISC 202 and either MBB 243 or 3 units of CMPT or equivalent, all with a minimum grade of C. Recommended: STAT 201 (or an equivalent statistics course) or STAT 270.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

RATIONALE (must be included)

MBB 243-3 (Data Analysis for Molecular Biology and Biochemistry) is a new course that can serve as a prereq for MBB 342 as an alternative to 3 units of CMPT.

November 2016
COURSE MODIFICATION FORM

COURSE SUBJECT  MBB  NUMBER  432-4  TITLE  Advanced Molecular Biology Techniques

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  X
Title  □  Description  □  Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

MBB 432 - Advanced Molecular Biology Techniques (4)

Laboratory with accompanying lectures designed to give practical experience in advanced contemporary molecular biology techniques. Projects will involve recombinant gene and protein manipulations to investigate the dynamics of proteins within living cells. Prerequisite: MBB 309W, MBB 308 and MBB 331, all with a minimum grade of C, or permission of instructor. Recommended: MBB 309W.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

RATIONALE (must be included)

Having 2 lab courses, MBB 308 and 309W, plus MBB 331 as prereqs for MBB 432 limits enrollment, which has already suffered from moving this course from a Fall to Summer offering. Changing the MBB 309W to "recommended" instead of "required" will allow more students to take MBB 432. The instructor will adapt the course accordingly.

November 2016
COURSE SUBJECT  STAT  NUMBER  430  TITLE  Statistical Design & Analysis of Experiments

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  X

Title  □  Description  □  Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

An extension of the designs discussed in STAT 350 to include more than one blocking variable, incomplete block designs, fractional factorial designs, and response surface methods. Prerequisite: STAT 350 (or MATH 372). Quantitative.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Fall 2019

RATIONALE (must be included)

MATH 372 no longer exists.

November 2016
MEMORANDUM

ATTENTION: Senate  
FROM: Wade Parkhouse, Chair Senate Committee on Undergraduate Studies  
RE: Program Changes

For information:

Acting under delegated authority at its meeting of October 11, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

a. Beedie School of Business (SCUS 18-63)

(i) Requirement changes to the Certificate in Business Technology Management
(ii) Revision of calendar language for the Corporate Environmental and Social Sustainability Certificate
(iii) Requirement changes to the Business and Economics Joint Major
(iv) Admission requirement changes to the major program for internal transfers
(v) Requirement changes to the Innovation & Entrepreneurship Certificate
(vi) Changes to the International Co-Op component of the International Experiential Learning Certificate
(vii) Requirement changes to the Business and Mechatronics Systems Engineering Double Degree and the Business and Economics Joint Major programs
(viii) Upper division requirement changes to the:
   • Business and Communication Joint Major
   • Business and Economic Joint Major
   • Business and Geography Joint Major
(ix) Upper division requirement changes to the:
   • Interactive Arts and Technology and Business joint Major – BA or BBA
   • Interactive Arts and Technology and Business Joint Major – BSc
(x) Upper division requirement changes to the MBB & Business Joint Major
(xi) Requirement changes to the Mechatronic Systems Engineering and Business Double Degree Program Major
(xii) Lower division requirement changes to the Business and Psychology Joint Major
(xiii) Upper division requirement changes to the Business and Molecular Biology & Biochemistry Joint Honours
(xiv) Upper division requirement changes to the Information Systems in Business Administration and Computing Science Joint Major
(xv) Upper division requirement changes to the Sustainable Business Joint Major
(xvi) Requirement changes to the Business and Economics Joint Honours
(xvii) Requirement changes to the Business Administration Major and Honours
(xviii) Requirement changes to the:
  • Business & Mechatronics Systems Engineering Double Degree
  • Business & Economics Joint Major
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
These updates to the description of the experiential component of this certificate will clarify the requirements for students and correct some typos in the previous language.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Certificate in Business Technology Management

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Limitations
Students may complete either the Certificate in Business Technology Management or the Certificate in Business Analytics and Decision Making, but not both certificates.

Additionally, units applied to one certificate may not be applied to another Simon Fraser University certificate or diploma, as noted here.

Grade Requirements
In addition to normal university grade point average requirements, the Beedie School of Business requires a minimum 2.30 overall SFU Business course grade point average for entry into all 300 and 400 division business courses.

For a course to be accepted as fulfilling a prerequisite, or for a lower division requirement, or for a core course to be accepted in a student’s program in business, a student must have obtained a minimum grade of C- (C minus).

Program Requirements
Students complete a minimum of 26 to 28 units, including 5 core courses, one of the TWO specializations, and an experiential component, as below. The number of units will differ based on the BTM specialization selected by student (BTM-MIS=28, BTM-Financial Services=26)

Core Courses
Students must complete all of
BUS 361 - Project Management (3)
BUS 362 - Business Process Analysis (4)
BUS 462 - Business Analytics (3)
BUS 464 - Business Data Management (3)
BUS 468 - Managing Information Technology for Business Value (3)

Students must complete the courses associated with one of the two following specializations for the certificate:

Management Information Systems Specialization
BUS 465 - Business Systems Development (3)
and any two of
BUS 338 - Foundations of Innovation (3)
BUS 466 - Web-Enabled Business (3)
BUS 486 - Leadership (3)
and one of
CMPT 120 - Introduction to Computing Science and Programming I (3)
CMPT 165 - Introduction to the Internet and the World Wide Web (3)
IAT 201 - Human-Computer Interaction and Cognition (3)

Financial Services Specialization
All of
BUS 410 - Financial Institutions (3)
BUS 413 - Corporate Finance (4)
BUS 418 - International Financial Management (3)
Both the Financial Services and Management Information Systems specializations also require the completion of one of the following approved experiential or service learning components:

Experience in a volunteer, internship, research assistantship or other non co-op work role within a student group, social enterprise, charitable organization, or non-profit organization related to Business and Technology.* Prior approval is required before the commencement of this experience by submitting a detailed outline describing activities that will be undertaken. Upon completion of these activities, students must submit a detailed outline and description of activities.

Successful completion of at least one Co-operative Education (Co-op) work term with a focus related to Business and Technology.* A description (written by either the student or the organization and signed and validated by the employer/supervisor) of the organization, and the student's role and activities undertaken with that organization, and signed and validated by the employer/supervisor must be submitted.

*Experience which will be considered relevant includes those that require a significant amount of work activities such as: (i) planning, managing and/or leading a business technology project; (ii) analyzing a business need and presenting a technology based solution or plan to address need; (iii) designing and presenting a technology enabled solution to a business problem; (iv) analyzing a business process and developing a plan to implement a technology enabled solution; and/or (v) developing a technology based solution to a business problem.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Updating the punctuation makes it clear that this sentence introduces the list that follows. The period after “students will submit to the Academic Director – Business Major” should be changed to a colon.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Corporate Environmental and Social Sustainability Certificate

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upon completion of the experiential component, students will submit to the Academic Director - Business Major:

a description (written by either the student or the organization) of the organization and the student’s role in the organization, signed and validated by the employer/supervisor
a reflective 500 word essay about the student’s work/volunteer experience that identifies key corporate environmental and social sustainability experiences and how that influenced their current thinking about the implications of business practice on society and the environment. The essay will be graded pass/fail.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
These edits are consistent with those made to the Business Major admission section of the calendar, which was also recently updated. These edits provide a description of the admissions process in clearer, more consistent language.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Economics Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Beedie School of Business Admission Requirements

Joint Major applicants should apply to Beedie through the internal transfer process, which is outlined here, after completing 30 units, including the eight lower division courses required for admission. Students must already be accepted to the Economics portion of the Joint Major or be eligible for admission that term.

Internal transfer (Category 3 or 4) applicants should apply to Beedie by submitting a supplemental application form after completing 30 units (including lower division requirements, except BUS 217W and BUS 254), meeting a minimum 2.30 overall SFU Business course grade point average, and must either already be accepted to the Economics portion of the Joint Major or be eligible for admission that term. The supplemental application can be found on Beedie’s website.

Students not accepted upon initial application may reapply. Unsuccessful applicants may are permitted to appeal through the faculty admissions appeals committee.

Application Deadlines
Visit http://beedie.sfu.ca/bba/apply for application deadlines.

April 2016
Calendar Entry Change  
Beedie School of Business Undergraduate Program

Rationale for change:  
Business students are not permitted to use Business courses to satisfy one portion of the certificate requirements (as it would provide too much overlap between their degree requirements and the certificate). 
Previously all the business courses were listed, however as the list is growing we have decided to clearly indicate that business students may not use business courses to satisfy this particular requirement.

Effective term and year:  
Summer 2019

The following program(s) will be affected by these changes:  
Innovation & Entrepreneurship Certificate

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Innovation and Entrepreneurship  
CERTIFICATE

Admission Requirements  
A student in any faculty at SFU may declare this certificate through the Beedie School of Business.

Limitations  
Students may complete only one of the Certificate in Business Analytics and Decision Making, the Certificate in Business Technology Management, or the Certificate in Innovation and Entrepreneurship.

Additionally, units applied to one certificate may not be applied to another Simon Fraser University certificate or diploma, as noted here.

Grade Requirements  
In addition to normal university grade point average requirements, the Beedie School of Business requires a minimum 2.30 overall SFU Business course grade point average for entry into all 300 and 400 division business courses.

For a course to be accepted as fulfilling a prerequisite, or for a lower division requirement, or for a core course to be accepted in a student’s program in business, a student must have obtained a minimum grade of C- (C minus).

Program Requirements

April 2016
Students must complete the following, including foundational business courses, a capstone course, and additional coursework from a variety of disciplines.

Students will complete all of:

BUS 238 - Introduction to Entrepreneurship and Innovation (3)
BUS 314 - Resourcing New Ventures (3)
BUS 338 - Foundations of Innovation (3)
BUS 361 - Project Management (3)

And one of:

BUS 477 - Startup Experience (4)
CA 489 - Interdisciplinary Project in FPA (5)
ENV 495 - Environmental Capstone (4)**
HSCI 495 - Applied Health Science Project (4)
IAT 430 - Business of Design III: Refinement and Production (3) ^ and BUS 476 - Business of Design IV - Promotion, Packaging and Launch - Launching a Design-Led Business (4) ^
IAT 499 - Graduation Project (6)
MSE 410 - Capstone Design Technical Project I (3) ^^ and MSE 411W - Capstone Design Technical Project II (3) ^^

Students# will complete two of:

BUS 339 - Business of Design II - Iteration and Prototyping (4)
BISC 373 - Brewing Science (2) or BISC 374 - Brewing Science with Lab (3)
BUS 406 - Startup Accelerator (3)
BUS 443 - New Product Development and Design (3)
BUS 450 - Managing Emerging Opportunities (3)
BUS 453 - Sustainable Innovation (3)
BUS 490 - Selected Topics in Business Administration (3) ***
BUS 491 - Selected Topics in Business Administration (3) ***
BUS 492 - Selected Topics in Business Administration (3) ***
BUS 493 - Selected Topics in Business Administration (3) ***
BUS 494 - Selected Topics in Business Administration (3) ***
BUS 495 - Selected Topics in Business Administration (3) ***
BUS 496 - Selected Topics in Business Administration (5) ***
CA 381 - Thriving as a Cultural Entrepreneur (3)
CMNS 425 - Applied Communication for Social Issues (4)
CMPT 120 - Introduction to Computing Science and Programming I (3)
CMPT 320 - Social Implications - Computerized Society (3)
HSCI 130 - Foundations of Health Science (4)
HSCI 305 - The Canadian Health System (3)
HSCI 312 - Health Promotion: Individuals and Communities (3)

April 2016
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<tbody>
<tr>
<td>IAT 330</td>
<td>Business of Design I: Introduction</td>
<td>(3)</td>
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<tr>
<td>IAT 333</td>
<td>Interaction Design Methods</td>
<td>(3)</td>
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<td>IAT 431</td>
<td>Speculative Design</td>
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<td>IAT 481</td>
<td>Special Topics in Interactive Arts and Technology</td>
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<td>MSE 110</td>
<td>Mechatronics Design I</td>
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<td>MSE 111</td>
<td>Mechatronics for non-Engineers</td>
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<tr>
<td>POL 150</td>
<td>Science, Policy, and Innovation</td>
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<tr>
<td>POL 457W</td>
<td>Technology and Innovation Policy</td>
<td>(4)</td>
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<td>PUB 101</td>
<td>Publication of Self in Everyday Life</td>
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<td>PUB 201</td>
<td>The Publication of Professional Self</td>
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<td>PUB 212</td>
<td>Public Relations and Public Engagement</td>
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<td>PUB 456</td>
<td>Institutional and International Event Planning and Management</td>
<td>(4)</td>
</tr>
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</table>
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
This change clarifies that a Co-op work term must be outside of Canada in order to count towards the experiential component of this certificate.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
International Experiential Learning Certificate

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

International Experiential Component

Students must complete one of the following international experiential components:

STREAM 1: STUDY ABROAD COMPONENT

One study abroad term (at least nine units) as an exchange student at an SFU exchange partner or one full time SFU field school program or an alternate approved full time Study Abroad program.

STREAM 2: INTERNATIONAL CO-OP COMPONENT

Participation in one full-time Co-operative Education term outside of Canada.

Stream 2 students must also complete 2 additional Language, International Business, or Global Perspectives courses from the lists above. One of these two courses must be an upper division (300 or 400 level) course. These two courses must be worth a minimum of 3 units each.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
We are adding explicit language to the calendar stating that students may not attempt BUS 360W or 320 more than twice to be considered for admission to the Accounting concentration.
Although this is something that has never been permitted, we are seeing an increase in the number of student requests for exceptions, indicating that clearer language on the policy should be in the calendar.
The language used is consistent with language that was used on our business admissions policy in Fall 2016 (but that has since been eliminated for other reasons).

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Mechatronics Systems Engineering Double Degree
Business and Economics Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Accounting
Admission to this concentration requires a cumulative grade point average of 2.70 or higher. Students may apply once they have completed their lower division requirements and have either completed or enrolled in both BUS 320 and 360W. Students must have a minimum grade of a C+ in both of these courses before they are admitted to the concentration and these courses may be repeated a maximum of one time each for admission. Only students admitted to this concentration will be permitted to enrol in upper division (300- and 400-level) accounting courses required for this concentration (with the exception of BUS 320).

Students must complete all* of

BUS 320 - Financial Accounting: Assets (3)
BUS 321 - Financial Accounting: Equities (3)
BUS 322 - Intermediate Managerial Accounting (3)
BUS 421 - Accounting Theory (3)
At least two* of

BUS 420 - Advanced Accounting (3)
BUS 424 - Advanced Managerial Accounting (3)
BUS 426 - Auditing and Assurance: Concepts and Methods (3)
BUS 427 - Financial Statement Analysis (3)

April 2016
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
BUS 492 - Selected Topics in Business Administration (3) **
BUS 493 - Selected Topics in Business Administration (3) **
BUS 494 - Selected Topics in Business Administration (3) **
BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **
*Must be completed at SFU.

** When offered as a selected topics course in Accounting.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to.
Some language has also been edited below to be clearer (around core courses).

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Communication Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business Upper Division Requirements
Students complete at least 33 upper division units in BUS or BUEC courses including the business core courses, and the marketing courses specified below. Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

Business Core Courses

The Beedie School of Business core courses must be completed, except as specifically modified as listed below. Students complete all of:

BUS 303 - Business, Society and Ethics (3)
BUS 312 - Introduction to Finance (4)
BUS 336 - Data and Decisions II (4)
BUS 393 - Commercial Law (3)
BUS 478 - Strategy (3)

and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

BUS 360W is recommended but not required. BUS 360W will be waived as a prerequisite for 400 division BUS courses for those in approved BUS joint programs. BUS 360W must be completed at Simon Fraser University in accordance with the WQB requirements.

^ To be completed at Simon Fraser University.
Marketing Required Courses
Students complete all of

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 343 - Introduction to Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BUS 345 - Marketing Research</td>
<td>4</td>
</tr>
<tr>
<td>BUS 347 - Consumer Behavior</td>
<td>3</td>
</tr>
</tbody>
</table>

and successful completion of at least one 400 division BUS course worth a minimum of three units, chosen from the marketing concentration listed under the Business Major program.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Economics Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business Upper Division Requirements

CORE COURSES

Students complete at least 29 upper division units in BUS or BUEC courses, including all of

BUS 312 - Introduction to Finance (4)
BUS 336 - Data and Decisions II (4)
BUS 343 - Introduction to Marketing (3)
BUS 393 - Commercial Law (3)
BUS 478 - Strategy (3) *

and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

BUS 360W is recommended but not required. BUS 360W will be waived as a prerequisite for 400 division BUS courses for those in approved BUS joint programs. BUS 360W must be completed at Simon Fraser University in accordance with the WQB requirements.

BUSINESS 400 DIVISION REQUIREMENT
Students complete two 400 division BUS or BUEC courses*, each worth a minimum of three units (excluding practicum courses and BUS 478).

*Note that BUEC courses may count only once as business units or as economic units.

April 2016
^ To be completed at Simon Fraser University.

Areas of Concentration
Beyond the core course requirements listed above, students complete three courses within a single area of concentration, as shown below. **Students may choose to complete one or more business concentrations by meeting the requirements listed.**
Calendar Entry Change  
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to.

Some language has also been edited below to be clearer (around core courses).

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Geography Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Requirements

BUSINESS CORE COURSES

The Beedie School of Business core courses must be completed, except as specifically modified as listed below. Students complete all of:

BUS 303 - Business, Society and Ethics (3)
BUS 312 - Introduction to Finance (4)
BUS 336 - Data and Decisions II (4)
BUS 343 - Introduction to Marketing (3)
BUS 393 - Commercial Law (3)
BUS 478 - Strategy (3)

and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

and one additional 400 division BUS course, worth a minimum of three units (excluding practicum courses).

BUS 360W is recommended but not required. BUS 360W will be waived as a prerequisite for 400 division BUS courses for those in approved BUS joint programs. BUS 360W must be completed at Simon Fraser University in accordance with the WQB requirements.

April 2016
Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not consistent in the calendar.
Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to, using the same language for all programs.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Interactive Arts and Technology and Business Joint Major - BA or BBA
Interactive Arts and Technology and Business Joint Major - BSc

**Calendar Change:** "to" and "from" sections are not required. All deletions should be crossed out as follows: *sample*. All additions should be marked by a **bold**.

Upper Division Business Requirements
Students complete all of

BUS 303 - Business, Society and Ethics (3)
BUS 312 - Introduction to Finance (4)
BUS 343 - Introduction to Marketing (3)
BUS 393 - Commercial Law (3)
BUS 478 - Strategy (3) ^

and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

and an additional 400 division BUS course, worth a minimum of three units (excluding practicum courses).

Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

BUS 360W is highly recommended but not required. BUS 360W will be waived as a prerequisite for 400 division BUS courses for those in approved BUS joint programs. BUS 360W must be completed at Simon Fraser University in accordance with the WQB requirements.

^ to be completed at Simon Fraser University.

April 2016
Business Areas of Concentration

In addition to the above requirements, students may also choose to complete a business concentration, which requires additional courses. See below for details.

Accounting

Admission to this concentration requires a cumulative grade point average of 2.70 or higher. Students may apply once they have completed their lower division requirements and have either completed or enrolled in both BUS 320 and 360W. Students must have a minimum grade of a C+ in both of these courses before they are admitted to the concentration. Only students admitted to this concentration will be permitted to enroll in upper division (300- and 400-level) accounting courses required for this concentration (with the exception of BUS 320).

Students must complete all* of

- BUS 320 — Financial Accounting: Assets (3)
- BUS 321 — Financial Accounting: Equities (3)
- BUS 322 — Intermediate Managerial Accounting (3)
- BUS 421 — Accounting Theory (3)

At least two* of

- BUS 420 — Advanced Accounting (3)
- BUS 424 — Advanced Managerial Accounting (3)
- BUS 426 — Auditing and Assurance: Concepts and Methods (3)
- BUS 427 — Financial Statement Analysis (3)
- BUS 490 — Selected Topics in Business Administration (3)**
- BUS 491 — Selected Topics in Business Administration (3)**
- BUS 492 — Selected Topics in Business Administration (3)**
- BUS 493 — Selected Topics in Business Administration (3)**
- BUS 494 — Selected Topics in Business Administration (3)**
- BUS 495 — Selected Topics in Business Administration (3)**
- BUS 496 — Selected Topics in Business Administration (5)**

* Must be completed at SFU.

** When offered as a selected topics course in Accounting.

Innovation and Entrepreneurship

For this concentration, students complete all of

- BUS 314 — Resourcing New Ventures (3)
- BUS 338 — Foundations of Innovation (3)
- BUS 361 — Project Management (3)
- BUS 477 — Startup Experience (4)

and one of
Program Modification

**BUS 339 – Business of Design II – Iteration and Prototyping (4)**
**BUS 406 – Startup Accelerator (3)**
**BUS 443 – New Product Development and Design (3)**
**BUS 450 – Managing Emerging Opportunities (3)**
**BUS 453 – Sustainable Innovation (3)**
**BUS 490 – Selected Topics in Business Administration (3)**
**BUS 491 – Selected Topics in Business Administration (3)**
**BUS 492 – Selected Topics in Business Administration (3)**
**BUS 493 – Selected Topics in Business Administration (3)**
**BUS 494 – Selected Topics in Business Administration (3)**
**BUS 495 – Selected Topics in Business Administration (3)**
**BUS 496 – Selected Topics in Business Administration (5)**

**When offered as a selected topics course in Innovation and Entrepreneurship.**

**Finance**

For this concentration, students complete all of

**BUS 312 – Introduction to Finance (4)**
**BUS 315 – Investments (4)**
**BUS 316 – Derivative Securities (3)**

and two of

**BUS 410 – Financial Institutions (3)**
**BUS 413 – Corporate Finance (4)**
**BUS 417 – Security Analysis (4)**
**BUS 418 – International Financial Management (3)**
**BUS 419 – Advanced Derivative Securities (3)**
**BUS 490 – Selected Topics in Business Administration (3)**
**BUS 491 – Selected Topics in Business Administration (3)**
**BUS 492 – Selected Topics in Business Administration (3)**
**BUS 493 – Selected Topics in Business Administration (3)**
**BUS 494 – Selected Topics in Business Administration (3)**
**BUS 495 – Selected Topics in Business Administration (3)**
**BUS 496 – Selected Topics in Business Administration (5)**

**When offered as a selected topics course in Finance.**

**Human Resource Management**

For this concentration, students complete both of

**BUS 374 – Organization Theory (3)**
**BUS 381 – Introduction to Human Resource Management (3)**

and three of

April 2016
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>BUS 432</td>
<td>International Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>BUS 481</td>
<td>Recruitment and Selection</td>
<td>3</td>
</tr>
<tr>
<td>BUS 482</td>
<td>Performance Management</td>
<td>3</td>
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<tr>
<td>BUS 483</td>
<td>Introduction to Employment Law for Business</td>
<td>3</td>
</tr>
<tr>
<td>BUS 484</td>
<td>Employment Systems</td>
<td>3</td>
</tr>
<tr>
<td>BUS 485</td>
<td>Negotiations and Conflict Management</td>
<td>3</td>
</tr>
<tr>
<td>BUS 486</td>
<td>Leadership</td>
<td>3</td>
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<tr>
<td>BUS 487</td>
<td>Organizational Development and Change Management</td>
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<tr>
<td>BUS 488</td>
<td>Group Dynamics and Teamwork</td>
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<td>BUS 489</td>
<td>Management Practices for Sustainability</td>
<td>3</td>
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<td>BUS 490</td>
<td>Selected Topics in Business Administration</td>
<td>3</td>
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<tr>
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<tr>
<td>BUS 496</td>
<td>Selected Topics in Business Administration</td>
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</tr>
</tbody>
</table>

**OPTION A**

It is recommended that students who wish to become a personnel specialist in a human resource function complete three of

- BUS 432 - International Human Resource Management (3)
- BUS 481 - Recruitment and Selection (3)
- BUS 482 - Performance Management (3)
- BUS 484 - Employment Systems (3)

**OPTION B**

It is recommended that students who wish to develop skills in managing people, including employment systems design, change and organizational leadership, complete three of

- BUS 485 - Negotiations and Conflict Management (3)
- BUS 486 - Leadership (3)
- BUS 487 - Organizational Development and Change Management (3)
- BUS 488 - Group Dynamics and Teamwork (3)
- BUS 489 - Management Practices for Sustainability (3)

**When offered as a selected topics course in Human Resource Management.**

*International Business*

For this concentration, students complete

- BUS 346 - Global Business Environment (3)

and three of

- BUS 418 - International Financial Management (3)
- BUS 430 - Cross-Cultural Management (3)

April 2016
BUS 431 - Business with East Asian Countries (3)  
BUS 432 - International Human Resource Management (3)  
BUS 434 - Foreign Market Entry (3)  
BUS 435 - Management of International Firms (3)  
BUS 447 - Global Marketing Management (3)  
BUS 490 - Selected Topics in Business Administration (3) **  
BUS 491 - Selected Topics in Business Administration (3) **  
BUS 492 - Selected Topics in Business Administration (3) **  
BUS 493 - Selected Topics in Business Administration (3) **  
BUS 494 - Selected Topics in Business Administration (3) **  
BUS 495 - Selected Topics in Business Administration (3) **  
BUS 496 - Selected Topics in Business Administration (5) **  

Students concentrating in international business are strongly advised to consider combining it with another business concentration.

Other 400 division courses deemed to have significant international business relevance may, with prior faculty permission, be substituted for the above 400 division courses. These may be offered in another faculty. A course substitution for International Business cannot be used for any other concentration.

** When offered as a special topics course in International Business.

Management Information Systems  
For this concentration, students complete all of  

BUS 361 - Project Management (3)  
BUS 362 - Business Process Analysis (4)  
BUS 468 - Managing Information Technology for Business Value (3)  

and two of  

BUS 462 - Business Analytics (3)  
BUS 464 - Business Data Management (3)  
BUS 465 - Business Systems Development (3)  
BUS 466 - Web-Enabled Business (3)  
BUS 490 - Selected Topics in Business Administration (3) **  
BUS 491 - Selected Topics in Business Administration (3) **  
BUS 492 - Selected Topics in Business Administration (3) **  
BUS 493 - Selected Topics in Business Administration (3) **  
BUS 494 - Selected Topics in Business Administration (3) **  
BUS 495 - Selected Topics in Business Administration (3) **  
BUS 496 - Selected Topics in Business Administration (5) **  

** When offered as a selected topics course in Management Information Systems.

Operations Management
For this concentration, students complete both of

BUS 336—Data and Decisions II (4)
BUS 473—Operations Management (4)
and two of

BUS 437—Decision Analysis in Business (3)
BUS 440—Simulation in Management Decision-making (4)
BUS 445—Customer Analytics (3)
BUS 474—Supply Chain Management (3)
BUS 475—Sustainable Operations (3)
BUS 490—Selected Topics in Business Administration (3)**
BUS 491—Selected Topics in Business Administration (3)**
BUS 492—Selected Topics in Business Administration (3)**
BUS 493—Selected Topics in Business Administration (3)**
BUS 494—Selected Topics in Business Administration (3)**
BUS 495—Selected Topics in Business Administration (3)**
BUS 496—Selected Topics in Business Administration (5)**
** When offered as a selected topics course in Operations Management.

Marketing
For this concentration, students complete all of

BUS 343—Introduction to Marketing (3)
BUS 345—Marketing Research (4)
BUS 347—Consumer Behavior (3)
and three of

BUS 441—Web Analytics (3)
BUS 443—New Product Development and Design (3)
BUS 444—Business to Business Marketing (3)
BUS 445—Customer Analytics (3)
BUS 446—Marketing Strategy (4)
BUS 447—Global Marketing Management (3)
BUS 448—Integrated Marketing Communications (4)
BUS 449—Ethical Issues in Marketing (3)
BUS 455—Product & Brand Management (3)
BUS 459—Services Marketing (3)
BUS 490—Selected Topics in Business Administration (3)**
BUS 491—Selected Topics in Business Administration (3)**
BUS 492—Selected Topics in Business Administration (3)**
BUS 493—Selected Topics in Business Administration (3)**
BUS 494—Selected Topics in Business Administration (3)**
BUS 495—Selected Topics in Business Administration (3)**

April 2016
<table>
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<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>BUS 496</td>
<td>Selected Topics in Business Administration (5) **</td>
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<tr>
<td></td>
<td>** When offered as a selected topics course in Marketing.</td>
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</tr>
</tbody>
</table>

**Strategic Analysis**

For this concentration, students complete

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 478</td>
<td>Strategy (3)</td>
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<tr>
<td>BUS 470</td>
<td>Business Applications of Game Theory (3)</td>
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<tr>
<td>BUS 471</td>
<td>Strategic Decision Making (3)</td>
<td></td>
</tr>
<tr>
<td>BUS 479</td>
<td>Strategy Analysis Practicum (3)</td>
<td></td>
</tr>
</tbody>
</table>

Students concentrating in Strategic Analysis are strongly advised to consider combining it with another business concentration.

** When offered as a selected topics course in Strategic Analysis

April 2016
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear and consistent in the calendar.
Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to, using the same language for all programs.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
MBB & Business Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Business Requirements
Students complete a total of 31 units.

Core Courses
Students complete all of

BUS 303 - Business, Society and Ethics (3)
BUS 312 - Introduction to Finance (4)
BUS 336 - Data and Decisions II (4)
BUS 343 - Introduction to Marketing (3)
BUS 360W - Business Communication (4)
BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

Marketing Courses
Students must also complete

BUS 347 - Consumer Behavior (3)
or another upper division BUS course from the marketing concentration listed under the Business Major program.

April 2016
Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

† To be completed at Simon Fraser University in accordance with the WQB requirements.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Mechatronic Systems Engineering and Business Double Degree Program Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business Concentration Elective Courses

Students also complete four upper division courses in a business concentration including at least three 400 division BUS or BUEC courses, each worth a minimum of three units (not including BUS 425 or 478). At least one of these 400 division BUS or BUEC courses must be completed at Simon Fraser University. Students may choose to complete one or more business concentrations by meeting the requirements listed.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to. Some language has also been edited below to be clearer (around core courses).

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Psychology Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business Requirements

LOWER DIVISION REQUIREMENTS

Students complete all of

BUEC 232 - Data and Decisions I (4)
BUS 217W - Critical Thinking in Business (3)
BUS 237 - Introduction to Business Technology Management (3)
BUS 251 - Financial Accounting I (3)
BUS 254 - Managerial Accounting I (3)
BUS 272 - Behavior in Organizations (3)
ECON 103 - Principles of Microeconomics (4)
ECON 105 - Principles of Macroeconomics (4)

and one of

MATH 150 - Calculus I with Review (4)
MATH 151 - Calculus I (3)
MATH 154 - Calculus I for the Biological Sciences (3)
MATH 157 - Calculus I for the Social Sciences (3)

and one of*

ENGL 111W - Literary Classics in English (3)
ENGL 112W - Literature Now (3)

April 2016
<table>
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<th>Course Title</th>
<th>Credit Units</th>
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<td>ENGL 113W</td>
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<td>ENGL 114W</td>
<td>Language and Purpose (3)</td>
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<td>ENGL 115W</td>
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<td>ENGL 199W</td>
<td>Introduction to University Writing (3)</td>
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<td>PHIL 100W</td>
<td>Knowledge and Reality (3)</td>
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<td>Critical Thinking (3)</td>
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<td>PHIL 120W</td>
<td>Moral Problems (3)</td>
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<tr>
<td>WL 101W</td>
<td>Writing in World Literature (3)</td>
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</tr>
<tr>
<td>WL 103W</td>
<td>Early World Literatures (3)</td>
<td></td>
</tr>
<tr>
<td>WL 104W</td>
<td>Modern World Literatures (3)</td>
<td></td>
</tr>
</tbody>
</table>

It is recommended that students complete BUS 202 - Foundations for Collaborative Work Environments (3) in order to ensure they possess the foundational skills in communication and collaborating necessary for successful completion of upper division business coursework. Students wishing to register in BUS 202 should consult with an Undergraduate Academic Advisor in the Beedie School of Business.

*Any one of these courses may be replaced by any three unspecified transfer units in English or in ENGL-Writing at the 100- or 200-level.

**CORE COURSES**

The Beedie School of Business core courses must be completed, except as specifically modified as listed below. Students complete all of:

- BUS 303 - Business, Society and Ethics (3)
- BUS 312 - Introduction to Finance (4)
- BUS 336 - Data and Decisions II (4)
- BUS 343 - Introduction to Marketing (3)
- BUS 393 - Commercial Law (3)
- BUS 478 - Strategy (3)

and one of

- BUS 374 - Organization Theory (3)
- BUS 381 - Introduction to Human Resource Management (3)

and successful completion of at least one 400 division BUS course worth a minimum of three units, chosen from the human resource management concentration listed under the Business Major program. **Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.**
<table>
<thead>
<tr>
<th><strong>Program Modification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 360W is recommended but not required. BUS 360W will be waived as a prerequisite for 400 division BUS courses for those in approved BUS joint programs. BUS 360W must be completed at Simon Fraser University in accordance with the WQB requirements.</td>
</tr>
<tr>
<td>^ To be completed at Simon Fraser University.</td>
</tr>
</tbody>
</table>

April 2016
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
This update indicates that students in this program may complete one or more of the Business concentrations. In practice, students have had the option to complete multiple concentrations, but this clarifies the calendar language around this for students.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Business and Molecular Biology & Biochemistry Joint Honours

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Upper Division Business Requirements
Students complete a minimum of 37 upper division units.

Core Courses
Students complete all of

BUS 303 - Business, Society and Ethics (3)
BUS 312 - Introduction to Finance (4)
BUS 336 - Data and Decisions II (4)
BUS 343 - Introduction to Marketing (3)
BUS 360W - Business Communication (4) ↑
BUS 393 - Commercial Law (3)
BUS 477 - Startup Experience (4)
and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

Marketing Courses
Students must also complete

BUS 347 - Consumer Behavior (3)
or another upper division BUS course from the marketing concentration listed under the Business Major program.

Additional Business Units

April 2016
and an additional six units of 400 division BUS or BUEC courses, each worth a minimum of three units (excluding practicum courses and BUS 478).

Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

† To be completed at Simon Fraser University in accordance with the WQB requirements.
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear in the calendar. Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Information Systems in Business Administration and Computing Science Joint Major

Calendar Change: “to” and “from” sections are not required. All deletions should be crossed out as follows:
All additions should be marked by a bold.

Upper Division Requirements
Students complete all of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 312</td>
<td>Introduction to Finance</td>
<td>4</td>
</tr>
<tr>
<td>BUS 336</td>
<td>Data and Decisions II</td>
<td>4</td>
</tr>
<tr>
<td>BUS 343</td>
<td>Introduction to Marketing</td>
<td>3</td>
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<tr>
<td>BUS 361</td>
<td>Project Management</td>
<td>3</td>
</tr>
<tr>
<td>BUS 466</td>
<td>Managing Information Technology for Business Value</td>
<td>3</td>
</tr>
<tr>
<td>BUS 478</td>
<td>Strategy</td>
<td>3</td>
</tr>
<tr>
<td>CMPT 300</td>
<td>Operating Systems I</td>
<td>3</td>
</tr>
<tr>
<td>CMPT 307</td>
<td>Data Structures and Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CMPT 354</td>
<td>Database Systems I</td>
<td>3</td>
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</table>

and one of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 374</td>
<td>Organization Theory</td>
<td>3</td>
</tr>
<tr>
<td>BUS 381</td>
<td>Introduction to Human Resource Management</td>
<td>3</td>
</tr>
</tbody>
</table>

and one of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 466</td>
<td>Web-Enabled Business</td>
<td>3</td>
</tr>
<tr>
<td>CMPT 371</td>
<td>Data Communications and Networking</td>
<td>3</td>
</tr>
</tbody>
</table>

and fifteen additional upper division CMPT units, excluding CMPT 301. At least one of the courses must be at the 400 division or above.

Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

^ to be completed at Simon Fraser University

April 2016
Calendar Entry Change
Beedie School of Business Undergraduate Program

Rationale for change:
Beedie has considered completing concentrations optional for Business Joint Majors and the Double Degree with Mechatronics. However, this language is not clear and consistent in the calendar.
Edits below clarify that joint major and MSE double degree students may complete one or more business concentrations, if they wish to, using the same language for all programs.

Effective term and year:
Summer 2019

The following program(s) will be affected by these changes:
Sustainable Business Joint Major

Calendar Change: "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Business Upper Division Requirements

Core Courses

The Beedie School of Business core courses must be completed, except as specifically modified as listed below. Students must complete all core courses with a minimum C- grade.

Students complete all of:

BUS 312 - Introduction to Finance (4)
BUS 343 - Introduction to Marketing (3)
BUS 360W - Business Communication (4) ***

and one of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

and one of

BUS 336 - Data and Decisions II (4) **
GEOG 352 - Spatial Analysis (4)
REM 412 - Environmental Modeling (3)

and one of

BUS 303 - Business, Society and Ethics (3)
ENV 320W - Ethics and the Environment (3)

April 2016
**PROGRAM MODIFICATION**

<table>
<thead>
<tr>
<th>PHIL 328 - Environmental Philosophy (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>and one of</td>
</tr>
<tr>
<td>BUS 393 - Commercial Law (3)</td>
</tr>
<tr>
<td>REM 319 - Environmental Law (3)</td>
</tr>
<tr>
<td>Additional Upper Division Business Requirements</td>
</tr>
</tbody>
</table>

Student must complete the following

| BUS 361 - Project Management (3)       |
| BUS 475 - Sustainable Operations (3)   |
| and one of                             |
| BUS 453 - Sustainable Innovation (3)   |
| BUS 489 - Management Practices for Sustainability (3) |

Students may choose to complete one or more business concentrations by meeting the concentration requirements listed on the Business Major page of the calendar.

April 2016
Calendar Entry Change  
Beedie School of Business Undergraduate Program

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This update indicates that students in this program may complete one or more of the Business concentrations.</td>
</tr>
<tr>
<td>In practice, students have had the option to complete multiple concentrations, but this clarifies the calendar language around this for students.</td>
</tr>
<tr>
<td>Also updates the language around course repeats of BUS 360W &amp; 320 – courses may not be attempted a third time for admission to the accounting concentration.</td>
</tr>
<tr>
<td>Also adds BUS 415 (new course: Applied Portfolio Management) as an option in the Finance Concentration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2019</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business and Economics Joint Honours</td>
</tr>
</tbody>
</table>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

**Areas of Concentration**
Students also complete the requirements for one of the following areas of concentration. **Students may choose to complete more than one business concentration.**

**Accounting**
Admission to this concentration requires a cumulative grade point average of 2.70 or higher. Students may apply once they have completed their lower division requirements and have either completed or enrolled in both BUS 320 and 360W. Students must have a minimum grade of a C+ in both of these courses before they are admitted to the concentration and these courses may be repeated a maximum of one time each for admission. Only students admitted to this concentration will be permitted to enroll in upper division (300- and 400-level) accounting courses required for this concentration (with the exception of BUS 320).

Students must complete all* of:

**BUS 320 - Financial Accounting: Assets (3)**
**BUS 321 - Financial Accounting: Equities (3)**
**BUS 322 - Intermediate Managerial Accounting (3)**
**BUS 421 - Accounting Theory (3)**
At least two* of:

**BUS 420 - Advanced Accounting (3)**

April 2016
SFU SENATE COMMITTEE ON UNDERGRADUATE STUDIES

PROGRAM MODIFICATION

** SFU **

** item 7fx **

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 424</td>
<td>Advanced Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BUS 426</td>
<td>Auditing and Assurance: Concepts and Methods</td>
<td>3</td>
</tr>
<tr>
<td>BUS 427</td>
<td>Financial Statement Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BUS 490</td>
<td>Selected Topics in Business Administration</td>
<td>3**</td>
</tr>
<tr>
<td>BUS 491</td>
<td>Selected Topics in Business Administration</td>
<td>3**</td>
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<td>BUS 492</td>
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<td>BUS 495</td>
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<tr>
<td>BUS 496</td>
<td>Selected Topics in Business Administration</td>
<td>5**</td>
</tr>
</tbody>
</table>

* Must be completed at SFU.

** When offered as a selected topics course in Accounting.

Innovation and Entrepreneurship
For this concentration, students complete all of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 314</td>
<td>Resourcing New Ventures</td>
<td>3</td>
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<tr>
<td>BUS 338</td>
<td>Foundations of Innovation</td>
<td>3</td>
</tr>
<tr>
<td>BUS 361</td>
<td>Project Management</td>
<td>3</td>
</tr>
<tr>
<td>BUS 477</td>
<td>Startup Experience</td>
<td>4</td>
</tr>
</tbody>
</table>

and one of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 339</td>
<td>Business of Design II - Iteration and Prototyping</td>
<td>4</td>
</tr>
<tr>
<td>BUS 406</td>
<td>Startup Accelerator</td>
<td>3</td>
</tr>
<tr>
<td>BUS 443</td>
<td>New Product Development and Design</td>
<td>3</td>
</tr>
<tr>
<td>BUS 450</td>
<td>Managing Emerging Opportunities</td>
<td>3</td>
</tr>
<tr>
<td>BUS 453</td>
<td>Sustainable Innovation</td>
<td>3</td>
</tr>
<tr>
<td>BUS 490</td>
<td>Selected Topics in Business Administration</td>
<td>3**</td>
</tr>
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<td>BUS 491</td>
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<td>BUS 495</td>
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<td>3**</td>
</tr>
<tr>
<td>BUS 496</td>
<td>Selected Topics in Business Administration</td>
<td>5**</td>
</tr>
</tbody>
</table>

** When offered as a selected topics course in Innovation and Entrepreneurship.

Finance
For this concentration, students complete all of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 312</td>
<td>Introduction to Finance</td>
<td>4</td>
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<tr>
<td>BUS 315</td>
<td>Investments</td>
<td>4</td>
</tr>
<tr>
<td>BUS 316</td>
<td>Derivative Securities</td>
<td>3</td>
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</table>

and two of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 312</td>
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<td>BUS 315</td>
<td>Investments</td>
<td>4</td>
</tr>
<tr>
<td>BUS 316</td>
<td>Derivative Securities</td>
<td>3</td>
</tr>
</tbody>
</table>

April 2016
BUS 410 - Financial Institutions (3)
BUS 413 - Corporate Finance (4)
**BUS 415 - Applied Portfolio Management (3)**
BUS 417 - Security Analysis (4)
BUS 418 - International Financial Management (3)
BUS 419 - Advanced Derivative Securities (3)
BUS 490 - Selected Topics in Business Administration (3)**
BUS 491 - Selected Topics in Business Administration (3)**
BUS 492 - Selected Topics in Business Administration (3)**
BUS 493 - Selected Topics in Business Administration (3)**
BUS 494 - Selected Topics in Business Administration (3)**
BUS 495 - Selected Topics in Business Administration (3)**
BUS 496 - Selected Topics in Business Administration (5)**
**When offered as a selected topics course in Finance.

Human Resource Management
For this concentration, students complete both of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)
and three of

BUS 432 - International Human Resource Management (3)
BUS 481 - Recruitment and Selection (3)
BUS 482 - Performance Management (3)
BUS 483 - Introduction to Employment Law For Business (3)
BUS 484 - Employment Systems (3)
BUS 485 - Negotiations and Conflict Management (3)
BUS 486 - Leadership (3)
BUS 487 - Organizational Development and Change Management (3)
BUS 488 - Group Dynamics and Teamwork (3)
BUS 489 - Management Practices for Sustainability (3)
BUS 490 - Selected Topics in Business Administration (3)**
BUS 491 - Selected Topics in Business Administration (3)**
BUS 492 - Selected Topics in Business Administration (3)**
BUS 493 - Selected Topics in Business Administration (3)**
BUS 494 - Selected Topics in Business Administration (3)**
BUS 495 - Selected Topics in Business Administration (3)**
BUS 496 - Selected Topics in Business Administration (5)**

OPTION A
It is recommended that students who wish to become a personnel specialist in a human resource function complete three of

April 2016
**PROGRAM MODIFICATION**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BUS 432</td>
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</tr>
<tr>
<td>BUS 481</td>
<td>Recruitment and Selection (3)</td>
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<tr>
<td>BUS 482</td>
<td>Performance Management (3)</td>
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</tr>
<tr>
<td>BUS 484</td>
<td>Employment Systems (3)</td>
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</table>

**OPTION B**

It is recommended that students who wish to develop skills in managing people, including employment systems design, change and organizational leadership, complete three of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BUS 485</td>
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<td>Leadership (3)</td>
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<td>BUS 487</td>
<td>Organizational Development and Change Management (3)</td>
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<td>BUS 488</td>
<td>Group Dynamics and Teamwork (3)</td>
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<tr>
<td>BUS 489</td>
<td>Management Practices for Sustainability (3)</td>
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</table>

**When offered as a selected topics course in Human Resource Management.**

Management Information Systems

For this concentration, students complete all of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 361</td>
<td>Project Management (3)</td>
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<td>BUS 362</td>
<td>Business Process Analysis (4)</td>
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<tr>
<td>BUS 468</td>
<td>Managing Information Technology for Business Value (3)</td>
<td></td>
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</table>

and two of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>BUS 464</td>
<td>Business Data Management (3)</td>
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<td>BUS 465</td>
<td>Business Systems Development (3)</td>
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<tr>
<td>BUS 466</td>
<td>Web-Enabled Business (3)</td>
<td></td>
</tr>
<tr>
<td>BUS 490</td>
<td>Selected Topics in Business Administration (3) **</td>
<td></td>
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<td>BUS 491</td>
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<tr>
<td>BUS 496</td>
<td>Selected Topics in Business Administration (5) **</td>
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</tr>
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</table>

**When offered as a selected topics course in Management Information Systems.**

International Business

For this concentration, students complete

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BUS 346</td>
<td>Global Business Environment (3)</td>
<td></td>
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and three of

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>BUS 418</td>
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<td>BUS 430</td>
<td>Cross-Cultural Management (3)</td>
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</tr>
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</table>

April 2016
BUS 431 - Business with East Asian Countries (3)
BUS 432 - International Human Resource Management (3)
BUS 434 - Foreign Market Entry (3)
BUS 435 - Management of International Firms (3)
BUS 447 - Global Marketing Management (3)
BUS 490 - Selected Topics in Business Administration (3)**
BUS 491 - Selected Topics in Business Administration (3)**
BUS 492 - Selected Topics in Business Administration (3)**
BUS 493 - Selected Topics in Business Administration (3)**
BUS 494 - Selected Topics in Business Administration (3)**
BUS 495 - Selected Topics in Business Administration (3)**
BUS 496 - Selected Topics in Business Administration (3)**
Other 400 division courses deemed to have significant international business relevance may, with prior faculty permission, be substituted for the above 400 division courses. These may be offered in another faculty. A course substitution for International Business cannot be used for any other concentration.

Students concentrating in international business are strongly advised to consider combining it with another business concentration.

**When offered as a selected topics course in International Business.

Operations Management
For this concentration, students complete both of

BUS 336 - Data and Decisions II (4)
BUS 473 - Operations Management (4)
and two of

BUS 437 - Decision Analysis in Business (3)
BUS 440 - Simulation in Management Decision-making (4)
BUS 445 - Customer Analytics (3)
BUS 474 - Supply Chain Management (3)
BUS 475 - Sustainable Operations (3)
BUS 490 - Selected Topics in Business Administration (3)**
BUS 491 - Selected Topics in Business Administration (3)**
BUS 492 - Selected Topics in Business Administration (3)**
BUS 493 - Selected Topics in Business Administration (3)**
BUS 494 - Selected Topics in Business Administration (3)**
BUS 495 - Selected Topics in Business Administration (3)**
BUS 496 - Selected Topics in Business Administration (5)**
**When offered as a selected topics course in Operations Management.

Marketing

April 2016
For this concentration, students complete all of

BUS 343 - Introduction to Marketing (3)
BUS 345 - Marketing Research (4)
BUS 347 - Consumer Behavior (3)
and three of

BUS 441 - Web Analytics (3)
BUS 443 - New Product Development and Design (3)
BUS 444 - Business to Business Marketing (3)
BUS 445 - Customer Analytics (3)
BUS 446 - Marketing Strategy (4)
BUS 447 - Global Marketing Management (3)
BUS 448 - Integrated Marketing Communications (4)
BUS 449 - Ethical Issues in Marketing (3)
BUS 455 - Product & Brand Management (3)
BUS 459 - Services Marketing (3)
BUS 490 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **
** When offered as a selected topics course in Marketing.

Strategic Analysis
For this concentration, students complete

BUS 478 - Strategy (3)
and three of

BUS 371 - Critical Thinking Through Business Case Analysis (3)
BUS 470 - Business Applications of Game Theory (3)
BUS 471 - Strategic Decision Making (3)
BUS 479 - Strategy Analysis Practicum (3)
BUS 490 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **
Students concentrating in Strategic Analysis are strongly advised to consider combining it with another business concentration.

** When offered as a selected topics course in Strategic Analysis

Additional Business Requirements
Students also complete at least three 400 division BUS or BUEC* courses, each worth a minimum of three units (excluding practicum courses and BUS 478). These courses may be within the area of concentration chosen above. At least one of these 400 division courses must be completed at Simon Fraser University.

*Note that BUEC courses may count only once as business units or as economic units.
Calendar Entry Change  
Beedie School of Business Undergraduate Program

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This update indicates that students in this program may complete one or more of the Business concentrations. In practice, students have had the option to complete multiple concentrations, but this clarifies the calendar language around this for students. Also updates the language around course repeats of BUS 360W &amp; 320 – courses may not be attempted a third time for admission to the accounting concentration. Also adds BUS 415 (new course: Applied Portfolio Management) as an option in the Finance Concentration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2019</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Administration Major</td>
</tr>
<tr>
<td>Business Administration Honours</td>
</tr>
</tbody>
</table>

Calendar Change: "to" and "from" sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a bold.

Areas of Concentration
Students choose one or more of the following areas of concentration and complete all the requirements as specified below.

Accounting
Admission to this concentration requires a cumulative grade point average of 2.70 or higher. Students may apply once they have completed their lower division requirements and have either completed or enrolled in both BUS 320 and 360W. Students must have a minimum grade of a C+ in both of these courses before they are admitted to the concentration and these courses may be repeated a maximum of one time each for admission. Only students admitted to this concentration will be permitted to enroll in upper division (300- and 400-level) accounting courses required for this concentration (with the exception of BUS 320).

Students must complete all* of

- BUS 320 - Financial Accounting: Assets (3)
- BUS 321 - Financial Accounting: Equities (3)
- BUS 322 - Intermediate Managerial Accounting (3)
- BUS 421 - Accounting Theory (3)

At least two* of

April 2016
BUS 420 - Advanced Accounting (3)
BUS 424 - Advanced Managerial Accounting (3)
BUS 426 - Auditing and Assurance: Concepts and Methods (3)
BUS 427 - Financial Statement Analysis (3)
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
BUS 492 - Selected Topics in Business Administration (3) **
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BUS 494 - Selected Topics in Business Administration (3) **
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BUS 496 - Selected Topics in Business Administration (5) **
* Must be completed at SFU.

** When offered as a selected topics course in Accounting.

Innovation and Entrepreneurship
For this concentration, students complete all of

BUS 314 - Resourcing New Ventures (3)
BUS 338 - Foundations of Innovation (3)
BUS 361 - Project Management (3)
BUS 477 - Startup Experience (4)
and one of

BUS 339 - Business of Design II - Iteration and Prototyping (4)
BUS 406 - Startup Accelerator (3)
BUS 443 - New Product Development and Design (3)
BUS 450 - Managing Emerging Opportunities (3)
BUS 453 - Sustainable Innovation (3)
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **
** When offered as a selected topics course in Innovation and Entrepreneurship.

Finance
For this concentration, students complete all of

BUS 312 - Introduction to Finance (4)
BUS 315 - Investments (4)
BUS 316 - Derivative Securities (3)
and two of

BUS 410 - Financial Institutions (3)
BUS 413 - Corporate Finance (4)
BUS 415 - Applied Portfolio Management (3)
BUS 417 - Security Analysis (4)
BUS 418 - International Financial Management (3)
BUS 419 - Advanced Derivative Securities (3)
BUS 490 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **
** When offered as a selected topics course in Finance.

Human Resource Management
For this concentration, students complete both of

BUS 374 - Organization Theory (3)
BUS 381 - Introduction to Human Resource Management (3)

and three of

BUS 432 - International Human Resource Management (3)
BUS 481 - Recruitment and Selection (3)
BUS 482 - Performance Management (3)
BUS 483 - Introduction to Employment Law For Business (3)
BUS 484 - Employment Systems (3)
BUS 485 - Negotiations and Conflict Management (3)
BUS 486 - Leadership (3)
BUS 487 - Organizational Development and Change Management (3)
BUS 488 - Group Dynamics and Teamwork (3)
BUS 489 - Management Practices for Sustainability (3)
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **

OPTION A
It is recommended that students who wish to become a personnel specialist in a human resource function complete three of
BUS 432 - International Human Resource Management (3)
BUS 481 - Recruitment and Selection (3)
BUS 482 - Performance Management (3)
BUS 484 - Employment Systems (3)

OPTION B
It is recommended that students who wish to develop skills in managing people, including employment systems design, change and organizational leadership, complete three of

BUS 485 - Negotiations and Conflict Management (3)
BUS 486 - Leadership (3)
BUS 487 - Organizational Development and Change Management (3)
BUS 488 - Group Dynamics and Teamwork (3)
BUS 489 - Management Practices for Sustainability (3)

** When offered as a selected topics course in Human Resource Management.

Management Information Systems
For this concentration, students complete all of

BUS 361 - Project Management (3)
BUS 362 - Business Process Analysis (4)
BUS 468 - Managing Information Technology for Business Value (3)

and two of

BUS 462 - Business Analytics (3)
BUS 464 - Business Data Management (3)
BUS 465 - Business Systems Development (3)
BUS 466 - Web-Enabled Business (3)
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
BUS 492 - Selected Topics in Business Administration (3) **
BUS 493 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **

** When offered as a selected topics course in Management Information Systems.

International Business
For this concentration, students complete

BUS 346 - Global Business Environment (3)

and three of

BUS 418 - International Financial Management (3)
BUS 430 - Cross-Cultural Management (3)
BUS 431 - Business with East Asian Countries (3)
BUS 432 - International Human Resource Management (3)
BUS 434 - Foreign Market Entry (3)
BUS 435 - Management of International Firms (3)
BUS 447 - Global Marketing Management (3)
BUS 490 - Selected Topics in Business Administration (3) **
BUS 491 - Selected Topics in Business Administration (3) **
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BUS 495 - Selected Topics in Business Administration (3) **
BUS 496 - Selected Topics in Business Administration (5) **

Other 400 division courses deemed to have significant international business relevance may, with prior faculty permission, be substituted for the above 400 division courses. These may be offered in another faculty. A course substitution for International Business cannot be used for any other concentration.

Students concentrating in international business are strongly advised to consider combining it with another business concentration.

** When offered as a selected topics course in International Business.

Operations Management
For this concentration, students complete both of

BUS 336 - Data and Decisions II (4)
BUS 473 - Operations Management (4)

and two of

BUS 437 - Decision Analysis in Business (3)
BUS 440 - Simulation in Management Decision-making (4)
BUS 445 - Customer Analytics (3)
BUS 474 - Supply Chain Management (3)
BUS 475 - Sustainable Operations (3)
BUS 490 - Selected Topics in Business Administration (3) **
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BUS 496 - Selected Topics in Business Administration (5) **

** When offered as a selected topics course in Operations Management.
Marketing
For this concentration, students complete all of

BUS 343 - Introduction to Marketing (3)
BUS 345 - Marketing Research (4)
BUS 347 - Consumer Behavior (3)
and three of

BUS 441 - Web Analytics (3)
BUS 443 - New Product Development and Design (3)
BUS 444 - Business to Business Marketing (3)
BUS 445 - Customer Analytics (3)
BUS 446 - Marketing Strategy (4)
BUS 447 - Global Marketing Management (3)
BUS 448 - Integrated Marketing Communications (4)
BUS 449 - Ethical Issues in Marketing (3)
BUS 455 - Product & Brand Management (3)
BUS 459 - Services Marketing (3)
BUS 490 - Selected Topics in Business Administration (3) **
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** When offered as a selected topics course in Marketing.

Strategic Analysis
For this concentration, students complete

BUS 478 - Strategy (3)
and three of

BUS 371 - Critical Thinking Through Business Case Analysis (3)
BUS 470 - Business Applications of Game Theory (3)
BUS 471 - Strategic Decision Making (3)
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BUS 490 - Selected Topics in Business Administration (3) **
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BUS 496 - Selected Topics in Business Administration (5) **
Students concentrating in Strategic Analysis are strongly advised to consider combining it with another business concentration.

** When offered as a selected topics course in Strategic Analysis

Additional Business Requirements
Students also complete at least three 400 division BUS or BUEC* courses, each worth a minimum of three units (excluding practicum courses and BUS 478). These courses may be within the area of concentration chosen above. At least one of these 400 division courses must be completed at Simon Fraser University.

*Note that BUEC courses may count only once as business units or as economic units.
Calendar Entry Change  
Beedie School of Business Undergraduate Program

<table>
<thead>
<tr>
<th>Rationale for change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 415 (3) Applied Portfolio Management was recently approved as a new course in the Finance area. This change allows this course to count as one of the two 400-level finance courses that are required to complete a finance concentration.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective term and year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2019</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>The following program(s) will be affected by these changes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business &amp; Mechatronics Systems Engineering Double Degree</td>
</tr>
<tr>
<td>Business &amp; Economics Joint Major</td>
</tr>
</tbody>
</table>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: sample. All additions should be marked by a **bold**.

**Finance**  
Students complete all of the following required courses for this concentration

| BUS 312 - Introduction to Finance (4) |
| BUS 315 - Investments (4) |
| BUS 316 - Derivative Securities (3) |
| and two of |
| BUS 410 - Financial Institutions (3) |
| BUS 413 - Corporate Finance (4) |
| **BUS 415 - Applied Portfolio Management (3)** |
| BUS 417 - Security Analysis (4) |
| BUS 418 - International Financial Management (3) |
| BUS 419 - Advanced Derivative Securities (3) |
| BUS 490 - Selected Topics in Business Administration (3) ** |
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| BUS 494 - Selected Topics in Business Administration (3) ** |
| BUS 495 - Selected Topics in Business Administration (3) ** |
| BUS 496 - Selected Topics in Business Administration (5) ** |

**When offered as a selected topics course in Finance.**
For information:

Acting under delegated authority at its meeting of October 11, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

**a. Beedie School of Business (SCUS 18-61)**

(i) New Course Proposal: BUS 415-, Applied Portfolio Management (Spring 2020)

**b. Faculty of Science (SCUS 18-62)**

1. Department of Biological Sciences

(i) New Course Proposal: BISC 212-3, Biological Research

2. Faculty of Science (SCUS 18-47)

COURSE SUBJECT  BUS  NUMBER 415

COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation
Applied Portfolio Management

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation
Applied Portfolio Management

CAMPUS where course will be normally taught: ☐ Burnaby  ☐ Surrey  ☐ Vancouver  ☐ Great Northern Way  ☐ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don’t include WQB or prequisites info in this description box.
Explores how investment selections can be used to form different portfolios, how to assess the ex-ante risk of those portfolios, and how to analyze portfolio performance. There will be a strong emphasis on ethics, development of investment policy, and integration of environmental, social, and governance in portfolio management.

REPEAT FOR CREDIT  ☐ YES  ☐ NO  How many times?  ☐  Within a term?  ☐ YES  ☐ NO

LIBRARY RESOURCES
NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that serves as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

Library review done?  Yes - no further resources are required

RATIONALE FOR INTRODUCTION OF THIS COURSE

This class was offered in Spring 2018 as a special topics course. It is taken by the BEAM (Beedie Endowment Asset Management) group of students who are engaged in investing $7 million of the Beedie Endowment Funds at SFU. The students are undergraduate students who have applied for and been admitted to the BEAM Group after an extensive interview process. The students commit to be part of the BEAM Group for two years.

Following four years where BEAM was supported by a single academic course, the second class was added in 2018. The second class was added to adapt to the asset management industry’s move toward a more quantitative approach to portfolio formation and analysis. The second class also reinforces the emphasis on sustainability in investment, which has become more important for the industry.

The second class has enhanced the professionalism of the BEAM program. It should continue as permanent part of the Undergraduate Program.
**SENATE COMMITTEE ON UNDERGRADUATE STUDIES**

**NEW COURSE PROPOSAL**

<table>
<thead>
<tr>
<th>SCHEDULING AND ENROLLMENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term and year course would first be offered (e.g. FALL 2016): <strong>Spring 2020</strong></td>
</tr>
<tr>
<td>Term in which course will typically be offered: □ Spring □ Summer □ Fall □ Other (describe)</td>
</tr>
<tr>
<td>Will this be a required or elective course in the curriculum? □ Required □ Elective</td>
</tr>
<tr>
<td>What is the probable enrollment when offered? Estimate: <strong>10 students</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate number of units: □ 3</td>
</tr>
<tr>
<td>Indicate no. of contact hours: □ Lecture □ Seminar □ Tutorial □ Lab □ Other; explain below</td>
</tr>
</tbody>
</table>

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

**FACULTY**

Which of your present CFL faculty have the expertise to offer this course?

Derek Yee, Peter Klein

**WQB DESIGNATION**

(attach approval from Curriculum Office)

**PREREQUISITE AND / OR COREQUISITE**

BUS 318, BUS 360W, 60 units.

**EQUIVALENT COURSES**

Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses?

Students who have taken BUS 493 when the subject of the course was Portfolio Management may not take this course for further credit.

*September 2016*
FEES
Are there any proposed student fees associated with this course other than tuition fees?  
☐ YES  ☐ NO

COURSE - LEVEL EDUCATIONAL GOALS (OPTIONAL)

RESOURCES
List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

OTHER IMPLICATIONS
Final exam required  ☐ YES  ☐ NO
Criminal Record Check required  ☐ YES  ☐ NO

OVERLAP CHECK
Checking for overlap is the responsibility of the Associate Dean.
Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator
Stephen Spector

September 2016
Course: BUS 415
Title: Applied Portfolio Management

Course Description

The course is a continuation of BUS 318, which focuses on valuing equities and making credit decisions. BUS 415 explores how investment selections can be used to form different portfolios, how to assess the ex-ante risk of those portfolios, and how to analyze portfolio performance. There will be a strong emphasis on ethics, development of investment policy, and integration of environmental, social, and governance in portfolio management.

Rationale

This class was offered in Spring 2018 as a special topics course. It is taken by the BEAM (Beedie Endowment Asset Management) group of students who are engaged in investing $7 million of the Beedie Endowment Funds at SFU. The students are undergraduate students who have applied for and been admitted to the BEAM Group after an extensive interview process. The students commit to be part of the BEAM Group for two years.

Following four years where BEAM was supported by a single academic course, the second class was added in 2018. The second class was added to adapt to the asset management industry’s move toward a more quantitative approach to portfolio formation and analysis. The second class also reinforces the emphasis on sustainability in investment, which has become more important for the industry.

The second course has enhanced the professionalism of the BEAM program. It should continue as permanent part of the Undergraduate Program.

Learning Objectives

- Form different types of portfolios (concentrated, semi-active, long-short) for a set of investment recommendations.
- Build different portfolios from fundamental and from purely quantitative inputs, including the use of commercial optimization tools.
- Calculate ex-ante risk measures, including Value at Risk (VaR) and expected track record for portfolios.
- Build predictive tools that will estimate ex-ante performance in different economic scenarios.
- Construct paper portfolios that use derivative instruments for currency hedging and other purposes.
- Understand ethical performance presentation and the GICS standard for performance presentation.
- Build portfolios that incorporate Environmental, Social and Governance (ESG) factors.

Textbooks

**Evaluation**

The course requires completion of eight assignments that will be presented by students on a rotating basis. The assignments are meant to provide hands-on experience in securities selection and portfolio management, and to build skills in Microsoft Excel, including Solver (Reduced Gradient Algorithm), VBA and User-defined functions, and matrix calculations. The course will have two midterms and no final exam. Individual instructors may modify this assessment method.

**Proposed evaluation components are as follows:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>30%</td>
</tr>
</tbody>
</table>
# New Course Proposal

**Course Subject:** BISC  
**Number:** 212

## Course Title Long
- **Biological Research**

## Course Title Short
- **Biological Research**

## Campus
- **Burnaby**
- **Surrey**
- **Vancouver**
- **Great Northern Way**
- **Off campus**

## Course Description

Students experience the practical challenges and creative joys of biological research. Initially, students learn to think, research, and collaborate like scientists, while finding solutions to several “Real-World Problems”. In subsequent weeks, students design, propose, conduct, and present their own original research projects, in teams.

## Rationale for Introduction of This Course

Throughout their high school and lower-division post-secondary courses, most students experience Biology (and Science, in general) as a collection of facts and formulas to be memorized and recalled. As a result, they lack both an understanding of the nature of scientific discovery and the creativity and critical-thinking skills needed to be successful researchers. This is harmful to our students because it lowers their motivation to stay in science programs, it reduces their learning to a fact-memorizing chore, and it generates graduates without the skills and experiences necessary to succeed in a career in science.

While Co-op placements, Independent Study Semesters, and Undergraduate Research courses (e.g. BISC 498) can give students genuine research experiences, these are generally not available to lower-division students. The introduction of BISC 298 opens a door, but very few lower-division students have the skills, confidence and good fortune to find a professor who is willing to supervise them. As a result, most science students spend a majority of their undergraduate years without any real research experience. BISC 212 can make a significant impact here, by taking first- and second-year students (most of whom have no research experience), and spending a semester turning them into confident and capable researchers.

This course has been offered twice (as BISC 272 - Special topics: Biological Research), and its students have shown great growth and success in their development as researchers and critical thinkers, both during and after our semester together. For example:
- To date, six out of 20 BISC 272 research groups have taken the time to submit their findings to the peer-reviewed SFU Student Undergraduate Research Journal (SURJ). Two of these have already been published, and two more have just been accepted for publication, pending revisions. One BISC 272 alumnus is also currently an executive editor for SFU SURJ.
- Many BISC 272 alumni continue to conduct original research, as co-op students, USRA recipients, BISC 498 students, and research volunteers. Some of them met their subsequent supervisors during the public poster sessions that ended each BISC 272 experience.
- Twelve of the 23 original BISC 272 students (from 2015) returned as peer-mentors for the 48 new BISC 272 students (in 2017). These mentor's insightful advice highlighted how much their scientific thinking skills had developed, since taking BISC 272.
- Surprisingly, these research and mentorship activities are not restricted to the academic stars of the course. Even students who entered and exited BISC 272 with C+ to B- CGPAs continue to take part in research and mentorship with great confidence and skill.
- Overall, the SETC comments for BISC 272 attest to its great value to students, despite the huge workload (which I've now reduced).
SCHEDULING AND ENROLLMENT INFORMATION

Effective term and year (e.g. FALL 2016) SUMMER 2019

Term in which course will typically be offered □ Spring √ Summer □ Fall

Other (describe) 

Will this be a required or elective course in the curriculum? □ Required √ Elective

What is the probable enrollment when offered? Estimate: 48

UNITS

Indicate number of units: 3

Indicate no. of contact hours: 2 Lecture □ Seminar □ Tutorial 4 Lab □ Other; explain below

OTHER


FACULTY

Which of your present CFL faculty have the expertise to offer this course?

Kevin Lam, Megan Barker, Julian Christians, Kathleen Fitzpatrick, Erin Barley, Peter Hollman, and any other faculty members with research experience and a keen interest in training young undergraduates into capable researchers.

WQB DESIGNATION

(attach approval from Curriculum Office)

n/a

PREREQUISITE AND / OR COREQUISITE

ANY TWO of the following courses: BISC 101, BISC 102, BPK 142, CHEM 121, CHEM 126, PHYS 130, PHYS 131, PHYS 140, and PHYS 141. Preference will be given to students who have completed fewer than 60 credit hours toward their degree program.
EQUIVALENT COURSES [For more information on equivalency, see Equivalency Statements under Information about Specific Course components.]

1. SEQUENTIAL COURSE [is not hard coded in the student information management system (SIMS).]
   Students who have taken (place relevant course(s) in the blank below (ex: STAT 100) first may not then take this course for further credit.

2. ONE-WAY EQUIVALENCY [is not hard coded in SIMS.]
   (Place relevant course(s) in the blank below (ex: STAT 100) will be accepted in lieu of this course.

3. TWO-WAY EQUIVALENCY [is hard coded and enforced by SIMS.]
   Students with credit for (place relevant course(s) in the blank below (ex: STAT 100) may not take this course for further credit.
   
   Does the partner academic unit agree that this is a two-way equivalency? □ YES □ NO
   Please also have the partner academic unit submit a course change form to update the course equivalency for their course(s).

4. SPECIAL TOPICS PRECLUSION STATEMENT [is not hard coded in SIMS.]
   Students with credit for BISC 272 - Special Topics: Biological Research may not take this course for further credit.

FEES

Are there any proposed student fees associated with this course other than tuition fees? □ YES □ NO

COURSE - LEVEL EDUCATIONAL GOALS (OPTIONAL)

By the end of the semester, successful students will be able to:
1. Use primary literature, and preliminary experiments, to find and refine their own original research questions.
2. Write and defend research proposals, and plan a research program that fits within given time and budgetary constraints.
3. Design and conduct new experiments, and record detailed observations in lab notebooks.
4. Conduct statistical analyses of experimental results, and use the outcomes of these analyses to refine subsequent hypotheses/experiments.
5. Participate in lab meetings, to give and receive feedback on research teams’ methods, results, conclusions, and challenges.
6. Share research findings concisely and accurately, via research posters and presentations.
7. Present and discuss findings with faculty members and graduate students, during a public poster session at the end of the semester.
RESOURCES
List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

N/A

OTHER IMPLICATIONS
Final exam required  □ YES  ✔ NO
Criminal Record Check required  □ YES  ✔ NO

OVERLAP CHECK
Checking for overlap is the responsibility of the Associate Dean.
Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator
Kevin Lam
COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation
"The Science Around Us" Interdisciplinary Science for Pre-Service Teachers

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation
Science for Teaching K-8

CAMPUS where course will be normally taught: ☑ Burnaby ☑ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don’t include WQB or prerequisites info in this description box.

An introduction to science inquiry, the processes of doing science, and the science around us. This studio format course engages future teachers in key biology, chemistry, physics and Earth sciences topics through the core competencies outlined in the BC K-8 curriculum. Connections between the sciences are highlighted through themes such as climate change and energy.

REPEAT FOR CREDIT
☑ YES ☐ NO Total completions allowed
☐ YES ☐ NO Within a term?

LIBRARY RESOURCES
NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that serves as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

RATIONALE FOR INTRODUCTION OF THIS COURSE

The newly re-designed British Columbia K-8 curriculum requires teachers to teach science as inquiry, through the curricular competencies of questioning and predicting, planning and conducting, processing and analyzing data and information, evaluating, applying and innovating, and communicating. Science topics are organized as 'big ideas' in subject areas including life sciences, chemistry, physics and Earth sciences.

Currently, pre-service teachers admitted into the Professional Development Program (PDP) at SFU are required to take one lab science course from any of the scientific disciplines. Since many PDP applicants do not have a strong background in science, having one science course from one science discipline does not adequately prepare them to teach the range of topics designated in the K-8 curriculum.

We propose to offer an interdisciplinary science course covering selected topics from most of the main science disciplines, highlight connections between the sciences through interdisciplinary themes such as climate change and energy, and teach through a studio format where students learn experientially about the processes and competencies of doing science. Our team of faculty members from five science departments (EASC, BPK, BISC, PHYS, CHEM), the Faculty of Education, and the Curriculum Coordinator of School District 43 Coquitlam, are collaboratively designing this course which we believe will better prepare future teachers to engage their students with science inquiry, and meet the requirements of the BC K-8 curriculum.
SCHEDULING AND ENROLLMENT INFORMATION

Effective term and year (e.g. FALL 2016) Fall 2019

Term in which course will typically be offered □ Spring □ Summer ☑ Fall

Other (describe) If needed, also in spring and summer.

Will this be a required or elective course in the curriculum? □ Required ☑ Elective

What is the probable enrollment when offered? Estimate: 30-80

UNITS
Indicate number of units: 4

Indicate no. of contact hours: Lecture Seminar Tutorial Lab 6 Other; explain below

OTHER

Studio course with two three hour blocks per week.

FACULTY

Which of your present CFL faculty have the expertise to offer this course?

Diana Bedoya, Rebecca Goyan, Peter Hollman, Sarah Johnson, Eileen van der Flier-Keller, Glyn Williams-Jones

WQB DESIGNATION

(attach approval from Curriculum Office)

B-Sci

PREREQUISITE AND / OR COREQUISITE

none
EQUIVALENT COURSES [For more information on equivalency, see Equivalency Statements under Information about Specific Course components.]

1. SEQUENTIAL COURSE [is not hard coded in the student information management system (SIMS).]
   Students who have taken (place relevant course(s) in the blank below (ex: STAT 100)) first may not then take this course for further credit.
   N/A

2. ONE-WAY EQUIVALENCY [is not hard coded in SIMS]
   (Place relevant course(s) in the blank below (ex: STAT 100)) will be accepted in lieu of this course.
   N/A

3. TWO-WAY EQUIVALENCY [is hard coded and enforced by SIMS]
   Students with credit for (place relevant course(s) in the blank below (ex: STAT 100)) may not take this course for further credit.
   N/A

   Does the partner academic unit agree that this is a two-way equivalency?  □ YES  □ NO
   Please also have the partner academic unit submit a course change form to update the course equivalency for their course(s).

4. SPECIAL TOPICS PRECLUSION STATEMENT [is not hard coded in SIMS]
   N/A

FEES

Are there any proposed student fees associated with this course other than tuition fees?  □ YES  □ NO

COURSE - LEVEL EDUCATIONAL GOALS (OPTIONAL)

1. Describe fundamental science concepts that explain the behaviour of the world around us.
2. Explain how the scientific method is used to learn about natural systems by creating hypotheses based on observations, performing and evaluating experiments, iterating and organizing and communicating findings.
3. Design and carry out an experiment, record, analyze and interpret the results.
4. Model and analyze a science problem with methods typically used at the K-8 level.
5. Create meaningful assignments, activities and assessments for K-8 students about science problems, using everyday materials where possible, and address typical misconceptions.
6. Communicate science appropriately in various forms such as words, graphs, equations and diagrams, and to various audiences.
7. Explain the relevance of science to society using examples, including technical applications. See science around us, and be its advocate.
8. Find reliable sources of information on topics relevant to the BC K-8 science curriculum, and distinguish them from dubious ones.
9. Distinguish the scientific method from other approaches to describing and understanding the world. Know the limitations and strengths (and history) of science, and distinguish it from bogus or fake science.
10. Analyze their own understanding of science and be willing to be life-long learners.

JULY 2017
RESOURCES
List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

none

OTHER IMPLICATIONS
Final exam required  □ YES  ✔ NO
Criminal Record Check required  □ YES  ✔ NO

OVERLAP CHECK
Checking for overlap is the responsibility of the Associate Dean.
Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

Eileen van der Flier-Keller
MEMORANDUM

ATTENTION: Carl Lowenberger, Associate Dean, Faculty of Science

DATE: August 13, 2018

FROM: Susan Rhodes, Director
University Curriculum & Institutional Liaison

RE: SCI Breadth designation approval

The University Curriculum Office has reviewed and approved B-Sci designation for the following proposed Faculty of Science course, effective Summer 2019 (1194):

SCI 192-4 The Science Around Us: Interdisciplinary Science for Pre-Service Teachers

Please forward this memo to your Faculty UCC and then on to SCUS and Senate for further approval.

cc: Glyn Williams-Jones, UCC Chair, Earth Sciences
    Eileen van der Flier-Keller, Special Advisor, Office of the Dean of Science
MEMORANDUM

ATTENTION: Senate
FROM: Wade Parkhouse, Chair
Senate Committee on Undergraduate Studies
RE: Course Changes (SCUS 18-60)

DATE: October 12, 2018
PAGES: 1/2

For information:

Acting under delegated authority at its meeting of October 11, 2018 SCUS approved the following curriculum revisions effective Summer 2019.

a. Beedie School of Business

(i) Course number and equivalent statement change for BUEC 232 (Fall 2019)
(ii) Prerequisite change for BUS 330, 331 and 339

b. Faculty of Science

1. Department of Statistics and Actuarial Science

(i) Description change for ACMA 438
(ii) Description change for STAT 438

2. Department of Biological Sciences

(i) Description change for BISC 446

3. Department of Biomedical Physiology and Kinesiology

(i) Description change for BPK 453

4. Department of Chemistry

(i) Description change for CHEM 408
5. Department of Mathematics
   (i) Description change for MATH 486
6. Department of Molecular Biology and Biochemistry
   (i) Description change for MBB 452
7. Department of Physics
   (i) Description change for PHYS 437
COURSE SUBJECT  BUEC  NUMBER  232  TITLE  Data & Decisions I

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number ☒
- Units ☐
- Prerequisite ☐
- Title ☐
- Description ☐
- Equivalent Statement ☒

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

**BUEG BUS 232 - Data and Decisions I (4)**
An introduction to business statistics with a heavy emphasis on applications and the use of EXCEL. Students will be required to use statistical applications to solve business problems. Prerequisite: MATH 150, MATH 151, MATH 154, or MATH 157; 15 units. MATH 150, MATH 151, MATH 154, or MATH 157 may be taken concurrently with BUEG BUS 232. Students with credit for BUEG 232 may not take this course for further credit. Quantitative.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Fall 2019

November 2016
RATIONALE (must be included)

Working with the Economics department, the two remaining BUEC courses are being integrated into Economics (BUEC 333) or Business (BUEC 232).

The Economics department is changing BUEC 333 to ECON 333, and Business is changing BUEC 232 to BUS 232. This change reflects the content and use of the courses. Currently BUEC 232 is overseen (offered, scheduled, staffed) by the Business school. This course is also used primarily for the Business program.

BUEC 232 is also required in the Political Science & Economics Joint Major, and these students will continue to have full access to BUS 232.

BUEC 232 and BUS 232 will be directly equivalent (two-way equivalency).

November 2016
<table>
<thead>
<tr>
<th>COURSE SUBJECT</th>
<th>BUS</th>
<th>NUMBER</th>
<th>330</th>
<th>TITLE</th>
<th>Income Tax for Individuals</th>
</tr>
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</table>

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

- Course number □
- Units □
- Prerequisite □
- Title □
- Description □
- Equivalent Statement □

**WORDING/DESCRIPTION EDITS.** Indicate deleted or changed text using strike-through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Basic knowledge of the underlying principles and concepts of the Canadian Income Tax Act and the application of its rules to practical situations. It also examines the general income tax planning principles and equip students with the ability to identify tax planning opportunities for individuals. Corequisite: BUS 320, **45 units**. Students who have taken BUS 329 first may not then take this course for further credit.

**EFFECTIVE TERM AND YEAR FOR CHANGES**
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

All 300-level Business courses have a prerequisite of 45 units to ensure that students are taking them at the appropriate point in their degree and maintain consistency across our courses.
Students will examine the taxation of corporations, corporate distributions, and transactions between corporations and their shareholders. Topics include an in-depth coverage of taxable capital gains; deferred income plans; and the taxation of corporate entities, partnerships, trusts and corporate reorganizations. Prerequisite: BUS 330 (or BUS 329), 45 units.
All 300-level Business courses have a prerequisite of 45 units to ensure that students are taking them at the appropriate point in their degree and maintain consistency across our courses.
COURSE SUBJECT: BUS  NUMBER: 339  TITLE: Business of Design II – Iteration and Prototyping

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number □ Units □ Prerequisite □

Title □ Description □ Equivalent Statement □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Students work in small teams to rapidly and repeatedly conceive a new business, produce its first prototype product or service and test that product or service with potential business customers. Through several such iterations, students learn practical business planning, the importance of people, context and technology and effective teamwork skills. Prerequisite: BUS 238, IAT 330, 45 units; or permission from the instructor.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
All 300-level Business courses have a prerequisite of 45 units to ensure that students are taking them at the appropriate point in their degree and maintain consistency across our courses.
COURSE SUBJECT | ACMA | NUMBER 438 | TITLE Job Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

<table>
<thead>
<tr>
<th>Course number</th>
<th>Units</th>
<th>Prerequisite</th>
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<td>Statement</td>
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</table>

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

Optional fifth term of work experience in a co-operative education program available to actuarial students. Units from this course do not count towards the units required for an SFU degree. Grading is on a pass/withdraw basis. A course fee is required. Prerequisite: ACMA 437 or Job Practicum IV from another department. Students must apply and receive permission from the co-op coordinator at least one term in advance. This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONALE (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
COURSE SUBJECT | STAT | NUMBER | 438 | TITLE | Job Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number □
- Units □
- Prerequisite □
- Title □
- Description □
- Equivalent Statement □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

This is an optional fifth term of work experience in a co-operative education program available to statistics students. Units from this course do not count towards the units required for an SFU degree. The course will be graded on a pass/withdraw basis. A course fee is required. Prerequisite: STAT 437 or Job Practicum IV from another department. Students must apply and receive permission from the co-op co-ordinator at least one term in advance. This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)
Summer 2019

November 2016
RATIONAL (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
COURSE SUBJECT  BISC  NUMBER  446  TITLE  Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

- Course number
- Units
- Prerequisite
- Title
- Description
- Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Fifth term of work experience in the Biological Sciences Co-operative Education Program. Units for this course do not count towards the units required for an SFU degree. Prerequisite: BISC 444 and readmission to the Science Co-op Education Program. This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
In some instances students may be completing additional co-op work terms beyond the final course available.
| COURSE SUBJECT | BPK | NUMBER | 453 | TITLE | Practicum V |

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

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<th>Prerequisite</th>
<th>Description</th>
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Optional term of work experience for students in the Kinesiology to Biomedical Physiology Co-operative Education Program. Units from this course do not count towards the units required for an SFU degree. Work terms are graded as pass/fail (P/F). Prerequisite: BPK 452. **This course may be repeated for additive credit.**

**EFFECTIVE TERM AND YEAR FOR CHANGES**

Fall, Spring, Summer and year (please enter in textbox)

| Summer 2019 |

November 2016
In some instances students may be completing additional co-op work terms beyond the final course available.
**COURSE MODIFICATION FORM**

**Page 1 of 2**

<table>
<thead>
<tr>
<th>COURSE SUBJECT</th>
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<th>NUMBER</th>
<th>408</th>
<th>TITLE</th>
<th>Practicum V</th>
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**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

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Optional term of work experience in the Chemistry Co-operative Education Program. Units for this course do not count towards the units required for an SFU degree. Prerequisite: CHEM 407. **This course may be repeated for additive credit.**

**EFFECTIVE TERM AND YEAR FOR CHANGES**

Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
COURSE MODIFICATION FORM
Page 1 of 2

SFU
SENATE COMMITTEE ON
UNDERGRADUATE STUDIES

COURSE SUBJECT  MATH  NUMBER  486  TITLE  Job Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number  □  Units  □  Prerequisite  □
Title  □  Description  □  Equivalent Statement  □

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

This is an optional fifth term of work experience in a co-operative education program available to mathematics and statistics students. Units from this course do not count towards the units required for an SFU degree. Prerequisite: MATH 437 and permission of the co-op co-ordinator. Students must apply at least one term in advance. This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019

November 2016
RATIONALE (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
### COURSE MODIFICATION FORM

**COURSE SUBJECT** | **MBB**<br>**NUMBER** | **452**<br>**TITLE** | **Practicum V**
--- | --- | --- | ---

**TYPE OF CHANGES.** Please type 'X' for the appropriate revision(s):

- Course number [ ]
- Units [ ]
- Prerequisite [ ]
- Title [ ]
- Description [X]
- Equivalent Statement [ ]

**WORDING/DESCRIPTION EDITS.** Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the "Equivalency statements" section under Information about specific course components if changing equivalent statement(s).

Fifth term of work experience in the Molecular Biology and Biochemistry Co-operative Education Program. Units from this course do not count towards the units required for an SFU degree. Prerequisite: Acceptance in the Science Co-operative Education Program. This course may be repeated for additive credit.

**EFFECTIVE TERM AND YEAR FOR CHANGES**

Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONALE (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
COURSE SUBJECT PHYS | NUMBER 437 | TITLE Practicum V

TYPE OF CHANGES. Please type 'X' for the appropriate revision(s):

Course number □ | Units □ | Prerequisite □

Title □ | Description □ | Equivalent Statement

WORDING/DESCRIPTION EDITS. Indicate deleted or changed text using strike through, indicate added or new text using underline. If you need to enter more text than the box allows, drag the endpoint of the text box to make it bigger, as it will not automatically expand. Please review the “Equivalency statements” section under Information about specific course components if changing equivalent statement(s).

This is an optional fifth term of work experience in a co-operative education program available to students who are studying physics or related areas such as biophysics, chemical physics or mathematical physics. Units from this course do not count towards the units required for an SFU degree. A course fee is required. This course is evaluated on a pass/withdrawal basis. Prerequisite: PHYS 436 and a minimum cumulative GPA of 2.75. Students should apply to the department at least one term in advance. This course may be repeated for additive credit.

EFFECTIVE TERM AND YEAR FOR CHANGES
Fall, Spring, Summer and year (please enter in textbox)

Summer 2019
RATIONAL (must be included)

In some instances students may be completing additional co-op work terms beyond the final course available.
MEMORANDUM

ATTENTION Senate

DATE October 3, 2018

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

RE: Program Change

For information:
Acting under delegated authority at its meeting of June 5, 2018, SGSC approved the following program changes, effective Spring 2019:

Beedie School of Business
1) Program change: Management of Technology MBA
Memo to SGSC

To: Senate Graduate Studies Committee
From: Andrew Gemino, Associate Dean, Graduate Programs
Re: Curriculum revisions to Management of Technology MBA
Date: April 10, 2018

The following curriculum revisions have been approved by the Beedie School of Business and are forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective Spring 2019.

Please include them on the next SGSC agenda.

- MOT Program Change: Removal of Applied Project
- Course Change: BUS 783 Unit Increase
- Revised MOT MBA calendar entry to reflect program change and unit increase

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino
Professor, Management Information Systems
Associate Dean, Graduate Programs, Beedie School of Business
SGSC Rationale Memo: Removal of MOT MBA Applied Project

To: Senate Graduate Studies Committee
From: Kamal Masri, Academic Director, Management of Technology MBA
Re: Removal of MOT Applied Project
Date: April 10, 2018

Historically, MOT students have been given the option of completing an Applied Project (6-unit BUS 780) or the Capstone Simulation plus two additional 2-unit courses in their final term. Over the past three years, very few students have utilized the Applied Project option.

2014: 6 students
2015: 3 students
2016: 5 students

Offering the Applied Project as an alternative limits flexibility of course offerings in the final term of the MOT. Due to low interest in BUS 780, and considering scheduling constraints of the proposed 4-unit BUS 783 (Entrepreneurship), discontinuing the Applied Project as an MOT program requirement option is proposed. The Capstone Simulation (BUS 782) is still a requirement.

BUS 780 will be removed from the MOT academic calendar entry, but still remain an active course. The use of BUS 780 to fulfill the MOT program requirement of 54 units is at the discretion of the academic director, and would be processed as a course exception on a case-by-case.

Regards,

Dr. Kamal Masri
Senior Lecturer, Management Information Systems
Academic Director, Management of Technology MBA
Calendar Entry Change for Management of Technology MBA

Summary of change:
- Removal of BUS 780 MOT MBA Applied Project as a program requirement alternative.
- BUS 783 unit increase from 2 to 4.
- Removal of BUS 773

Rationale for change:
- Very few students have utilized the Applied Project option.
- Offering the Applied Project as an alternative limits flexibility of course offerings in the final term of the MOT.
- Consideration of scheduling constraints with the proposed 4-unit BUS 783 (Entrepreneurship).
- To keep overall program requirements at 54 units, BUS 773 (Special Topics) has been removed.

Effective term and year: Spring 2019

Will this change impact current students? If yes, what is the plan for current students?
No – the current MOT cohort still has the option to take the Applied Project or the 6 units of course work.

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<thead>
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<tr>
<td>[...]</td>
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<tr>
<td>Program Requirements</td>
<td>Program Requirements</td>
</tr>
<tr>
<td>This program consists of course requirements and either an applied project or three additional courses for a minimum of 54 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted for courses below at the discretion of the academic director.</td>
<td>This program consists of course work for a minimum of 54 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted for courses below at the discretion of the academic director.</td>
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<tr>
<td>Students must complete all of</td>
<td>Students must complete all of</td>
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<tr>
<td>BUS 750 - Managing Technological Innovation (4)</td>
<td>BUS 750 - Managing Technological Innovation (4)</td>
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<tr>
<td>BUS 751 - Managerial Economics for Technology Firms (4)</td>
<td>BUS 751 - Managerial Economics for Technology Firms (4)</td>
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<tr>
<td>BUS 752 - Strategic Management of Technology-Based Firms (4)</td>
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<td>BUS 753 - Business Ethics (2)</td>
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<tr>
<td>BUS 754 - Marketing Tech-based Products and Services (4)</td>
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<tr>
<td>BUS 755 - Topics in International Business (2)</td>
<td>BUS 755 - Topics in International Business (2)</td>
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</tbody>
</table>
BUS 756 - Strategic Use of Information and Knowledge (4)  
BUS 757 - Negotiations (2)  
BUS 758 - Business Operations Design (4)  
BUS 761 - Leadership for the Technology Driven Enterprise (2)  
BUS 762 - Project Management (4)  
BUS 763 - Managing Self and Others: An Organizational Simulation (2)  
BUS 764 - Financing the Organization (4)  
BUS 766 - Financial and Managerial Accounting (4)  
BUS 773 - Special Topics (2)  
and either an applied project  
BUS 780 - Applied Project (6)  
or all of  
BUS 782 - Capstone Simulation (2)  
BUS 783 - Entrepreneurship (2)  
BUS 784 - Special Topics (2)  

Students who have completed or have been enrolled in the graduate diploma in business administration program at SFU may receive advance credit for BUS 751, 753, 754, 756, 762, 764 and 766 at the discretion of the academic director. A minimum grade of a B (3.0) in the course equivalent is required.

Students who have completed or have been enrolled in the science and technology commercialization graduate certificate program at SFU may receive advance credit for BUS 754, 764, 761, and partial credit for BUS 780 (4 out of 6 credits) at the discretion of the academic director. A minimum grade of a B (3.0) in the course equivalent is required.

Biotechnology Management Stream  
Students wishing to complete the biotechnology management stream must successfully complete the MOT requirements and four units of biotechnology specific courses. The biotechnology courses BUS 770 and BUS 771 replace one standard four-unit course determined by the academic director.

BUS 770 - Special Topics (2)  
BUS 771 - Special Topics (2)
MEMORANDUM

ATTENTION Senate

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

RE: CSAR Master of Science in Accounting with Cognitive Analytics

DATE October 18, 2018

For information:
At its meeting of September 11, 2018, SGSC approved the Cohort Special Arrangements proposal for Master of Science in Accounting with Cognitive Analytics in the Beedie School of Business. The proposal was received by SCUP at its meeting on October 10, 2018.

The following program proposal and new courses are to be effective Summer 2019.

Beedie School of Business

1) Program proposal: Master of Science in Accounting with Cognitive Analytics (Cohort Special Arrangements)
2) New calendar entry for Master of Science in Accounting with Cognitive Analytics
3) New Courses:
   - BUS 830 Foundations of Business Systems and Data
   - BUS 831 Analyzing and Visualizing Accounting Data
   - BUS 832 Data Analytics for Auditing Practice
   - BUS 838 Collaboration, Teaming, and Agile Methods
   - BUS 839 Applied Project
   - BUS 840 Data Mining and Business Intelligence
   - BUS 841 Predictive Analytics for Accounting
   - BUS 842 Advanced Analytical Auditing
   - BUS 844 Fraudulent Financial Reporting
   - BUS 845 Advanced Applied Project I
   - BUS 846 Advanced Applied Project II
MEMORANDUM

ATTENTION Senate Committee on University Priorities (SCUP)  
DATE September 24, 2018

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

RE: Cohort Special Arrangements proposal for a Master of Science in Accounting with Cognitive Analytics

For Information:

At its meeting of September 11, 2018, SGSC approved the Cohort Special Arrangements proposal for a Master of Science in Accounting with Cognitive Analytics, effective Summer 2019.
Memo to SGSC

To: Senate Graduate Studies Committee  
From: Andrew Gemino, Associate Dean, Graduate Programs  
Re: CSAR New Program Proposals  
Date: August 23, 2018 REVISED: September 17, 2018

The following curriculum revisions have been approved by the Beedie School of Business and are forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for Summer 2019.

Please include them on the next SGSC agenda.

- CSAR new program proposal: Graduate Certificate in Accounting with Digital Analytics
- CSAR new program proposal: Master of Science in Accounting with Cognitive Analytics

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino  
Professor, Management Information Systems  
Associate Dean, Graduate Programs, Beedie School of Business
To: Senate Graduate Studies Committee  
From: Andrew Gemino, Associate Dean, Graduate Programs  
Re: CSAR New Program Proposals  
Date: September 17, 2018

The following curriculum revisions have been approved by the Beedie School of Business and are being forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for Summer 2019:

- New program proposal (Cohort Special Arrangement):
  - Graduate Certificate in Accounting with Digital Analytics
- New program proposal (Cohort Special Arrangement):
  - Master of Science in Accounting with Cognitive Analytics

The credential names differ to reflect the different levels of knowledge associated with the graduate certificate and MSc degree. The graduate certificate program is intended to solidify the foundation for digital analytics, and the MSc builds upon this foundation with applications of predictive analytics and machine learning techniques that are signature to cognitive analytics approaches.

Students will receive either the graduate certificate credential or the MSc credential, depending on their entry pathway. Not all students will proceed from the graduate certificate to the MSc credential. As such, these programs are presented as stand-alone credentials which the naming now reflects.

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino  
Professor, Management Information Systems  
Associate Dean, Graduate Programs, Beedie School of Business
Master of Science
in Accounting with Cognitive Analytics

Cohort Special Arrangement Program Proposal

August 2018
Beedie School of Business
PART A: Information required by the Ministry of Advanced Education

EXECUTIVE SUMMARY

Overview of SFU's history, mission, and academic goals

As Canada's engaged university, Simon Fraser University is defined by its dynamic integration of innovative education, cutting-edge research and far-reaching community engagement. SFU was founded just over 50 years ago with a mission to be a different kind of university—to bring an interdisciplinary approach to learning, embrace bold initiatives, and engage with communities near and far. Today, SFU is a leader amongst Canada's comprehensive research universities. With campuses in British Columbia's three largest cities—Vancouver, Surrey and Burnaby—SFU has eight faculties, delivers almost 150 programs to over 30,000 students, and boasts more than 130,000 alumni in 130 countries around the world.

The Beedie School of Business is internationally accredited by both the AACSB (Association to Advance Collegiate Schools of Business) and EQUIS Quality award from the EFMD (European Federation for Management Development). These accreditations from globally recognized business school accrediting agencies place Beedie in the top 1% of business schools worldwide. Beedie has 100 world class faculty, 3500 undergraduate students and over 600 graduate students. The combination of expertise, experience, educational technology, and infrastructure necessary for sustained success allows Beedie to act on the calling of developing innovative and socially responsible business leaders with a global perspective through education, inspired by research and grounded in practice.

Proposed credential to be awarded

Master of Science in Accounting with Cognitive Analytics

Location of program

Primarily online, with some face-to-face sessions (Vancouver: Segal campus, and offsite)

Academic unit(s) offering proposed program

Beedie School of Business

Anticipated program start date

Summer 2019

Anticipated completion time

Five terms
A) Aims, goals and/or objectives of the proposed program

Creating “next generation” accountants through innovative programming. To prepare accounting industry employees with analytical skills, and develop the “next generation” accountant who will be:

• knowledgeable about how the profession has evolved and will evolve technologically
• accomplished in best practices in accounting, auditing, tax, and financial reporting
• empowered with data and able to use advanced data and analytic technologies
• prepared to collaborate and innovate with teams of business professionals

The purpose of the Master of Science in Accounting with Cognitive Analytics is to further develop auditing with data analytics capabilities. With analytical capabilities at the heart of the program, Beedie aims to design practical and interactive courses empowering this next generation of auditors for excellence, embracing change, innovation, and critical thinking. To accomplish this objective, the integration of four skill dimensions is proposed:

i. advanced auditing techniques
ii. data and visualization skills
iii. statistical and analytical capabilities
iv. advanced leadership/teaming skills

The proposed MSc provides curriculum related to each of these skills to prepare accounting industry professionals to contribute and lead analytical teams in organizational projects. The final applied project course requirement, delivered with cooperation from industry partners, provides a capstone experience integrating the knowledge gained throughout the coursework. MSc students are challenged in a team environment to demonstrate significant benefits that could accrue from real-world analytic projects in accounting, enabling graduates to excel as participants and business leaders in complex data and analytic projects.

B) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

In 2017, the Beedie School identified its vision as the following statement: “We develop innovative and socially responsible business leaders with a global perspective through education, inspired by research and grounded in practice.”

A focus on innovation and collaborative capabilities, with attention on data and analytical skills, educates business professionals by developing these skills and grounding them in everyday business practice. The program is therefore highly aligned with Beedie’s mission statement. In turn, Beedie’s focus on innovation also aligns with the SFU Innovates overall strategy (http://innovates.vpr.sfu.ca/our-strategy). The proposed MSc
stands on the entrepreneurial education pillar of the SFU Innovates strategy, and challenges business professionals to innovate their practice with data and analytic capabilities. Finally, the program aligns with SFU’s Big Data strategic initiative and the “Engaging Students” goal noted in the Presidents Goals and Objectives 2017-18, which suggest SFU helps “To equip students with the knowledge, skills, and experiences that prepare them for life in an ever-changing and challenging world.”

c) Linkages between the educational goals and the curriculum
The purpose of the program is to develop accounting professionals with analytic capabilities. By creating an educational program to support the advancement of these skills, Beedie will be preparing accounting business professionals to embrace the changes coming to the industry and provide the skills they need to play a vital role in helping client organizations create value. To accomplish this central objective, we have designed curriculum that integrates four data and analytic curricular dimensions:

i. advanced auditing techniques
ii. data and visualization skills
iii. statistical and analytical capabilities
iv. advanced leadership/teaming skills

Each of these four program learning objectives are developed through a corresponding series of courses. The students then participate in a capstone project experience. The capstone course serves as an integrative experience that challenges students to demonstrate their abilities in analytics within an accounting context. As the program is targeted at accounting industry professionals, we will encourage students to select topics that are directly related to their organization or industry. While there is no mandatory work experience required in this program, the capstone applied project can bring considerations of the student’s work environment directly into the program. Techniques learned in earlier courses should be able to be applied directly in the capstone. In doing this, students will be demonstrating mastery in the curricular topics and achieving the goal of developing analytic capabilities.

d) Potential areas/sectors of employment for graduates and/or opportunities for further study
As the proposed program is geared towards students with high levels of familiarity with accounting, promotion within company and/or industry is a key target area for graduates. Career development will focus on collaborative teaming; as analytic projects continue to grow in complexity, the need for agile, team-based approaches to analytic projects will grow significantly. This will lead to new role definitions in the accounting profession including analytic translators, workflow integrators, delivery managers and analytic business leaders. Business professionals in the accounting area who are prepared with analytical skills, and advanced skills in business project leadership, will open pathways to the new roles and careers. While many of these analytic roles are not yet well defined,
MSc in Accounting with Cognitive Analytics

MSc graduates will be well prepared to take leadership positions in the area of analytics within organizations as these emerging roles become clearer.

e) Delivery methods
A cohort-based, blended education delivery approach including face-to-face sessions integrated with an online learning management system (LMS). Online programming through CANVAS will provide the core of learning environment, enabling students to immerse themselves in learning on their own schedule while encouraging a collaborative, team-based approach. This collaborative approach is further supported by face-to-face sessions for each cohort. A cohort model is proposed in order for students to apply cumulative skills in the final course, which an integrative applied project capstone center around teaming and applying data analytic skills learned throughout the MSc.

f) Program strengths
The Beedie School of Business collaborates with a wide range of clients to provide innovative strategic learning solutions. We approach each industry as a unique organizational learning opportunity and work closely with key stakeholders to ensure that learning resonates with individual and organizational goals. We have strong faculty in the area of data analytics combined with a history of innovative programming. Our 50 years in graduate business education combined with two decades of experience in online education provide the foundation for programming that allows students to effectively learn when and where it makes sense to them.

The proposed program develops foundational skills in Year 1. Year 2 includes four courses featuring advanced skill development offered. Participants will then be challenged to apply their advanced skills with a final integrative capstone project. This applied project is the essential feature of the program.

g) An overview of the level of support and recognition from other post-secondary institutions and relevant regulatory or professional bodies, where applicable, and plans for admissions and transfer within the British Columbia post-secondary education system
The Beedie School consulted with professionals in Accounting (Audit, Tax, Strategy and Information Systems Consulting) including presidents of big 4 firms to assess the demands for analytic training for professionals with a Certified Professional Accountant (CPA) designation. Data and analytics was clearly changing the way that the public accounting profession is providing services. An opportunity was identified to provide specific education to advance the education of accounting with D&A.

In addition, a number of Universities in the US have developed Accounting and Data Analytics programs since 2017 including:
— Villanova School of Business
— Ohio State University Max M. Fisher College of Business
MSc in Accounting with Cognitive Analytics

— Arizona State University’s W. P. Carey School of Business
— The University of Georgia’s Terry College of Business
— The University of Mississippi’s Patterson School of Accountancy
— The University of Missouri’s Robert J. Trulaske, Sr. College of Business
— The University of Southern California’s Leventhal School of Accounting

We have contacted Villanova and Ohio State and discussed the program, particularly the suggestions for developing and recruiting students. Both Universities suggested a high student demand and strong industry support for the program.

We also contacted the General Management Admissions Council and were provided access to the 2017 Prospective Student Survey. The report highlighted that the percentage of candidates considering applying to Master of Data Analytics programs grew from 7 percent in 2009 to 16 percent as of May 2017. We expect this increases recognition the importance of data and analytics skills continues.

The proposed MSc will utilize existing policies of Beedie Graduate Programs. Students within the British Columbia post-secondary education system will not be able to transfer into the program, due to the cohort model and required courses list. Advanced standing will not be granted, with the exception of students who complete the Graduate Certificate in Accounting with Digital Analytics courses at a suitable academic level.

h) Related programs in the institution or other British Columbia post-secondary institutions

There are several big data and analytic academic programs in post-secondary institutions within BC. Most of these programs are focused on developing computing science and technical skills for data scientists. The demand for these skills is high, and the need for new programs is clear. The proposed MSc program focuses on bringing basic data and analytic skills to business professionals in accounting. Business professionals in accounting see the value of adding data and analytical skills, but do not intend to become data scientists nor data management professionals. As the proposed MSc is intended to teach data and analytic skills in a business context, it will not duplicate programs with a more technical, statistical focus.

Internal: SFU – Master of Science in Computer Science with a specialization in Big Data

The SFU MSc in Computer Science with a specialization in Big Data is designed to develop data architects who apply a deep knowledge of computer science. The program is challenging and ideal for those with a strong aptitude in computer science and engineering. The MSc in Computer Science focuses on highly technical skill development rather than collaboration and basic analytic and data skills in a business environment. The proposed MSc program does not require, nor does it assume, a strong aptitude in computing science, and therefore intended to develop skills at a different level.
MSc in Accounting with Cognitive Analytics

than the MSc in Computer Science. While both programs will focus on skills relating Big Data, there is a significantly different learning outcome for business professionals than there would be for technical professionals.


The Master in Data Science is developed by the departments of Computer Science and Statistics at UBC to develop analytical skills for people with an undergraduate degree in any discipline. The program does not seek business professionals for admission, and covers a wide variety of interdisciplinary analytical situations. The Master of Data Science program does not focus on collaboration and as it is offered by the departments of computing science and statistics, does not focus on business applications in organizational environments. The proposed MSc is intended for a more mature business professional student and focuses on developing skills at a different level than the Master of Data Science program. While both programs will focus on analytical skills, there is a significantly different learning outcome for business professionals than there would be for more technical professionals or data scientists.

External: UBC – Master of Business Analytics - 
http://www.sauder.ubc.ca/Programs/Master_of_Business_Analytics

The UBC Master of Business Analytics (MBAN) provides broad analytical training that includes simulation, mathematical modeling and data management. The focus of the program is on operations management, supply chain, and marketing. Admissions are open to students in all faculties and not limited to business professionals. In contrast, the proposed MSc is focused on business professionals as students and provides data and analytic skills with no simulation or mathematical/optimization modeling. With a focus on data and analytical skills for the accounting profession, the proposed MSc differs in the type of student, the area of business focus (accounting versus operations), and the nature of the skills taught in the program.

Contact information
Ali Dastmalchian, Dean, Beedie School of Business: beedie_ea@sfu.ca 778.782.7664
Andrew Gemino, Associate Dean, Graduate Programs: gemino@sfu.ca 778.782.3653
Maria Szymczak, Executive Director, Graduate Programs: mdelguer@sfu.ca 778.782.5023
Jamal Nazari, Associate Professor, Accounting: inazari@sfu.ca 778.782.4604

PART B: Information required by Simon Fraser University

PROGRAM DETAILS

a) Graduation requirements, target audience

Cohort Special Arrangement Program Proposal
MSc in Accounting with Cognitive Analytics

The proposed Master of Science in Accounting with Cognitive Analytics consists of course work and a capstone applied project for a minimum of 33 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted at the discretion of the academic director.

In Year 1, students must complete all of:
BUS 830 - Foundations of Business Systems and Data (3)
BUS 831 - Analyzing and Visualizing Accounting Data (3)
BUS 832 - Data Analytics for Auditing Practice (3)
BUS 838 - Collaboration, Teaming, and Agile Methods (3)
And a project:
BUS 839 - Applied Project (3)

In Year 2, students must complete all of:
BUS 840 - Data Mining and Business Intelligence (3)
BUS 841 - Predictive Analytics for Accounting (3)
BUS 842 - Advanced Analytical Auditing (3)
BUS 844 - Fraudulent Financial Reporting (3)
And a project:
BUS 845 - Advanced Applied Project I (3)
BUS 846 - Advanced Applied Project II (3)

Students are expected to complete the program requirements within five terms.

The proposed program is geared towards employees already working within the accounting and auditing sector, primarily at the Junior Accountant level. Therefore, company employees will be the targeted recruitment group. Due to the blended delivery model, it is predicted that primarily domestic students will be interested. Students who are admitted to the proposed Graduate Certificate in Accounting with Digital Analytics will also make up the target audience to further their studies from the certificate to master’s level.

b) Admission requirements

Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar. An undergraduate degree in business, management, commerce, or other suitable quantitatively oriented programs is required and a minimum of two years of applicable work experience. Candidates holding a professional designation such as a CPA and evidence of strong mathematics competency would also be ideal candidates. Advanced credit of equivalent courses may be granted from the Certificate in Accounting with Digital Analytics.

Option 1: Direct entry into the MSc in Accounting with Cognitive Analytics. Successful applicants must meet admission requirements outlined in Graduate General Regulations 1.3.3: Admission to a Master’s Program. After Year 1, students who do not meet the
minimum CGPA requirement of 3.0 will have the option to graduate with a Graduate Certificate in Digital Analytics and forgo the MSc credential.

Option 2: Students start in the certificate in Accounting with Digital Analytics, complete a minimum of 12 units of course work with a CGPA of 3.0 or above and transfer into the MSc in Accounting with Cognitive Analytics. This may only be done before the certificate in Accounting with Digital Analytics has been granted. The only credential received is the Master of Science.

Due to the stakeholders involved, we will not be offering the option where students graduate with a certificate in Accounting with Digital Analytics and then apply into the MSc in Accounting with Cognitive Analytics program and receive both credentials.
c) Evidence of student interest and labour market demand
The Graduate Management Admissions Council (GMAC) owns and administers the Graduate Management Admission Test® (GMAT®) exam. The GMAT is used by more than 7,000 graduate programs worldwide. Approximately 9 out of 10 new MBA enrollments globally are made using a GMAT score and more than 200,000 candidates take the GMAT exam every year. The information they provide is perhaps the best source for considering student demand. In recent papers, GMAC has noted the significant demand for Masters of Analytics programs.\(^1\) In addition, a 2011 report from McKinsey Consulting\(^2\) has suggested that "by 2018, the United States alone could face a shortage of between 140,000 and 190,000 of workers with analytical skills". Each of these reports suggests strong general demand for analytics programming. Evidence of the demand within the accounting profession is also significant. The Chartered Professional Accountant (CPA) has recognized the changes data and analytical skills are bringing to the profession.\(^3\)

These articles suggest a significant unmet need for further education in the area of data analytics, specifically in the area of accounting/audit/tax. The type of jobs that candidates are likely to access after graduation include analytic team leads, lead business analysts, managers of business analytics teams. Emerging roles in organizations include:

- Delivery managers: Deliver data/analytic insights and work with end users
- Analytics translators: Ensure analytics solve critical business problems
- Workflow integrators: Build interactive decision tools and implement changes
- Visualization analysts: Visualize data and validate reports and dashboards

d) Eligibility for scholarships, awards, and financial aid
Not eligible for scholarships, awards, and financial aid at this time. The MSc in Accounting with Cognitive Analytics is proposed as a Cohort Special Arrangement program, which is not eligible for awards adjudicated by the Senate Graduate Awards Adjudication Committee.

e) Program evaluation and academic/administrative oversight
All graduate programs in the Beedie School are subject to accreditation. The Beedie School is double accredited by EQUIS\(^4\) and AACSB. Each of these accreditation bodies

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\(^3\) See for instance the following article accessed June 20, 2018: https://www.cpaajournal.com/2017/06/26/big-data-business-analytics-implications-audit-profession

\(^4\) For EQUIS accredited Schools see : http://www.efmd.org/accreditation-main/equis/accredited-schools
MSc in Accounting with Cognitive Analytics

require 5-year re-evaluation cycles and our internal Assurance of Learning (AoL) processes run annually to collect data on program learning goals, outcomes and traits. Outcomes of this AoL process are reported to the Graduate AoL committee that then coordinate this information for the accreditation agencies and external reviews.

To avoid disruptive changes, program evaluations normally occur on a 3-year rotating basis across the major programs. Academic Directors are responsible for annual summaries of program performance that are reported in the graduate program committee. Members of the graduate program committee (GPC) include academic directors, faculty members and senior graduate staff members. Any changes to graduate programs must be passed through the graduate curriculum committee. The graduate curriculum committee (GCC) is chaired by the Associate Dean, Graduate Programs and composed of a majority of faculty members, a selection of academic directors, and senior staff.

f) Main competitors outside BC
There are a number of Canadian universities offering Master of Accounting degrees. These programs are not focused on data and analytics but rather serve to develop accounting professional in traditional areas of tax, audit and risk management. These programs normally require a previous undergraduate degree (BBA) in accounting. Examples include:

York University, Schulich School of Business:
http://schulich.yorku.ca/programs/macc/

Alberta School of Business:
https://www.ualberta.ca/business/programs/master-of-accounting

University of Saskatchewan, Edwards School of Business:
http://www.edwards.usask.ca/programs/mpacc/

There are a growing number of business schools offering a Masters of Business Analytics in Canada. These programs are not focused in the area of accounting and instead are intended to serve all areas of business. These programs do not require significant experience in a particular area of business. Many of the programs are directed at undergraduate students who are looking for a one-year program that provides business analytic training. Examples include:
From our research to date, there are no business schools in Canada offering a Master’s program in accounting with data and analytics. There are a larger number of business schools in the US that are running Masters programs in accounting, data and analytics. These include:

Arizona State University’s W. P. Carey School of Business:  
https://wpcarey.asu.edu/masters-programs/accounting/data-analytics-track

The University of Georgia’s Terry College of Business:  
http://www.terry.uga.edu/macc/

The University of Mississippi’s Patterson School of Accountancy:  

The University of Missouri’s Robert J. Trulaske, Sr. College of Business:  

The University of Southern California’s Leventhal School of Accounting:  

Virginia Tech’s Pamplin College of Business:  
https://acis.pamplin.vt.edu/

Villanova University, School of Business:  
http://www1.villanova.edu/villanova/business/graduate/specializedprograms/mac.html

All of the American programs feature skills in data management and information technology along with descriptive and predictive statistics. The target is business professionals with accounting backgrounds. The programs seek to transition these accounting professionals into data and analytic roles. Most programs run between 8 months to 1 year in length and are offered exclusively within the business school.
programs are slightly different in course structures focusing on tax, auditing, risk management and other areas of accounting. They vary in the number of credits required. All programs require a minimum of 30 credits with a maximum of 40 credits.

RESOURCES

a) Enrolment Plan
We expect to run a Certificate program in parallel with the MSc. Our expectations are that 50% of students who take the Certificate will move immediately into the MSc after completing the certificate coursework. Given current expressions of interest from potential students, and as indicated through the letter of support from KPMG (Appendix 2), we expect to be able to recruit 60-70 Certificate students in the first year (Summer 2019). This would suggest a total of 30-35 MSc students starting Year 2 in Summer 2020. Predicted enrolment numbers of 40-50 students per cohort per year for the proposed MSc program suggests 80-100 Certificate students. Advancement from the proposed Graduate Certificate in Accounting with Digital Analytics is expected to be a major factor for MSc admission numbers.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments
Existing resources will be utilized. Canvas will be the online course delivery tool. Face-to-face sessions are minimal, meaning limited physical resources are needed. Face-to-face sessions will be held at the Segal Graduate School or offsite utilizing corporate space with an industry partner organization, with no requirement for additional lab space, library space, or other on-campus facilities. Students will not utilize in-house Beedie resources such as the Career Management Centre or student engagement opportunities. Administrative resources will come from existing Beedie Graduate Program staff at the Segal Graduate School. Existing faculty will be utilized, with no new hires planned.

c) Faculty member’s teaching/supervision
SFU Beedie has exceptional, world class faculty with skills and expertise in data and analytics. Below provides example of credentials and profiles of some of our outstanding faculty in this area.

Accounting
Dr. Michael Favere-Marchesi: Ph.D. (University of Southern California), Master of Accountancy, B.Sc. (Brigham Young University), C.P.A. (California), Certified Internal Auditor profile
Dr. Jamal Nazari: Ph.D. Accounting (U of Calgary), MSc Accounting (U of Tehran), BA Accounting (U of Mashhad), CPA (BC), CMA, CGA (Alberta) profile
Dr. Kim Trottier: Ph.D. Accounting (UBC), MSc Accounting (UBC), BComm (Ottawa University), CPA, CA (Ontario) profile
MSc in Accounting with Cognitive Analytics

Information Systems
Dr. Andrew Gemino: Ph.D. (University of British Columbia); M.B.A., M.A., B.A. (Simon Fraser University) profile
Dr. Nilesh Saraf: Ph.D. (University of Southern California), M.B.A. (Indian Institute of Management, Lucknow), B.Eng. (Maharaja Sayajirao U., India) profile
Dr. Peter Tingling: Ph.D. (U. of Western Ontario), M.B.A. (Wilfrid Laurier), CPA, CGA profile

Operations Management
Dr. Payman Jula: Ph.D. (UC Berkeley), M.Sc. (Western Michigan), B.Sc. (Tehran) profile
Dr. Michael Johnson: Ph.D., M.A.Sc., B.Eng, (Windsor) profile
Dr. Srini Krishnamoorthy: PhD (Columbia), PGDB (Indian institute of Management Lucknow), B.Tech. (Indian Institute of Technology, Madras) profile

Marketing
Dr. Bob Krider: Ph.D., M.Sc., B.Sc. (University of British Columbia) profile
Dr. Jason Ho: Ph.D. (University of British Columbia), Master of Philosophy in Marketing (Chinese University of Hong Kong) profile
Dr. Srabana Dasgupta: Ph.D. (University of Southern California), M.A. (Delhi School of Economics), B.A. (Jadavpur University) profile

d) Proposed tuition and other program fees including a justification
Tuition is to be charged on a per credit basis, using the existing Masters of Science in Finance (MSc Fin) tuition of $666.88 per unit plus additional student fees of approximately $200 per term (without a U-Pass, as the proposed program is primarily delivered online) as per the academic calendar.
### MSc budget:

#### MSc Cohort

<table>
<thead>
<tr>
<th>FINANCIAL SUMMARY</th>
<th>Total Revenue per student</th>
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<tbody>
<tr>
<td>Revenue</td>
<td></td>
</tr>
<tr>
<td>Tuition 1st year (40 students)</td>
<td>408,204</td>
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<tr>
<td>Tuition 2nd year (40 students)</td>
<td>489,845</td>
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<tr>
<td>Total Revenue</td>
<td>898,049</td>
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<tr>
<td>Tuition to Beedie minus VPA share (35.1)</td>
<td>582,834</td>
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<tr>
<td>One Time Development Fee</td>
<td>125,000</td>
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<tr>
<td><strong>Total Revenue To Beedie</strong></td>
<td><strong>707,834</strong></td>
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#### Expenses

**Program Salaries**

<table>
<thead>
<tr>
<th>Academic Salaries:</th>
<th></th>
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<tbody>
<tr>
<td>Certificate Faculty Salary</td>
<td>177,000</td>
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<tr>
<td>MSC Faculty Salary</td>
<td>106,200</td>
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<tr>
<td>TA</td>
<td>12,000</td>
</tr>
<tr>
<td>Program Assistant Salary &amp; Benefits (shared)</td>
<td>20,000</td>
</tr>
<tr>
<td><strong>Total Program Salaries</strong></td>
<td><strong>315,200</strong></td>
</tr>
</tbody>
</table>

**Operations Cost**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Software Purchase Costs</td>
<td>3,000</td>
</tr>
<tr>
<td>General Office Expenses</td>
<td>200</td>
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<td>Courier/Messenger Expense</td>
<td>750</td>
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<tr>
<td>Program &amp; Course Development</td>
<td>125,000</td>
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<tr>
<td>Computing Services Charges</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total Operations</strong></td>
<td><strong>128,975</strong></td>
</tr>
</tbody>
</table>

| TOTAL EXPENSES       | 444,175        |
| Revenue - EXPENSES   | 263,659        |
PART C: Appendices

Appendix 1 Calendar entry  
Appendix 2 New course forms with course outlines  
Appendix 3 Letter of support  
Appendix 4 Faculty biographies
Accounting with Cognitive Analytics
Master of Science

Description of Program

The Master of Science in Accounting with Cognitive Analytics develops auditing with data analytics capabilities. With a curriculum integrating advanced auditing techniques, data and visualization skills, statistical and analytical capabilities, and agile teaming skills, accounting industry professionals will learn to contribute and lead analytical teams in organizational projects. Students are challenged in a team environment to demonstrate significant benefits that could accrue from real-world analytic projects in accounting, enabling graduates to excel as participants and business leaders in complex data and analytic projects.

Admission Requirements

Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 in the SFU Calendar. An undergraduate degree in business, management, commerce, or other suitable quantitatively oriented programs is required and a minimum of two years of applicable work experience. Candidates holding a professional designation such as a CPA and evidence of strong mathematics competency would also be ideal candidates.

Advanced credit of equivalent courses may be granted from the Certificate in Accounting with Digital Analytics.

Program Requirements

The Master of Science in Accounting with Cognitive Analytics consists of course work (27 units) and an applied project (6 units) for a minimum of 33 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted at the discretion of the academic director.

Students must complete all of

BUS 830 – Foundations of Business Systems and Data (3)
BUS 831 – Analyzing and Visualizing Accounting Data (3)
BUS 832 – Data Analytics for Auditing Practice (3)
BUS 838 – Collaboration, Teaming, and Agile Methods (3)
BUS 840 – Data Mining and Business Intelligence (3)
BUS 841 – Predictive Analytics for Accounting (3)
BUS 842 – Advanced Analytical Auditing (3)
BUS 844 – Fraudulent Financial Reporting (3)

And all of the projects

BUS 839 – Applied Project (3)
BUS 845 – Advanced Applied Project I (3)
BUS 846 – Advanced Applied Project II (3)
Program Length

Students are expected to complete the program requirements within five terms.

Other Information

Advanced credit of equivalent courses may be granted from the Certificate in Accounting with Digital Analytics with a final grade of B or higher.

Academic Requirements within the Graduate General Regulations

All graduate students must satisfy the academic requirements that are specified in the graduate general regulations, as well as the specific requirements for the program in which they are enrolled.
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
<th>Number (eg. 810)</th>
<th>830</th>
<th>Units (eg. 4)</th>
<th>3</th>
</tr>
</thead>
</table>

**Course title (max. 100 characters)**

**Foundations of Business Systems and Data**

**Short title (for enrollment/transcript - max. 30 characters)**

**Bus Systems & Data**

- **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.

 Enterprise information systems, the relational database systems that underlie them, and creating value through competitive analytics. Develop an understanding of database querying and analytical applications to inspect, summarize, and transform data.

- **Rationale for introduction of this course**

  New course for the Master of Science in Accounting with Cognitive Analytics

- **Term of initial offering (eg. Fall 2019)**

  **Summer 2019**

- **Course delivery (eg. 3 hrs/week for 13 weeks)**

  3 hrs/week for 13 weeks

- **Frequency of offerings/year**

  Once/year

- **Estimated enrollment per offering**

  40-50

- **Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

  n/a

- **Prerequisite and/or Corequisite**

  n/a

- **Criminal record check required?**

  □ Yes  [✓] No

- **Additional course fees?**

  □ Yes  [✓] No

- **Campus where course will be taught**

  □ Burnaby  □ Surrey  [✓] Vancouver  □ Great Northern Way  [✓] Off campus

- **Course Components**

  [✓] Lecture  □ Seminar  □ Lab  □ Independent  □ Capstone

- **Grading Basis**

  [✓] Letter grades  □ Satisfactory/ Unsatisfactory  □ In Progress / Complete

- **Repeat for credit?**

  □ Yes  [✓] No

- **Total repeats allowed?**

  0

- **Repeat within a term?**

  □ Yes  [✓] No

- **Final exam required?**

  □ Yes  [✓] No

- **Capstone course?**

  □ Yes  [✓] No

- **Required course?**

  [✓] Yes  □ No

- **Combined with a undergrad course?**

  □ Yes  [✓] No

  If yes, identify which undergraduate course and the additional course requirements for graduate students:

  * See important definitions on the curriculum website.
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:
Andrew Gemino, Nilesh Saraf, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course:

CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beedie Graduate Programs</td>
<td>Lesley McKay</td>
<td><a href="mailto:buscoord@sfu.ca">buscoord@sfu.ca</a></td>
</tr>
</tbody>
</table>

ACADEMIC UNIT APPROVAL

A course outline must be included.

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
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<table>
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<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
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FACULTY APPROVAL

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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
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</thead>
<tbody>
<tr>
<td>Andrew Gemino</td>
<td></td>
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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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 2 4 2018</td>
</tr>
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ADMINISTRATIVE SECTION (for DGS office only)

Library Checks: SEP 07 2018

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

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
BUS 830: Foundations of Business Systems and Data

Semester: Summer 2019
LMS: canvas.sfu.ca

COURSE DESCRIPTION

Introduces the foundations of business processes and the business value of data in enterprise systems. A focus is placed on business processes and the relational database management systems underlying these processes. Introductions to business process mapping (MS Visio), Structured Querying Language (SQL) and visual querying methods (MS Access) for accounting data are provided. Skills in using spreadsheets (MS Excel) to summarize, transform and clean imported accounting data are developed in addition to introductory skills in attaching to a relational database and developing descriptive summaries of accounting data using visual analytic software (Tableau).

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Understanding fundamental technology elements underlying competitive analytics in organizations.
- Identifying business processes that could benefit from process redesign.
- Mapping business processes
- Interacting with relational database management systems that include structured and unstructured accounting data.
- Utilizing SQL to design and interpret basic join queries from a relational database.
- Importing data from SQL queries into spreadsheets (MS Excel) to further summarize, clean and transform accounting data as a basis for analysis.
- Attaching visual analytic applications (Tableau) to relational databases in order to generate descriptive visual summaries of accounting data.

COURSE WORKLOAD EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignments with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS


LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.
Individual BEEDIESCHOOL OF BUSINESS

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tr>
<td>Weekly Quizzes</td>
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</tr>
<tr>
<td>Individual Querying Assignment</td>
<td>20%</td>
</tr>
<tr>
<td>Individual Visual Analysis Assignment</td>
<td>20%</td>
</tr>
<tr>
<td>Group Process Mapping Assignment</td>
<td>20%</td>
</tr>
<tr>
<td>Group In-class Exercise</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Weekly Quizzes**

Due: Weekly, Sunday at 11:00 pm

A series of weekly multiple-choice quizzes will be provided through Canvas. Questions are drawn randomly from a question pool and provided to students in a timed format. Questions are focused on the material to be presented in the week to come and quizzes serve as a preparation for this material. Students have 30 minutes to answer 10 questions in an open book format. Students will receive feedback on their mark once the quiz closes.

**Group Business Process Assignment**

Due:

Students will work in groups of 3-4 to create a process map for a business process defined in a case. Students will be required to use MS Visio to map the business process. Assignment requirements also include a short analysis of the process along with 2 recommendations for how to improve the overall process. Groups will be assessed on their ability to effectively visualize the business process along with the quality of the process improvement recommendations.

**Individual Querying Assignment**

Due:

Students will work through a series of questions and provide the SQL code for each of the proposed queries. In addition, students will be asked to query data compiled in a relational database and then import this data into MS Excel. Students then use spreadsheet features to clean and transform data as described in the project. Students will be evaluated on the quality of the resulting transformed Excel worksheet.

**Individual Visual Analysis Assignment**

Due:

Students will compile a brief visual analysis of an accounting dataset. The data set will be created from a database query that the students design. Students will use a visual analytic tool (Tableau) to provide a summary of the data in the query. Students will be evaluated on the quality of the visual summary and a short write-up of the analysis.

**Group In-class Exercise**

Due

Students will work in groups of 3-4 in a time-limited, in-class assignment to integrate their learning about processes, querying and visual analysis. Students will be given a business process analysis case and then will be required to develop a business process map, develop queries that provide data about the process and then create a brief analysis of the process with some suggestions for improvement. Groups will be assessed on their ability to effectively visualize the business process, create the necessary queries and provide high-quality process improvement recommendations.

**COURSE STRUCTURE**

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements.
READING SCHEDULE

Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Competing on Analytics

Session 2: Business Process Mapping

Session 3: Business Process Mapping and Validation

Session 4: Business Process Improvement

Session 5: Business Process Improvement Reporting

Session 6: Introduction to SQL in Accounting

Session 7: Introduction to Database Querying

Session 8: Visual Querying using MS Access

Session 9: Developing Reports

Session 10: Introduction to Data Visualization
Session 11: Data Visualization in Accounting


Session 12

No readings. In-class exercise.

ACADEMIC HONESTY

Plagiarism is the unacknowledged use of other people's ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university's strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: [http://www.sfu.ca/policies/gazette/student.html](http://www.sfu.ca/policies/gazette/student.html)
# New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number (eg. 810)</td>
<td>831</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

## Course title (max. 100 characters)

**Analyzing and Visualizing Accounting Data**

## Short title (for enrollment/transcript - max. 30 characters)

**Analyzing & Visualizing Data**

## Course description for SFU Calendar

An exploration of financial and non-financial data using summary measures, predictive models for decision-making, and graphic visualizations.

## Rationale for introduction of this course

New course for the Master of Science in Accounting with Cognitive Analytics

## Term of initial offering (eg. Fall 2019)

**Summer 2019**

## Course delivery (eg. 3 hrs/week for 13 weeks)

3 hrs/week for 13 weeks

## Frequency of offerings/year

Once/year

## Estimated enrollment per offering

40-50

## Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

n/a

## Prerequisite and/or Corequisite

n/a

## Criminal record check required?

Yes

## Additional course fees?

Yes

## Campus where course will be taught

Burnaby

## Course Components *

- Lecture

## Grading Basis

- Letter grades

## Repeat for credit?

Yes

## Total repeats allowed?

0

## Repeat within a term?

Yes

## Required course?

Yes

## Final exam required?

Yes

## Capstone course?

Yes

## Combined with a undergrad course?

Yes

---

* 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

Michael Favere-Marchesi, Jamal Nazari, Kim Trottier

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedie Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee

Signature

Date

Department Chair

Signature

Date

FACULTY APPROVAL
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

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

Andrew Gemino

Signature

Date
August 23, 2018

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

Jeff Derksen

Signature

Date
SEP 24 2018

ADMINISTRATIVE SECTION (for DGS office only)
Library Check:  SEP 07 2018
Course Attribute:
Course Attribute Value:
Instruction Mode:
Attendance Type:

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
BUS 831: Analyzing and Visualizing Accounting Data

Instructor: 
Office Phone: 
Email: 

Semester: Summer 2019
LMS: canvas.sfu.ca

COURSE DESCRIPTION

Explores accounting data using univariate descriptive statistics, sampling and testing procedures for summary measures. Develops exploratory data analysis techniques and graphic visualizations to display relationships in accounting data that can be communicated to an executive audience. Introduces basics for multivariate predictive models that support accounting decision making. Develops basic multivariate predictive models to explore and validate data relationships and develops skills in communicating these relationships to business professionals.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Apply spreadsheet function (Excel) to create randomized samples and validate procedure.
- Use pivot tables in spreadsheet (Excel) for exploratory data analysis of accounting data.
- Apply visual analytic software (Tableau) to visualize descriptive statistics from accounting data.
- Perform confirmatory data analysis and identify outliers in an accounting data population.
- Identify appropriate statistical techniques and test statistic(s) for several business hypotheses.
- Understand the value of data mining and using a data analysis method (e.g. CRISP-DM).
- Utilize several multivariate predictive techniques for an accounting related issue.
- Develop and validate a multivariate predictive analytic model for an accounting issue.

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

5. Selected readings and custom courseware may be provided on Canvas.

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.
Individual Sampling Procedure Assignment

Students will work on business questions and apply their knowledge of spreadsheets to create randomized samples and validate these procedures. Student will then work toward a confirmatory data analysis with a holdback sample to identify outliers in an accounting data population. Students will be evaluated on the quality of the analysis and depth of analysis on identification of outliers.

Individual Descriptive Statistics Assignment

Students will develop an exploratory data analysis using pivot tables in spreadsheets (Excel) combined with visual analytic (Tableau) techniques to communicate important aspects of accounting data. A concise report will be developed that focuses on the business value of the exploratory analysis. Students will be evaluated on the quality of the combination of exploratory and visual summaries as well as the identification and communication of the business value associated with the exploratory analysis.

Group Predictive Modeling Report

Students will work in groups of 3-4 to create a predictive model from an accounting data set. The report will be written for a business executive audience, so an emphasis on the business impacts of the predictive model is essential. Groups will be assessed on their ability to effectively communicate the business implications of the predictive model along with the quality of the predictive modeling process recommendations.

Group Predictive Modeling Presentation

In the final session, students will make a time restricted, business presentation in groups of 3-4. This presentation should integrate their learning about sampling, exploratory analysis and predictive modeling. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the business issue and on the quality of the recommendations emerging from their analysis.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements.

READING SCHEDULE

Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Visual Storytelling with Tableau

Session 2: Visual Analytics and Choosing the Right Visual Aid

Session 3: Intermediate Visual Analytics I

Session 4: Intermediate Visual Analytics II

Session 5: Analysis with MS Excel I

Session 6: Analysis with MS Excel II

Session 7: Analysis with MS Excel III

Session 8: Analysis with MS Excel IV

Session 9: Sampling and Sample Distributions

Session 10: Hypothesis Testing I

Session 11: Hypothesis Testing II

Session 12
No readings. In-class group presentations.

ACADEMIC HONESTY

Plagiarism is the unacknowledged use of other people’s ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university’s strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the
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</tbody>
</table>

### Course title (max. 100 characters)

**Data Analytics for Auditing Practice**

### Short title (for enrollment/transcript - max. 30 characters)

**Data Analytics for Auditing**

### 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)

The use of information technology across audit processes. Applying analytics to deliver a high-quality audit and improve internal and external reporting quality.

### Rationale for introduction of this course

New course for the Master of Science in Accounting with Cognitive Analytics

### Term of initial offering (eg. Fall 2019)

**Summer 2019**

### Course delivery (eg. 3 hrs/week for 13 weeks)

3 hrs/week for 13 weeks

### Frequency of offerings/year

Once/year

### Estimated enrollment per offering

40-50

### Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

n/a

### Prerequisite and/or Corequisite

n/a

### Criminal record check required?

Yes

### Additional course fees?

Yes

### Campus where course will be taught

Burnaby

### Course Components

- Lecture
- Seminar
- Lab
- Independent
- Capstone

### Grading Basis

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

### Repeat for credit?

Yes

### Total repeats allowed?

0

### Repeat within a term?

Yes

### Required course?

Yes

### Final exam required?

Yes

### Capstone course?

Yes

### Combined with a undergrad course?

Yes

* See important definitions on the curriculum website.
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:

Andrew Gemino, Nilesh Saraf, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course.

CONTACT PERSON

Academic Unit / Program: Beedie Graduate Programs
Name (typically, Graduate Program Chair): Lesley McKay
Email: buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

FACULTY APPROVAL

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.

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:
Andrew Gemino
Signature: [Signature]
Date: August 23, 2018

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:
Jeff Derksen
Signature: [Signature]
Date: SEP 24, 2018

ADMINISTRATIVE SECTION (For DGS office only)
Library Check: SEP 7 2018
Course Attribute: 
Course Attribute Value: 
Instruction Mode: 
Attendance Type(s): 

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

Page 2 of 2 Revised December 2017
COURSE DESCRIPTION

Learn to apply Information technology across the end-to-end audit and accounting process. Access large quantities of accounting data, and use analysis to dig deeper, and deliver a high-quality audit, that provide clients with valuable insights to make better informed business decisions and improve their internal and external reporting quality.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Recognizing how data analytics can address accounting and business questions
- Understand the process to clean and prepare financial and non-financial data for analysis
- Recognize how completeness, reliability, or validity can affect data quality
- Perform basic data analysis to address business and accounting issues.
- Communicate the results of analysis to relevant stakeholders

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

2. Additional selected readings will be provided on Canvas

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
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<th>Weight</th>
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<td>Group Case 1</td>
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<tr>
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<tr>
<td>Total</td>
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</table>
Weekly Quizzes

A series of weekly multiple-choice and short answer quizzes will be provided through Canvas. Students will have about 40 minutes to answer 10 multiple-choice questions and two short answer questions. Students will receive feedback within 48 hours after finishing each quiz.

Final Exam

Final exam will be based on all the materials and concepts covered in the course.

Group Case 1

Students will work in groups of 3-4 to develop an audit plan from the available financial and non-financial datasets. Students will set up a cloud folder, review the changes to the working papers, identify audit data requirements, and prepare an audit plan. The audit plan developed by the groups will be assessed based on the procedures outlined in the audit plan. Each of these procedures should be supported by supplemental information and analysis.

Group Case 2

Students will work in groups of 3-4 on a case of financial statement analytic tool. Students will use XBRLAnalyst to access XBRL data, use XBRLAnalyst to create dynamic common size financial statements, and use SQL to query an XBRL database. Students will be assessed based on the quality of analysis performed using the XBRLAnalyst.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.

READING SCHEDULE

Additional selected readings are available electronically and can be found on Canvas. Solution to select cases and exercises will also be posted to Canvas. Students are expected to read the background materials and related chapters prior to attending each module.

TENTATIVE TIMETABLE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td><strong>Data Analytics in Accounting:</strong></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>• Explain why data analytics matter to accountants and how it affects auditing, financial accounting, and tax</td>
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<tr>
<td></td>
<td>• Describe the data analytics process using the IMPACT cycle</td>
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<tr>
<td></td>
<td>• Identify accounting and auditing issues that data analytics can address</td>
<td></td>
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<tr>
<td></td>
<td>• Describes the skills needed by accountants to perform data analysis</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td><strong>Accounting Data Preparation and Cleaning:</strong></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Understand how data are organized in an accounting information system</td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>Accounting Data Preparation and Cleaning:</td>
<td></td>
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<tr>
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</tr>
<tr>
<td></td>
<td>• Understand how financial data are stored in a relational database</td>
<td></td>
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<tr>
<td></td>
<td>• Explain and apply extraction, transformation, and loading technique</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Define data analytics approaches in accounting</td>
<td></td>
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<tr>
<td></td>
<td>• Explain the profiling approach to accounting data analytics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Describe the data reduction approaches to data analytics used in accounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Regression approach to accounting data analytics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Classification approach to accounting data analytics</td>
<td></td>
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<tr>
<td></td>
<td>• Clustering approach to accounting data analytics</td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>Data Visualization and Summaries to Communicate With Stakeholders</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identify the objective of data visualization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Selecting the best charts to present data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Chart refinement for effective and efficient communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identifying the audience, tone and content of the reports</td>
<td></td>
</tr>
<tr>
<td>Week 5</td>
<td>The Modern Audit and Continuous Auditing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Understand modern auditing techniques</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Evaluate an audit plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Understand the nature, extent, and timing of audit tests</td>
<td></td>
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<tr>
<td></td>
<td>• Select appropriate audit tasks and approaches</td>
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<td></td>
<td>• Evaluate audit alarms as part of continuous auditing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Understanding working paper platforms</td>
<td></td>
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<tr>
<td>Week 6</td>
<td>Introduction to Caseware IDEA Analytics tools</td>
<td></td>
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<tr>
<td></td>
<td>• IDEA data analytics</td>
<td></td>
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<tr>
<td></td>
<td>• IDEA Sampling techniques</td>
<td></td>
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<tr>
<td></td>
<td>• IDEA Statistical methods</td>
<td></td>
</tr>
<tr>
<td>Week 7</td>
<td>Audit Data Analytics</td>
<td></td>
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<tr>
<td></td>
<td>• Understand different types of analysis for auditing and when to use them</td>
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<tr>
<td></td>
<td>• Understand basic descriptive audit analyses</td>
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<tr>
<td></td>
<td>• Understand more complex statistical analyses, including Benford's law</td>
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<tr>
<td></td>
<td>• Understand advanced predictive and prescriptive audit analytics</td>
<td></td>
</tr>
<tr>
<td>Week 8</td>
<td>Introduction to KPMG Automated Audit Procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using KPMG Automated Audit Procedures to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Detection of unusual transaction data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Preparation of analysis data by collecting data from ERP (Enterprise Resource Planning)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Statistical Evaluation of audit risk by using financial and non-financial data</td>
<td></td>
</tr>
</tbody>
</table>

Readings on Canvas
### Introduction to Electronic Account Analysis Tool (eAAT)

Using eAAT to:
- Detection of unusual transaction data
- Preparation of analysis data by collecting data from ERP (Enterprise Resource Planning)
- Statistical Evaluation of audit risk by using financial and non-financial data

### Generating Key Performance Indicators

- Evaluate management requirements and identify useful KPIs from a list
- Evaluate underlying data quality used for KPI
- Create dashboard using KPIs

### Financial Statement Analytics

- Describe how XBRL tags financial reporting data
- Understand how different types of ratio analysis can be facilitated by XBRL
- Explain how to create and read visualizations of financial statement data
- Describe the value of text mining and sentiment analysis of financial reporting

### Final Exam

**ACADEMIC HONESTY**

Plagiarism is the unacknowledged use of other people's ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university’s strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty
You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: http://www.sfu.ca/policies/gazette/student.html
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>838</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Course title (max. 100 characters)**

Collaboration, Teaming, and Agile Methods

**Short title (for enrollment/transcript - max. 30 characters)**

Collaboration & Teaming

**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)**

Working collaboratively to practice agile project management techniques through team-based learning.

**Rationale for introduction of this course**

New course for the Master of Science in Accounting with Cognitive Analytics

**Term of initial offering (eg. Fall 2019)**

Summer 2019

**Course delivery (eg. 3 hrs/week for 13 weeks)**

3 hrs/week for 13 weeks

**Frequency of offerings/year**

Once/year

**Estimated enrollment per offering**

40-50

**Equivalent courses (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**

n/a

**Criminal record check required?**

Yes

**If yes is selected, add this as prerequisite**

Yes

**Additional course fees?**

Yes

**Campus where course will be taught**

Burnaby

Surrey

Vancouver

Great Northern Way

Off campus

**Course Components**

- [x] Lecture
- [ ] Seminar
- [ ] Lab
- [ ] Independent
- [ ] Capstone

**Grading Basis**

Letter grades

Satisfactory/ Unsatisfactory

In Progress / Complete

**Repeat for credit?**

Yes

No

**Total repeats allowed?**

0

**Repeat within a term?**

Yes

No

**Required course?**

Yes

No

**Final exam required?**

Yes

No

**Capstone course?**

Yes

No

**Combined with a undergrad course?**

Yes

No

* 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
Andrew Gemino, Payman Jula, Michael Johnson

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedie Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

FACULTY APPROVAL
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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Gemino</td>
<td></td>
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</tbody>
</table>

| Date | August 23, 2018 |

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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 24 2018</td>
</tr>
</tbody>
</table>

ADMINISTRATIVE SECTION (for DGS office only)

Library Check: SEP 07 2018

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
BUS 838: Collaboration, Teaming, and Agile Methods

Instructor: 
Office Phone: 
Email:

Semester: Summer 2019
LMS: canvas.sfu.ca

COURSE DESCRIPTION
Analytic projects in accounting require significant collaboration, project management and teaming skills. No individual alone has all the requisite skills for a complete, complex analysis. Students will work collaboratively practicing agile project management techniques. Learning how to work productively in agile project environments is a critical skill for project success. These skills will be developed throughout the course in team-based assignments.

OBJECTIVES
The following are course level goals. It is expected that participants completing the course will demonstrate proficiency in the following:

- Understanding the elements of creating effective teams and how to support other team members.
- Using aspects of “teaming” in short term project teams.
- Utilizing traditional project management methods to create a project plan.
- Applying agile project management techniques, focusing on Scrum methodology, to deliver a short-term project.

COURSE EXPECTATIONS
You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

4. Selected readings may be provided on Canvas

LEARNING AND ASSESSMENT
Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Weekly Quizzes</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Team Feedback Assignment</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Self-report – Final report</td>
<td>20%</td>
</tr>
</tbody>
</table>
Weekly Quizzes

A series of weekly multiple-choice quizzes will be provided through Canvas. Questions are drawn randomly from a question pool and provided to students in a timed format. Questions are focused on the material to be presented in the week to come and quizzes serve as a preparation for this material. Students will have 30 minutes to answer 10 questions in an open book format. Students will receive feedback on their mark once the quiz closes.

Team Feedback Assignment

Students will work in groups on the proposal and project plan. This group work will enable team members to gauge the effectiveness of other group members. Each team member will commit to a process of providing feedback to other group members and listening to feedback from others. Each student will be evaluated on the quality of the feedback provided to team members by both instructors and team members.

Self-report Final Report

A final self-report will be collected for each team member. This reflexive self-report should consider the experiences and knowledge gained in completing the project proposal and project plan. Students are asked to demonstrate how they have improved their ability to team and participate in project-based work. Students are asked to integrate readings and other experiences and include specific examples whenever possible. Students will be evaluated on the breadth and depth of the reflexive narrative and the quality of the writing provided in the document.

Group Project Proposal and Presentation

Students will work in groups of 3-4 to create a proposal for their final project to be completed in the final Year 1 course BUS 839: Applied Project. Students will make a time restricted, business presentation of this proposal in their groups. The proposal will follow a project management format including introduction, work breakdown structure proposed schedule and budget along with risk analysis. Groups will be assessed on the quality of the proposal and the group’s ability to effectively communicate project details and create a compelling proposal for further development.

Group Project Plan and Presentation

The Group Project Plan builds on the Group Project Proposal document. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for the final project for BUS 839. In the final sessions, students will make a time restricted, business presentation in groups of 3-4. This presentation should integrate their learning about traditional and agile project management. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project plan emerging from their team work.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.
READING SCHEDULE

Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Essentials of Teaming


Session 2: Building Effective Teams

   - reWork., https://rework.withgoogle.com/print/guides/5721312655835136/

Session 3: Essentials of Project Management I


Session 4: Essentials of Project Management II


Session 5: Essentials of Project Management III


Session 6: In-class Presentations

No readings. In-class group presentations.

Session 7: Introduction to Agile Project Management


Session 8: Agile Project Management Methods I


Session 9: Agile Project Management Methods II

Session 10: Hybrid Approaches to Project Management


Session 11: In-class Presentations

No readings. In-class group presentations.

Session 12: In-class Presentation

No readings. In-class group presentations.

ACADEMIC HONESTY

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- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

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New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
<th>Number (eg. 810)</th>
<th>839</th>
<th>Units (eg. 4)</th>
<th>3</th>
</tr>
</thead>
</table>

Course title (max. 100 characters)

Applied Project

Short title (for enrollment/transcript - max. 30 characters)

Applied Project

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)

A team-based strategic business analysis and essay supervised by a Simon Fraser University faculty member with support from a senior industry partner. Graded on a satisfactory/unsatisfactory basis.

Rationale for introduction of this course

New course for the Master of Science in Accounting with Cognitive Analytics

Term of initial offering (eg. Fall 2019)

Summer 2019

Course delivery (eg. 3 hrs/week for 13 weeks)

3 hrs/week for 13 weeks

Frequency of offerings/year

Once/year

Estimated enrollment per offering

40-50

Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

n/a

Prerequisite and/or Corequisite

n/a

Criminal record check required? Yes if yes is selected, add this as prerequisite

Additional course fees? Yes No

Campus where course will be taught

Burnaby No Surrey Yes Vancouver Yes Great Northern Way No Off campus

Course Components *

- Lecture
- Seminar
- Lab
- Independent
- Capstone
- 

Grading Basis

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

Repeat for credit?

- Yes
- No

Total repeats allowed?

0

Repeat within a term?

- Yes
- No

Required course?

- Yes
- No

Final exam required?

- Yes
- No

Capstone course?

- Yes
- No

Combined with a undergrad course?

- Yes
- 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

Andrew Gemino, Michael Johnson, Peter Tingling, Jamal Nazari

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedie Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL

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

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
Andrew Gemino
Signature
Date
August 23, 2018

A library review will be conducted. If additional funds are necessary, DOS will contact the academic unit prior to SGSC.

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee
Jeff Derksen
Signature
Date
SEP 24, 2018

ADMINISTRATIVE SECTION (for DOS office only)

Library Check: SEP 8 2018

If different from regular units:

Academic Progress Units: ______________________

Financial Aid Progress Units: ______________________
BUS 839: Applied Project

Instructor: [Instructor Name]
Office Phone: [Office Phone Number]
Email: [Email Address]

Semester: Fall 2019
LMS: canvas.sfu.ca

COURSE DESCRIPTION

The applied project is designed for students to undertake a team-based strategic business analysis to further their learning and career goals. Students will undertake a strategic business analysis and write an extended essay jointly supervised by a Simon Fraser University faculty member and an industry partner. A faculty member will negotiate the purpose, content and deliverables of each project with the students and the sponsoring organization. Common topics include a broad strategic analysis, an in-depth analysis of a specific business problem, a business plan, or a detailed functional strategy.

OBJECTIVES

The Applied Project course is an opportunity for students to use their knowledge and ability to create a team-based, high quality analysis to develop strategic value for themselves and a client (typically, the student's organization).

The project provides students with an opportunity to comprehensively integrate the various subjects studied during the certificate program. Collaborative learning is facilitated through a final presentation to the industry partner organization.

BOOK AND MATERIALS

There are no required readings for this course. Resources provided on Canvas:
1. Detailed information and schedule of deadlines
2. Selected readings and information about resources
3. Submission requirements information
4. Examples of various project types

LEARNING AND ASSESSMENT

Each project is assessed on a satisfactory/unsatisfactory basis and will be approved only after it meets a minimum quality threshold determined by the course instructor. Students will be expected to revise their work until that threshold is met. The quality threshold is a function of content, including analytical processes and conclusions, and University standards for written communications.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Self-reflection</th>
<th>20 %</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Peer review</td>
<td>20 %</td>
</tr>
<tr>
<td></td>
<td>Participation</td>
<td>10 %</td>
</tr>
<tr>
<td>Group</td>
<td>Team Presentation</td>
<td>30 %</td>
</tr>
<tr>
<td></td>
<td>Team Report</td>
<td>20 %</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Group Project Plan

Previously developed in Summer 2019 in BUS 838

Students will work in groups of 3-4 to operationalize the applied project proposal and plan created in BUS 838: Collaboration, Teaming, and Leading Change. A project management format including introduction, work breakdown structure, proposed schedule, and budget along with risk analysis will be
used. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for the term.

**Group Project Presentation**

In the final sessions, students will make a business presentation in groups of 3-4. This presentation should integrate their learning across Certificate courses. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project that emerges from their team work.

**Team Report**

Management requires you to deliver a report to accompany your presentation. In it, you should include detailed charts, projections, figures, and analysis, etc., that would be inappropriate to include in your presentation, but which would be necessary to develop a complete picture of your proposed solution. You should also include a copy of your slide deck with your report.

**Self-reflective Essay**

An individual paper (5 pages – 1200 words max) reflecting on your learnings throughout the Certificate program. Some considerations are as follows:

- What did you learn from the team-based applied project?
- What did you learn about managing organizations?
- What experiences did you find most interesting/informative? Why?
- Any impact on future career moves?

You are strongly encouraged to do additional research, as well as integrate relevant material from other Certificate courses.

**COURSE STRUCTURE**

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements.

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>September</td>
<td>Introductions, Teams and Project Plans, High-level Overview</td>
</tr>
<tr>
<td>2</td>
<td>Sept-Nov</td>
<td>Teams work with instructor and industry partner to develop applied project content</td>
</tr>
<tr>
<td>3</td>
<td>November</td>
<td>Practice Presentations</td>
</tr>
<tr>
<td>4</td>
<td>Late November</td>
<td>Practice Presentations and Adjudication Panel</td>
</tr>
<tr>
<td>5</td>
<td>December</td>
<td>Presentations to organization executives</td>
</tr>
</tbody>
</table>

**ACADEMIC HONESTY**

Plagiarism is the unacknowledged use of other people’s ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university’s strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.
The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
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- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: http://www.sfu.ca/policies/gazette/student.html

ABOUT THE COURSE INSTRUCTOR

Instructors may write their own short biography, or use the existing one on the Beedie staff directory.
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Number (eg. 810)</td>
<td>840</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Data Mining and Business Intelligence**

**Course title (max. 100 characters)**  
Data Mining and Business Intelligence

**Short title (for enrollment/transcript - max. 30 characters)**  
Data Mining & Bus Intelligence

**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

The application of data warehousing solutions to develop an integrated system of policies, applications, and network technologies designed to convert operational data into accessible business information.

**Rationale for introduction of this course**  
New course for the Master of Science in Accounting with Cognitive Analytics

**Term of initial offering** (eg. Fall 2019)  
Summer 2019

**Course delivery** (eg. 3 hrs/week for 13 weeks)  
3 hrs/week for 13 weeks

**Estimated enrollment per offering**  
40-50

**Equivalent courses** (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**  
n/a

**Criminal record check required?**  
Yes if yes is selected, add this as prerequisite  
Additional course fees?  
Yes ✔ No

**Campus where course will be taught**  
Burnaby  
Surrey  
Vancouver  
Great Northern Way  
✔ Off campus

**Course Components**  
✔ Lecture  
Seminar  
Lab  
Independent  
Capstone  
In Progress / Complete

**Grading Basis**  
✔ Letter grades  
Satisfactory/ Unsatisfactory  
In Progress / Complete

**Repeat for credit?**  
Yes ✔ No  
Total repeats allowed?  
0  
Repeat within a term?  
Yes ✔ No

**Required course?**  
Yes ✔ No  
Final exam required?  
Yes ✔ No  
Capstone course?  
Yes ✔ No

**Combined with a undergrad course?**  
Yes ✔ 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

**Andrew Gemino, Peter Tingling, Nilesh Saraf**

Additional faculty members, space, and/or specialized equipment required in order to offer this course

---

## CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beedie Graduate Programs</td>
<td>Lesley McKay</td>
<td><a href="mailto:buscoord@sfu.ca">buscoord@sfu.ca</a></td>
</tr>
</tbody>
</table>

---

## ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Department Chair</td>
<td>Signature</td>
<td>Date</td>
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</tbody>
</table>

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## FACULTY APPROVAL

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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Gemino</td>
<td></td>
<td>August 23, 2018</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td></td>
<td>SEP 24, 2018</td>
</tr>
</tbody>
</table>

---

**ADMINISTRATIVE SECTION (for DGS office only)**

Library Check: **SEP 07, 2018**

Course Attribute: 

Course Attribute Value: 

Instruction Mode: 

Attendance Type: 

If different from regular units: 

Academic Progress Units: 

Financial Aid Progress Units: 

Page 2 of 2 Revised December 2017
BUS 840: Data Mining & Business Intelligence

Instructor:  
Office Phone:  
Email:  
Semester: Summer 2020  
LMS: canvas.sfu.ca

COURSE DESCRIPTION
Extends understanding of relational databases into data warehousing and business intelligence systems. Develops awareness of how data warehousing helps achieve business value through an integrated system of databases, data transformations and network technologies designed to convert operational data into accessible business information. This provides the foundation for introducing data mining tools and applying automated techniques for data analysis to support business decision making.

COURSE OBJECTIVES
The following are course level goals. It is expected that participants completing the course will demonstrate proficiency in the following:

- Apply querying, data cleaning and aggregation techniques to support data warehouse development.
- Understand dimensional model and fact tables underlying storage in data warehouse systems
- Understand meta data and how to populate a data dictionary
- Create queries in dimensional models and use filtering for drill-down capabilities
- Create reports using business intelligence software attached to a data warehouse.
- Contrast real time data warehousing with traditional data warehousing
- Apply data mining techniques on a data set with multiple data types

COURSE EXPECTATIONS
You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

LEARNING AND ASSESSMENT
Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedle School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Weekly Quizzes</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Business Report Design</td>
<td>35%</td>
</tr>
<tr>
<td>Group</td>
<td>Dimensional Modeling</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Data Mining for Business Value</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
Weekly Quizzes

Weekly quizzes will be provided through Canvas. Questions are drawn randomly from a question pool and provided to students in a timed format. Questions are focused on the material to be presented in the week to come and quizzes serve as a preparation for this material. Students have 30 minutes to answer 10 questions in an open book format. Students will receive feedback on their mark once the quiz closes.

Individual Business Report Design

Students will work through a series of data to develop a standardized report and the queries underlying it. The goal is to develop an extraction, transformation and load process (including queries for extraction and data transformations) that can be replicated into a weekly report. Students can use spreadsheet features to clean and transform data as necessary. Students will be evaluated on the quality of the process and the quality of the resulting report.

Group Dimensional Modeling Assignment

Students will work in groups of 3-4 to create a dimensional for a business area defined in the case. Students will be required to document the dimensional design with a data dictionary. Assignment requirements also include 2 examples of reports that can be easily developed from the dimensional model. Groups will be assessed on their ability to effectively model the business area along with the quality of the example reports suggested.

Group Data Mining for Business Value

Students will work in groups of 3-4 in a time-limited, in-class assignment to integrate their learning about dimensional modeling, reporting and data mining. Students will be given a business case with a dimensional model and will be required to develop a report, run one automated data mining process and comment on the results of the data mining process. Groups will be assessed on their ability to build effective reports and the interpret significant automated data mining procedures.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments will be utilized.

READING SCHEDULE

Readings are available electronically and can be found on Canvas and Harvard. They are labeled accordingly. Please ensure that citations are in full APA (or other popular citation style), in order to ensure that the correct version of cases and articles are obtained for your course, and that copyright law is met.

Session 1: Business Intelligence


Session 2: Business Intelligence and Data Warehouses

Session 3: Data Warehousing: Dimensional Models I

Session 4: Data Warehousing: Dimensional Models II

Session 5: Creating Effective Business Reports

Session 6: Introduction to SQL in Accounting
No Reading. In class assignment. Creating Business Reports.

Session 7: Introduction to Data Mining

Session 8: Extraction, Transformation and Loading (ETL)

Session 9: Machine Learning Tools I

Session 10: Machine Learning Tools II

Session 11: Data Mining Group Presentations
No readings. In-class presentations.

Session 12: Data Mining Group Presentations
No readings. In-class presentations.

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New Graduate Course Proposal

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<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>841</td>
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<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Course title (max. 100 characters)**

Predictive Analytics for Accounting

**Short title (for enrollment/transcript - max. 30 characters)**

Predictive Analytics

**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)**

Provides an understanding of business intelligence tools beyond the univariate measures addressed in BUS 831. Multivariate modeling approaches are extended to build statistical models relating target behaviour to predictor variables.

**Rationale for introduction of this course**

New course for the Master of Science in Accounting with Cognitive Analytics

<table>
<thead>
<tr>
<th>Term of initial offering (eg. Fall 2019)</th>
<th>Summer 2019</th>
</tr>
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<tbody>
<tr>
<td>Course delivery (eg. 3 hrs/week for 13 weeks)</td>
<td>3 hrs/week for 13 weeks</td>
</tr>
</tbody>
</table>

**Estimated enrollment per offering**

40-50

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

n/a

**Prerequisite and/or Corequisite**

BUS 841: Prerequisite BUS 831

**Criminal record check required?**

Yes

**Additional course fees?**

Yes

**Campus where course will be taught**

Burnaby

**Course Components**

- Lecture

**Grading Basis**

- Letter grades

**Repeat for credit?**

Yes

**Total repeats allowed?**

0

**Repeat within a term?**

Yes

**Required course?**

Yes

**Final exam required?**

Yes

**Capstone course?**

Yes

**Combined with a undergrad course?**

Yes

* See important definitions on the curriculum website.
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**

Michael Favere-Marchesi, Jamal Nazari, Kim Trottier

**Additional faculty members, space, and/or specialized equipment required in order to offer this course**

**CONTACT PERSON**

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
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<td>Lesley McKay</td>
<td><a href="mailto:buscoord@sfu.ca">buscoord@sfu.ca</a></td>
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</tbody>
</table>

**ACADEMIC UNIT APPROVAL**

A course outline must be included.

Non-departmentalized faculties need not sign

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

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
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**FACULTY APPROVAL**

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.

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.

Andrew Gemino  

Date: August 23, 2018

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**

Jeff Derksen  

Date: SEP 24 2018

**ADMINISTRATIVE SECTION (for DGS office only)**

Library Check:  

- [ ] SEP 07 2018

If different from regular units:

- [ ] Academic Progress Units:  
- [ ] Financial Aid Progress Units:  

Page 2 of 2 Revised December 2017
COURSE DESCRIPTION

Students learn to summarize data using business intelligence tools that go beyond the univariate measures addressed in BUS 831. Several multivariate predictive modeling approaches useful in accounting context will be introduced and extended. Material goes beyond traditional business intelligence questions of "what happened" and "why did it happen", towards "what is likely to happen in the future." Students will also learn to communicate results of models to an executive audience.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Explore and understand data relevant to a business problem
- Clean and transform raw data from multiple sources
- Build predictive models of the target behaviour using statistical and machine learning techniques
- Produce evidence-based decisions, with a concrete measure of the expected improvement in dependent variables.
- Practice the art of storytelling-with-data in short business-focused presentations that emphasize the importance of clear communication, with neither formulae nor jargon.

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

3. Selected readings may be provided on Canvas.

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Pre-class Quizzes</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual Assignment 1 - Presentation</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Final Exam</td>
<td>35%</td>
</tr>
</tbody>
</table>
Short Module Assignments (teams of 2) 10%

Group

Individual Assignment 1 - Presentation 10%

Group Assignment 2 - Presentation 25%

Total 100%

Pre-class Individual Quizzes: 10%
Individual quizzes will be done online on Canvas before class. Quizzes will be available 24 hours before class and closed 10 minutes before class.

Assignment 1: Model Comparison, Assessment and Evaluation 10% (Due Week 6)
Individual Assignment. Purpose: Confirming understanding and providing feedback

Final exam: 35%
Covers all materials in the course. Purpose: Assessment

Short Module Exercises 10%
Each module will have an exercise to be turned in by the pair of students within 48 hours after the class is over.

Group Storytelling 10%:
Starting in session 4, a student group will give a short (approximately 5 minutes) presentation of the previous week's module. Purpose: Practice clear persuasive communication of technical topics to non-technical audiences.

Assignment 2: Predictive Modeling Competition 25% (Week 10)
Team Assignment. Purpose: Application and Feedback.

COURSE STRUCTURE
This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.

READING SCHEDULE

<table>
<thead>
<tr>
<th>Week 1: Analytics Overview:</th>
<th>Preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obstacles &amp; methods;</td>
<td>• Read Text Chapters 1 and 2, and Chapter 3 pages 33-37 and 48-57. Skip pages 38-47.</td>
</tr>
<tr>
<td>• Importance of Business Understanding</td>
<td></td>
</tr>
<tr>
<td>• Frameworks: CRISP-DM &amp; Rapid Model Development</td>
<td></td>
</tr>
<tr>
<td>• Introduction to R</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 2: Describing and Massaging Data</th>
<th>Preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Measurement Scales;</td>
<td>• Chapter 3, section 3.1 P 34-36</td>
</tr>
<tr>
<td>• Binning</td>
<td></td>
</tr>
<tr>
<td>• Summary Statistics</td>
<td>• Natural and Measured Scales handout (posted on Canvas)</td>
</tr>
<tr>
<td>• Contingency Tables</td>
<td></td>
</tr>
</tbody>
</table>
# Predictive Modelling

## Week 3:
Exploring and Visualizing Data
- Scatterplots
- Boxplots
- Line plots
- Multiple Regression
- Model Fit (Adj. $R^2$)
- Indicator Variables
- Log transforms for diminishing returns

### Preparation
- Chapter 4 Sections 4.1, 4.2, 4.3, 4.4:

## Week 4:
Modeling Individual Decisions
- Plot of Means
- Logistic Regression
- Model Fit (AIC)
- Oversampling

### Preparation
- Chapter 5 Sections 5.1, 5.2, 5.3

## Week 5:
Model Assessment & Validation
- Holdout / Validation Samples
- Overfitting
- Lift Charts

### Preparation
- Read Chapter 6.1 and 6.2
- Work through Tutorial 6.3
- Study Model Assessment

## Week 6:
Machine Learning Models (No statistics!)
- Classification Trees

### Preparation
- Chapter 7 Section 7.1 p 165-172

## Week 7:
- Neural Networks
- Missing Values

### Preparation
- Chapter 8 Sections 8.1, 8.2
- Missing Values Handout

## Week 8:
Putting it all Together
- Rapid Model Development Framework
- Pros and Cons of different Models
- Targeting the best prospects

### Preparation
- Chapter 9 Sections 9.1 and 9.2

## Other Business Problems and Methods

## Week 9
Location / Geodemographics (not in text)
- Geographical Info Systems

### Preparation
- Read Retail Site Selection Handout
- Work through QGIS Tutorial (posted)

## Week 10
Decision Calculus (not in text)
- Judgmental Calibration - Modeling without data

### No Preparation

## Week 11
Cluster Analysis
- Cluster Analysis

### Preparation
- Chapter 10 p 235-248

## Week 12
In-class Presentations
ACADEMIC HONESTY

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- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
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New Graduate Course Proposal

Course Subject (eg. PSYC)  BUS
Course title (max. 100 characters)  Advanced Analytical Auditing

Units (eg. 4)  3
Number (eg. 810)  842

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:
The use of information technology across auditing processes through advanced data analytics techniques.

Rationale for introduction of this course
New course for the Master of Science in Accounting with Cognitive Analytics

Term of initial offering (eg. Fall 2019)  Summer 2019
Course delivery (eg. 3 hrs/week for 13 weeks)  3 hrs/week for 13 weeks

Frequency of offerings/year  Once/year
Estimated enrollment per offering  40-50

Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)  n/a

Prerequisite and/or Corequisite
BUS 842: Prerequisite BUS 832

Criminal record check required?  Yes  if yes is selected, add this as prerequisite
Additional course fees?  Yes  No

Campus where course will be taught  Burnaby  Surrey  Vancouver  Great Northern Way  Off campus

Course Components
- Lecture  Seminar  Lab  Independent  Capstone

Grading Basis  Letter grades  Satisfactory/ Unsatisfactory  In Progress / Complete

Repeat for credit?  Yes  No  Total repeats allowed?  0
Repeat within a term?  Yes  No

Required course?  Yes  No  Final exam required?  Yes  No  Capstone course?  Yes  No

Combined with a undergrad course?  Yes  No  If yes, identify which undergraduate course and the additional course requirements for graduate students:

* See important definitions on the curriculum website.
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

Andrew Gemino, Nilesh Saraf, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course

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<th>CONTACT PERSON</th>
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<tr>
<td>Academic Unit / Program</td>
</tr>
<tr>
<td>Beedie Graduate Programs</td>
</tr>
</tbody>
</table>

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

| Graduate Program Committee | Signature | Date |
| Department Chair | Signature | Date |

FACULTY APPROVAL
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

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.

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<tr>
<td>Andrew Gemino</td>
<td>[Signature]</td>
<td>August 23, 2018</td>
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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

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<tr>
<th>Senate Graduate Studies Committee</th>
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<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
<td>[Signature]</td>
<td>SEP 24 2018</td>
</tr>
</tbody>
</table>

ADMINISTRATIVE SECTION (for DGS office only)
Library Check: SEP 07 2018
Course Attribute: ___________________________
Course Attribute Value: ______________________
Instruction Modes: __________________________
Attendance Type: ____________________________

If different from regular units:
Academic Progress Units: ____________________
Financial Aid Progress Units: __________________
BUS 842: Advanced Analytical Auditing

Instructor: Semester: Summer 2020
Office Phone: LMS: canvas.sfu.ca
Email:

COURSE DESCRIPTION
Digital disruption continues to redefine what it takes to compete in the accounting business environment. As decision-making is automated, trusting the integrity of the data, algorithms, and analytic capabilities is key for future success. Students will consider the use of information technology across the end-to-end audit process. Advanced data analytics (ADA) techniques for audit processes are explored and students are provided opportunities to communicate data findings and audit recommendations to different audiences.

OBJECTIVES
The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

• Appreciation of emerging technologies for audit
• Cases of analytics use in auditing
• Advanced auditing data analytic techniques.

COURSE EXPECTATIONS
You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

2. Additional selected readings will be provided on Canvas

LEARNING AND ASSESSMENT
Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedle School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
<tr>
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<th>Weekly Quizzes</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Final Exam</td>
<td>35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Group Case 1 -report and presentation</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Group Case 2 -report and presentation</td>
<td>25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>100%</th>
</tr>
</thead>
</table>
Weekly Quizzes

Due: Every week, Saturday at Midnight

A series of weekly multiple-choice and short answer quizzes will be provided through Canvas. Students will have about 40 minutes to answer 10 multiple-choice questions and two short answer questions. Students will receive feedback within 48 hours after finishing each quiz.

Final Exam

Due:

Final exam will be based on all the materials and concepts covered in the course.

Group Case 1

Due:

Students will work in groups of 3-4 to use ADAs in performing substantive analytical procedures. Cases that students will perform the analyses on include non-predictive statistical modeling to assess revenues and regression analysis of revenues from sale. The ADA used in conducting substantive analytical procedures will be presented to the class by the groups and will form the base for group project assessment. Each of these procedures should be supported by supplemental information and analysis and sent in a professional report form to the instructor.

Group Case 2

Due:

Students will work in groups of 3-4 to use ADAs in performing test of details. Cases that students will perform the detail test on include cash receipt to sales invoice matching, match of sales invoices, shipping documents, and a master price list. The ADA used in conducting test of details will be presented to the class by the groups and will form the base for group project assessment. Each of these procedures should be supported by supplemental information and analysis and sent in a professional report form to the instructor.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.

READING SCHEDULE

Additional selected readings are available electronically and can be found on Canvas. Solution to select cases and exercises will also be posted to Canvas. Students are expected to read the background materials and related chapters prior to attending each module.

TENTATIVE TIMETABLE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
</tr>
</thead>
</table>
| Week 1 | Choosing the Appropriate Audit Data Analytics (ADA):  
- Using Graphics and Tables (Visualization)  
- Accessing and Preparing Data for Purposes of an ADA  
- Relevance and Reliability of Data | 1 |
| Week 2 | Documenting ADA Procedures  
- Requirements of Canadian Assurance Standards on ADA documentations | 1,2 |
<table>
<thead>
<tr>
<th>Week 3</th>
<th>Applying Five Basic Steps for an ADA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planning the ADA</td>
</tr>
<tr>
<td></td>
<td>Accessing and preparing the data for purposes of the ADA</td>
</tr>
<tr>
<td></td>
<td>Considering the relevance and reliability of the data used</td>
</tr>
<tr>
<td></td>
<td>Performing the ADA</td>
</tr>
<tr>
<td></td>
<td>Evaluating the results and concluding on whether the purpose and specific objectives of performing the ADA have been achieved.</td>
</tr>
</tbody>
</table>

**Week 4**

**Using ADAs in Performing Substantive Analytical Procedures**

- Nature and Objectives of Substantive Analytical Procedures
- Steps in Planning, Performing, and Evaluating a Substantive Analytical Procedure: Setting the expectation, Precision, Level of assurance
- Plausibility and Predictability of Relevant Relationships
- Level of Disaggregation of Data
- Amount of Acceptable Difference of Recorded Amounts from Expected Values
- Investigation of a Significant Difference

<table>
<thead>
<tr>
<th>Week 5</th>
<th>Effectiveness of Method Used to Develop the Auditor's Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trend Analysis</td>
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<tr>
<td></td>
<td>Ratio Analysis</td>
</tr>
<tr>
<td></td>
<td>Non-Statistical Predictive Modeling</td>
</tr>
<tr>
<td></td>
<td>Regression Analysis</td>
</tr>
<tr>
<td></td>
<td>Documentation</td>
</tr>
</tbody>
</table>

**Using ADAs in Performing Tests of Details**

- Canadian Assurance Standards Relevant to the Use of ADAs in Performing Tests of Details
- Nature and Extent of Substantive Procedures
- Evaluation of Misstatements

<table>
<thead>
<tr>
<th>Week 6</th>
<th>Advanced use of Caseware IDEA Analytics tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IDEA data analytics</td>
</tr>
<tr>
<td></td>
<td>IDEA Sampling techniques</td>
</tr>
<tr>
<td></td>
<td>IDEA Statistical methods</td>
</tr>
</tbody>
</table>

**Week 6**

**Readings on Canvas**

**Week 7**

- Using Caseware IDEA, Perform the ADA by Identification of Possible Misstatements and Actual Misstatements

<table>
<thead>
<tr>
<th>Week 8</th>
<th>Advanced use of KPMG Automated Audit Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using Automated Audit Procedures to:</td>
</tr>
</tbody>
</table>

**Readings on Canvas**
Week 9

**Advanced use of Electronic Account Analysis Tool (eAAT)**

Using eAAT to:
- Detection of unusual transaction data
- Preparation of analysis data by collecting data from ERP (Enterprise Resource Planning)
- Statistical Evaluation of audit risk by using financial and non-financial data

<table>
<thead>
<tr>
<th>Week 10</th>
<th><strong>Group Case 1 Presentations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 11</td>
<td><strong>Group Case 2 Presentations</strong></td>
</tr>
<tr>
<td>Week 12</td>
<td><strong>FINAL EXAM</strong></td>
</tr>
</tbody>
</table>

**ACADEMIC HONESTY**

Plagiarism is the unacknowledged use of other people’s ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university’s strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance. Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty. For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: [http://www.sfu.ca/policies/gazette/student.html](http://www.sfu.ca/policies/gazette/student.html)
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>844</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
<tr>
<td>Course title (max. 100 characters)</td>
<td><strong>Fraudulent Financial Reporting</strong></td>
</tr>
<tr>
<td>Short title (for enrollment/transcript - max. 30 characters)</td>
<td>Fraudulent Fin Reporting</td>
</tr>
<tr>
<td>Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as &quot;This course will...&quot; or &quot;The purpose of this course is...&quot;)</td>
<td>Provides an understanding of the potential data analytics has in finding fraudulent financial reporting.</td>
</tr>
<tr>
<td>Rationale for introduction of this course</td>
<td>New course for the Master of Science in Accounting with Cognitive Analytics</td>
</tr>
<tr>
<td>Term of initial offering (eg. Fall 2019)</td>
<td><strong>Summer 2019</strong></td>
</tr>
<tr>
<td>Course delivery (eg. 3 hrs/week for 13 weeks)</td>
<td>3 hrs/week for 13 weeks</td>
</tr>
<tr>
<td>Frequency of offerings/year</td>
<td>Once/year</td>
</tr>
<tr>
<td>Estimated enrollment per offering</td>
<td>40-50</td>
</tr>
<tr>
<td>Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)</td>
<td>n/a</td>
</tr>
<tr>
<td>Prerequisite and/or Corequisite</td>
<td>n/a</td>
</tr>
<tr>
<td>Criminal record check required?</td>
<td>Yes if yes is selected, add this as prerequisite</td>
</tr>
<tr>
<td>Additional course fees?</td>
<td>Yes</td>
</tr>
<tr>
<td>Campus where course will be taught</td>
<td>Burnaby</td>
</tr>
<tr>
<td>Course Components</td>
<td>Lecture</td>
</tr>
<tr>
<td>Grading Basis</td>
<td>Letter grades</td>
</tr>
<tr>
<td>Repeat for credit?</td>
<td>Yes</td>
</tr>
<tr>
<td>Total repeats allowed?</td>
<td>0</td>
</tr>
<tr>
<td>Repeat within a term?</td>
<td>Yes</td>
</tr>
<tr>
<td>Required course?</td>
<td>Yes</td>
</tr>
<tr>
<td>Final exam required?</td>
<td>Yes</td>
</tr>
<tr>
<td>Capstone course?</td>
<td>Yes</td>
</tr>
<tr>
<td>Combined with a undergrad course?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* 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
Michael Favere-Marchesi, Jamal Nazari, Kim Trottier

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beedie Graduate Programs</td>
<td>Lesley McKay</td>
<td><a href="mailto:buscoord@sfu.ca">buscoord@sfu.ca</a></td>
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ACADEMIC UNIT APPROVAL
A course outline must be included.

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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

Overlap check done? ✓ YES

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SENATE GRADUATE STUDIES COMMITTEE APPROVAL

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ADMINISTRATIVE SECTION (for DGS office only)
Library Check: SEP 07 2018
Course Attributes:
Course Attribute Values:
Instruction Mode:
Attendance Type:

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

Page 2 of 2 Revised December 2017
BUS 844: Fraudulent Financial Reporting

Instructor: 
Office Phone: 
Email: 

Semester: Summer 2020 
LMS: canvas.sfu.ca

COURSE DESCRIPTION

Data and Analytics (D&A) in identifying anomalous and suspicious activity and combating it is critical as tech-savvy fraudsters increasingly use technology to perpetrate frauds. If a detection program is going to succeed, it must have access to reliable data. Students will explore the potential of D&A in finding fraudulent financial reporting.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Analyze large populations of financial and non-financial data for fraudulent activity
- Analyze information for fraudulent activity; Document audit procedures
- Develop techniques for deterring and detecting fraudulent reporting.
- Automation of fraud detection process

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

2. Additional selected readings will be provided on Canvas.

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

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<th>Final Exam</th>
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<tr>
<td>Individual</td>
<td>15%</td>
<td>35%</td>
</tr>
<tr>
<td>Group</td>
<td>Weekly Group Assignments 30%</td>
<td>Group Project 20%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Weekly Quizzes 
Due: Every week, Saturday at Midnight

A series of weekly multiple-choice and quizzes will be provided through Canvas. Students will have about 30 minutes to answer 10 multiple-choice questions. Students will receive feedback within 48 hours after finishing each quiz.
Final Exam
Due:
Final exam will be based on all the materials and concepts covered in the course.

Group Case
Due:
Students will work in groups of 3-4 to on application of one of the forensic analytics techniques learned in class to a practical senior. Students will be provided the option to choose the case that they would be working on but this has to be with prior approval of the instructor. The results of analysis should be clearly written up and communicated professionally. Students will be evaluated based on the quality of analysis and communication of the results.

Weekly Group Assignment
Due:
Students will work in groups of 3-4 on series of weekly assignments. These assignments are based on the topics covered in the course and require application to practical cases. Students will be assessed based on the quality of the responses on each of these assignments. Feedback will be provided within a week after finishing each assignment.

COURSE STRUCTURE
This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.

READING SCHEDULE
Additional selected readings are available electronically and can be found on Canvas. Solution to select cases and exercises will also be posted to Canvas. Students are expected to read the background materials and related chapters prior to attending each module.

TENTATIVE TIMETABLE

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<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td><strong>Using Access in Forensic Investigations</strong></td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td></td>
<td>• A Review of Access Tables</td>
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<tr>
<td></td>
<td>• Importing Data into Access</td>
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<td></td>
<td>• A Review of Access Queries</td>
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<tr>
<td></td>
<td>• Converting Excel Data into a Usable Access Format</td>
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<tr>
<td></td>
<td><strong>Using Excel in Forensic Investigations</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pitfalls in Using Excel</td>
<td></td>
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<tr>
<td></td>
<td>• Importing Data into Excel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reporting Forensic Analytics Results</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Protecting Excel Spreadsheet</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td><strong>Using PowerPoint in Forensic Presentations</strong></td>
<td>3 &amp; 4</td>
</tr>
<tr>
<td></td>
<td>• Overview of Forensic Presentations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Planning the Presentation</td>
<td></td>
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<tr>
<td></td>
<td>• Color Schemes for Forensic Presentations</td>
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<tr>
<td></td>
<td>• Problems with Forensic Reports</td>
<td></td>
</tr>
</tbody>
</table>
# SFU BEEDIE SCHOOL OF BUSINESS

## High-Level Data Overview Tests
- The Forensic Data Profile
- The Forensic Data Histogram
- The Periodic Graph
- Preparing the Data Profile Using Access
- Preparing the Data Profile Using Excel
- Calculating the Inputs for the Periodic Graph in Access

## Week 3 Benford’s Law: The Basics
- An Overview of Benford’s Law
- From Theory to Application in 60 Years
- Which Data Sets Should Conform to Benford’s Law?
- The Effect of Data Set Size
- The Basic Digit Tests
- Running the First-Two Digits Test in Access

## Week 4 Benford’s Law: Assessing Conformity
- One Digit at a Time: The Z-Statistic
- The Chi-Square and Kolmogorov-Smirnoff Tests
- The Mean Absolute Deviation (MAD) Test
- Tests Based on the Logarithmic Basis of Benford’s Law
- Creating a Perfect Synthetic Benford Set
- The Mantissa Arc Test

## Benford’s Law: The Second-Order and Summation Tests
- A Description of the Second-Order Test

## Week 5 Benford’s Law: The Number Duplication and Last-Two Digits Tests
- The Number Duplication Test
- Running the Number Duplication Test in Access
- Running the Number Duplication Test in Excel
- The Last-Two Digits Test

## Testing the Internal Diagnostics of Current Period and Prior Period Data
- A Review of Descriptive Statistics
- An Analysis of Alumni Gifts
- An Analysis of Fraudulent Data

## Week 6 Identifying Fraud Using the Largest Subsets and Largest Growth Tests
- Findings from the Largest Subsets Test
- Running the Largest Subsets Test in Access
- Running the Largest Growth Test in Access
- Running the Largest Subsets Test in Excel
- Running the Largest Growth Test in Excel

## Week 7 Identifying Anomalies Using the Relative Size Factor Test
- Relative Size Factor Test Findings
- Running the RSF Test
<table>
<thead>
<tr>
<th>Week 8</th>
<th>Identifying Fraud Using Abnormal Duplications within Subsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Running the Relative Size Factor Test in Access</td>
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<tr>
<td></td>
<td>• Running the Relative Size Factor Test in Excel</td>
</tr>
<tr>
<td></td>
<td>• The Same-Same-Same Test</td>
</tr>
<tr>
<td></td>
<td>• The Same-Same-Different Test</td>
</tr>
<tr>
<td></td>
<td>• The Subset Number Duplication Test</td>
</tr>
<tr>
<td></td>
<td>• Running the Same-Same-Same Test in Access</td>
</tr>
<tr>
<td></td>
<td>• Running the Same-Same-Different Test in Access</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>• Running the Same-Same-Different Test in Excel</td>
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<tr>
<td></td>
<td>• Running the Subset Number Duplication Test in Excel</td>
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<td></td>
<td>12</td>
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<tr>
<td>Week 9</td>
<td>Identifying Fraud Using Correlation</td>
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<tr>
<td></td>
<td>• The Concept of Correlation</td>
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<td></td>
<td>• Correlation Calculations</td>
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<tr>
<td></td>
<td>• Using Correlation to Detect Fraudulent Sales Numbers</td>
</tr>
<tr>
<td></td>
<td>• Using Correlation to Detect Electricity Theft</td>
</tr>
<tr>
<td></td>
<td>• Using Correlation to Detect Irregularities in Election</td>
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<tr>
<td></td>
<td>• Detecting Irregularities in Pollution Statistics</td>
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<td>• Calculating Correlations in Access</td>
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<td>• Calculating the Correlations in Excel</td>
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<td>Week 10</td>
<td>Identifying Fraud Using Time-Series Analysis</td>
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<td>• Time-Series Methods</td>
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<td>• An Application Using Heating Oil Sales</td>
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<td>• An Application Using Stock Market Data</td>
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<td>• An Application Using Construction Data</td>
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<td>• An Analysis of Streamflow Data</td>
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<td>• Running Time-Series Analysis in Excel</td>
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<td>• Calculating the Seasonal Factors</td>
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<td>• Running a Linear Regression</td>
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<td>• Fitting a Curve to the Historical Data</td>
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<td>• Calculating the Forecasts</td>
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<td>14</td>
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<td>Week 11</td>
<td>The Detection of Financial Statement Fraud</td>
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<td>• The Digits of Financial Statement Numbers</td>
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<td>• Detecting Biases in Accounting Numbers</td>
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<td>• An Analysis of Enron's Reported Numbers</td>
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<td>• An Analysis of Biased Reimbursement Numbers</td>
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<td>• Detecting Manipulations in Monthly Subsidiary Reports</td>
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<td>• Predictor Weightings</td>
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<td>17</td>
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<td>Week 12</td>
<td>FINAL EXAM</td>
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## New Graduate Course Proposal

### Course Details

<table>
<thead>
<tr>
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<th>Number (eg. 810)</th>
<th>Units (eg. 4)</th>
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</thead>
<tbody>
<tr>
<td>BUS</td>
<td>845</td>
<td>3</td>
</tr>
</tbody>
</table>

**Course title (max. 100 characters)**

Advanced Applied Project I

**Short title (for enrollment/transcript - max. 30 characters)**

Advanced Applied Project I

**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)**

A team-based strategic business analysis and extended essay supervised by a Simon Fraser University faculty member with support from a senior industry partner. This is the first part of a two part course. Graded on a satisfactory/unsatisfactory basis.

**Rationale for introduction of this course**

New course for the Master of Science in Accounting with Cognitive Analytics

<table>
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<tr>
<th>Term of initial offering (eg. Fall 2019)</th>
<th>Course delivery (eg. 3 hrs/week for 13 weeks)</th>
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</thead>
<tbody>
<tr>
<td>Summer 2019</td>
<td>3 hrs/week for 13 weeks</td>
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</tbody>
</table>

**Frequency of offerings/year**

Once/year

**Estimated enrollment per offering**

40-50

**Equivalent courses (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**

n/a

**Criminal record check required?** Yes

**If yes is selected, add this as prerequisite**

**Additional course fees?** Yes

**Campus where course will be taught**

- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

**Course Components**

- [x] Lecture
- [ ] Seminar
- [ ] Lab
- [ ] Independent
- [ ] Capstone

**Grading Basis**

- [ ] Letter grades
- [x] Satisfactory/ Unsatisfactory
- [ ] In Progress / Complete

**Repeat for credit?** Yes

**Total repeats allowed?** 0

**Repeat within a term?** Yes

**Required course?** Yes

**Final exam required?** Yes

**Capstone course?** Yes

**Combined with a undergrad course?** Yes

* 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.

<table>
<thead>
<tr>
<th>Faculty member(s) who will normally teach this course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Gemino, Michael Johnson, Jamal Nazari, Peter Tingling</td>
</tr>
</tbody>
</table>

Additional faculty members, space, and/or specialized equipment required in order to offer this course

### CONTACT PERSON

<table>
<thead>
<tr>
<th>Academic Unit / Program</th>
<th>Name (typically, Graduate Program Chair)</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beedie Graduate Programs</td>
<td>Lesley McKay</td>
<td><a href="mailto:buscoord@sfu.ca">buscoord@sfu.ca</a></td>
</tr>
</tbody>
</table>

### ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

<table>
<thead>
<tr>
<th>Graduate Program Committee</th>
<th>Signature</th>
<th>Date</th>
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<th>Department Chair</th>
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### FACULTY APPROVAL

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.

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.

<table>
<thead>
<tr>
<th>Faculty Graduate Studies Committee</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Gemino</td>
<td></td>
<td>August 23, 2018</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Senate Graduate Studies Committee</th>
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</thead>
<tbody>
<tr>
<td>Jeff Derksen</td>
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</table>

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: ____________________________
Integrates the frameworks and content of the MSc in Accounting and Data Analytics courses. This is the first part of a two-part course.

The applied project capstone course is an opportunity for students to make use of knowledge related to major topics of courses throughout the program to address a specific, practical issue, problem or opportunity. Students will undertake a strategic business analysis and write an extended essay jointly supervised by a Simon Fraser University faculty member. A faculty member will negotiate the purpose, content and deliverables of each project with the students and the sponsoring organization. Common topics include a broad strategic analysis, an in-depth analysis of a specific business problem, a business plan, or a detailed functional strategy.

OBJECTIVES
The applied project provides students with an opportunity to comprehensively integrate the various subjects studied during the MSc program. Collaborative learning is facilitated through a final presentation to the industry partner organization. Success in this course is predicated on:

- To consolidate knowledge gained over the two-year MSc to develop well-reasoned solutions to the problems currently faced by the industry partner.
- Delivering a clear, compelling, and well-rehearsed presentation.
- Delivering a detailed, well-written report.
- Working effectively in a small team.
- Demonstrating professionalism in all aspects of your relationship with the firm and its management.
- Evaluating the performance of your peers in a fair and objective fashion.
- At the end of the course, you will prepare a concise self-reflection summarizing your key learning outcomes.

COURSE EXPECTATIONS
During the semester students can expect at least 10 hours of out-of-class work weekly for each course. These out-of-class activities may include, participating in online activities, preparing readings and cases, answering practice questions, doing library research and reviewing sources, conducting interviews, and project planning.

Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the semester.

BOOK AND MATERIALS
There are no required readings for this course. Provided on Canvas:
1. Detailed information and schedule of deadlines
2. Selected readings and information about resources
3. Submission requirements information
4. Examples of various project types

LEARNING AND ASSESSMENT

Each project is assessed on a satisfactory/unsatisfactory basis and will be approved only after it meets a minimum quality threshold determined by the course instructor. Students will be expected to revise their work until that threshold is met. The quality threshold is a function of content, including analytical processes and conclusions, and University standards for written communications.

<table>
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<tr>
<th>Individual</th>
<th>Self-report</th>
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<td>Participation</td>
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<tr>
<td>Group</td>
<td>Project Proposal and Presentation</td>
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<tr>
<td></td>
<td>Project Plan and Presentation</td>
<td>30%</td>
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<tr>
<td></td>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

Self-report Final Report

A final self-report will be collected for each team member. This reflective self-report should consider the experiences and knowledge gained in completing the project proposal and project plan. Students are asked to demonstrate how they have improved their ability to team and participate in project-based work. Students are asked to integrate readings and other experiences and include specific examples whenever possible. Students will be evaluated on the breadth and depth of the narrative and the quality of the writing provided in the document.

Group Project Proposal and Presentation

Due:

Students will work in groups to create a proposal for their final project to be completed in BUS 846: Advanced Applied Project II. During the face-to-face session, students will make a time restricted, business presentation of this proposal in their groups. The proposal will follow a project management format including introduction, work breakdown structure, proposed schedule and budget along with risk analysis. Projects will be assessed on the quality of the proposal and the ability to effectively communicate project details and create a compelling proposal for further development.

Group Project Plan and Presentation

Due:

The Group Project Plan builds on the Group Project Proposal document. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for BUS 846: Advanced Applied Project II. In the final sessions, students will make a time restricted, business presentation in groups of 3-4. This presentation should integrate their learning about traditional and agile project management. The presentation should be formatted for a business executive audience. Projects will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project plan emerging from their team work.

COURSE STRUCTURE

The majority of work will be online and/or independently, in collaboration with project supervisors. A Thursday-Sunday face-to-face session will allow for final presentations in-person.
ACADEMIC HONESTY

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- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

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### New Graduate Course Proposal

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<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>846</td>
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<tr>
<td>Units (eg. 4)</td>
<td>3</td>
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</tbody>
</table>

#### Course title (max. 100 characters)
**Advanced Applied Project II**

#### Short title (for enrollment/transcript - max. 30 characters)
**Advanced Applied Project II**

#### 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)
A team-based strategic business analysis and extended essay supervised by a Simon Fraser University faculty member with support from a senior industry partner. The final project will be examined by two readers. This is the second part of a two part course. Graded on a satisfactory/unsatisfactory basis.

#### Rationale for introduction of this course
New course for the Master of Science in Accounting with Cognitive Analytics

#### Term of initial offering (eg. Fall 2019)
**Summer 2019**

#### Course delivery (eg. 3 hrs/week for 13 weeks)
3 hrs/week for 13 weeks

#### Frequency of offerings/year
Once/year

#### Estimated enrollment per offering
40-50

#### Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)
n/a

#### Prerequisite and/or Corequisite
**BUS 846: Prerequisite BUS 845**

#### Criminal record check required?
- [ ] Yes
- [x] No

#### Additional course fees?
- [ ] Yes
- [x] No

#### Campus where course will be taught
- [ ] Burnaby
- [ ] Surrey
- [x] Vancouver
- [ ] Great Northern Way
- [x] Off campus

#### Course Components
- [ ] Lecture
- [ ] Seminar
- [ ] Lab
- [ ] Independent
- [x] Capstone

#### Grading Basis
- [ ] Letter grades
- [x] Satisfactory/ Unsatisfactory
- [ ] In Progress/ Complete

#### Repeat for credit?
- [ ] Yes
- [x] No

#### Total repeats allowed?
0

#### Repeat within a term?
- [ ] Yes
- [x] No

#### Required course?
- [x] Yes
- [ ] No

#### Final exam required?
- [ ] Yes
- [x] No

#### Capstone course?
- [x] Yes
- [ ] No

#### Combined with a undergrad course?
- [ ] Yes
- [x] No

* If yes, identify which undergraduate course and the additional course requirements for graduate students:

---

* See important definitions on the curriculum website.
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:

Andrew Gemino, Michael Johnson, Jamal Nazari, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course:

CONTACT PERSON

Academic Unit / Program: Beedie Graduate Programs
Name (typically, Graduate Program Chair): Lesley McKay
Email: buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign:

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL

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.

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
Andrew Gemino
Signature:
Date: August 23, 2018

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
Jeff Derksen
Signature:
Date: SEP 24 2018

ADMINISTRATIVE SECTION (for DGS office only)

Library Check: [ ] YES
Course Attribute: GCAP
Course Attribute Value: Project
Instruction Mode: 
Attendance Type: 

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
COURSE DESCRIPTION

Integrate the frameworks and content of the MSc in Accounting and Data Analytics courses. This is the second part of a two-part course to provide students with adequate time to integrate the learning from the entire program with the needs of their industry.

The applied project capstone course is an opportunity for students to make use of knowledge related to major topics of courses throughout the program to address a specific, practical issue, problem or opportunity. Students will undertake a strategic business analysis and write an extended essay. A faculty member will negotiate the purpose, content and deliverables of each project with the students and the sponsoring organization. Common topics include a broad strategic analysis, an in-depth analysis of a specific business problem, a business plan, or a detailed functional strategy.

OBJECTIVES

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- Working effectively in a small team.
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- Evaluating the performance of your peers in a fair and objective fashion.
- At the end of the course, you will prepare a concise self-reflection summarizing your key learning outcomes.

COURSE EXPECTATIONS

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Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the semester.

BOOK AND MATERIALS

There are no required readings for this course. Provided on Canvas:

1. Detailed information and schedule of deadlines
2. Selected readings and information about resources
Learning and Assessment

Each project is assessed on a satisfactory/unsatisfactory basis and will be approved only after it meets a minimum quality threshold determined by the course instructor. Students will be expected to revise their work until that threshold is met. The quality threshold is a function of content, including analytical processes and conclusions, and University standards for written communications.

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<td></td>
<td>Team Report</td>
<td>20%</td>
</tr>
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<td></td>
<td>Total</td>
<td>100%</td>
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</table>

Group Project Plan

Previously developed in Summer 2019 in BUS 845

Students will work in groups to operationalize the applied project proposal and plan created in BUS 845: Advanced Applied Project I. A project management format including introduction, work breakdown structure, proposed schedule, and budget along with risk analysis will be used. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for the term.

Group Project Presentation

Due:

In the final face-to-face session, teams will make a business presentation to industry partner executives. This presentation should integrate their learning across MSc courses. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project that emerges from their team work.

Team Report

Due:

Management requires you to deliver a report to accompany your presentation. In it, you should include detailed charts, projections, figures, and analysis, etc., that would be inappropriate to include in your presentation, but which would be necessary to develop a complete picture of your proposed solution. You should also include a copy of your slide deck with your report.

Self-reflective Essay

Due:

An individual paper (5 pages - 1200 words max) reflecting on your learnings throughout the MSc program. Some considerations are as follows:

- What did you learn from the team-based applied project?
- What did you learn about managing organizations?
- What experiences did you find most interesting/informative? Why?
- Any impact on future career moves?

You are strongly encouraged to do additional research, as well as integrate relevant material from other MSc courses.
COURSE STRUCTURE
The majority of team work will be online and/or independently, in collaboration with faculty supervisors and the industry partner. A Thursday-Sunday face-to-face session will allow for final presentations in-person.

ACADEMIC HONESTY
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August 29, 2018

Dr. Andrew Gemino  
Associate Dean, Graduate Programs  
Beedie School of Business  
500 Granville Street  
Vancouver, BC  
Canada, V6C W6

Dear Dr. Gemino,

Re: New Program Proposal for Certificate and Masters of Science Program focused on data & analytics and technology skills

This letter communicates KPMG’s support for the creation of both a Certificate and a Masters of Science Program to provide technology and data and analytics (D&A) education for KPMG employees (program name to be determined). The proposed graduate-level education programs would fill an existing skills gap for KPMG employees.

Institutions and their audit committees are increasingly concerned with the impacts of technology and D&A on the audit. KPMG is mobilizing to provide the D&A knowledge its people need to bring innovation to the audit to advance audit quality. In developing educational programs to support the development of D&A skills, KPMG will be preparing its professionals to embrace the changes facing the profession and develop the skills they need to play a vital role in helping client organizations create value.

Developing internal D&A programs to more widely educate KPMG professionals will require significant resources. Given the rapid pace of industry change, and the short supply of D&A expertise world-wide, KPMG Canada could reduce its timeframe and resource use while maintaining high quality outcomes by utilizing an academic partner to deliver professional D&A programming within KPMG.

In forming an educational partnership with SFU Beedie, we are excited to work with an institution that has demonstrated strength in D&A programming, a successful history of innovative programming, as well as experience in working with corporations to provide custom and online programming.

We look forward to news about the program being implemented and to providing this opportunity to our people. If you have any questions, please contact the undersigned.

Yours sincerely,

Kristen Carscallen  
Canadian Managing Partner, Audit
Andrew Gemino

Biography

Dr. Andrew Gemino is an award-winning teacher who has twice received the Canada Trust Distinguished Teacher award from the Beedie School of Business and also received two teaching awards during his years at the University of British Columbia. Andrew’s academic research focuses on information technology project management, business systems analysis and the design of technology-mediated collaborative environments that includes examining how corporate teams can best collaborate using technologies such as instant messaging. Andrew holds a National Sciences and Research Council of Canada (NSERC) grant to study the effective communication of information system requirements. He is also the co-founder of a software company that develops commercial software for professional sports teams in the NHL and NBA, as well as automated employee scheduling for sports and entertainment companies. Andrew also provides his expertise to the Surgeon Information System Working Group for the Provincial Surgical Oncology Council which is affiliated with the BC Cancer Agency. An accomplished bass and piano player, Andrew played for many years in a local rock and roll band, a gig he says was “more than fun”.

https://beedie.sfu.ca/profiles/AndrewGemino

Nilesh Saraf

Biography

Professor Saraf is currently on sabbatical at the Department of Business Economics, Erasmus University, Rotterdam, Netherlands

Professor Saraf focuses his research on the diffusion of enterprise information technology and its role in creating business value. He also conducts research on open source software development, strategic behavior of IT product and service vendors and on the emergence of technology standards.

Professor Saraf’s research has appeared in top journals namely, MIS Quarterly and Information Systems Research. His research has won competitive awards including the Emerald Management Reviews Citations of Excellence Awards for 2011 & 2014, and the runner-up award for the Best Doctoral Dissertation competition (ACM-SIGMIS) in 2004. He
has also won competitive external grants from the Social Sciences and Humanities Research Council of Canada. His current academic service roles include the following:

- Associate Editor for Management Information Systems Quarterly (2018-) (click)
- Editorial board of IEEE Transactions on Engineering Management
- Academic Director, Business Technology Management (BTM) Certificate Program

Professor Saraf completed his Ph.D. in Business Administration from the Marshall School of Business, University of Southern California, Los Angeles. He has an undergraduate degree in Electronics Engineering from M.S. University, India, and an MBA from the Indian Institute of Management. He is married and has two children.

https://beedie.sfu.ca/profiles/nileshsaraf

Peter Tingling

Biography

Peter joined the Beedie School of Business at SFU from the Richard Ivey School of Business at the University of Western Ontario where his thesis examined organizational decision-making. Peter has had a long association with higher education and has taught at several business schools. Prior to academia, Peter had more than two decades of industrial experience working in a number of senior line and staff positions as well as consulting to a diverse range of Fortune 500, government, and start-up organizations across North America.

The University, says Peter, meets several of his life goals, allows him to make a greater contribution to society and offers new challenges. "Many industry practitioners are preoccupied with 'what' rather than the more useful 'why' and how' of theory," he says. "These are my interests."

Peter has always considered himself a 'closet academic' with a curious passion for eclectic reading. Some of his favourite authors include Daniel Kahneman (Thinking Fast and Slow), James Gleick (Genius: The biography of Richard Feynman), Peter Bernstein (Against the Gods: The Remarkable Story of Risk), David Halberstam (The Coldest Winter), Margaret MacMillan (Paris 1919, Six Months that Changed the World) and Neil Postman (Amusing Ourselves to Death: Public Discourse in the Age of Show Business).

Peter is a member of the Senate Committee on University Priorities (SCUP), the Senate Committee on University Honours (SCUH), the Electoral Standing Committee (ESC), Calendar Committee (CC (Chair)) and the Senate Committee on Agenda and Rules (SCAR). He serves as Vice-Chair of the Senate and as Associate Dean Undergraduate Programs he serves on a
number of Beedie committees.

Outside of the University, Peter is the president and CEO of Octothorpe Software Corporation, a decision sciences company.

https://beedie.sfu.ca/profiles/PeterTingling

Michael Favere-Marchesi

Biography

After several years in public and private accounting practice, Dr. Michael Favere-Marchesi started an academic career to fulfill his love for research and teaching. Today, as an associate professor of accounting and auditing, his public accounting and industry experiences enhance his lectures in auditing and managerial accounting. Prior to joining the Beedie School of Business, Dr. Favere-Marchesi taught at the Monterey Institute of International Studies in California, the National Institute of Development Administration (NIDA) in Thailand, and the University of Southern California. His research interests include audit judgment and decision-making, audit quality, fraud and international accounting. Dr. Favere-Marchesi earned his undergraduate and graduate degrees in the U.S. and spent several years in Thailand as director of NIDA'S Global MBA program in Bangkok. He speaks French, Spanish and conversational Thai. He served for several years as Chair of the international activities committee for SFU Business. This position included arranging a quality portfolio of university exchange arrangements between SFU Business and leading business schools around the world. Dr. Favere-Marchesi is currently a member of the University Senate and serves on the Senate's Committee on International Activities and the Senate's Committee on Disciplinary Appeal. Externally, Dr. Favere-Marchesi serves as the President-Elect of the Canadian Academic Accounting Association, and served as a member of the Board of Examiners of the American Institute of Certified Public Accountants and the Chair of its International Uniform CPA Qualification Examination Committee. Dr. Favere-Marchesi is currently a reviewer for Auditing, Behavioral Research in Accounting, Accounting Perspectives, and various accounting conferences.

https://beedie.sfu.ca/profiles/MichaelFavere-Marchesi
Jamal A. Nazari

Biography

Dr. Jamal Nazari came to Vancouver from Alberta. He completed his Ph.D. in accounting at the University of Calgary. He has taught various financial and management accounting courses at the undergraduate and graduate levels at Simon Fraser University, Mount Royal University, University of Calgary, and Sharif University. Jamal holds the designations of Chartered Professional Accountant, Certified General Accountant, and Certified Management Accountant. He has facilitated courses and programs for CMA and CPA Canada. He is currently serving on the Sustainability Advisory Board of the CPA Canada. His past industry experience includes holding the position of CFO for an investing and a trading company in the automotive industry. Jamal’s research interests include corporate social responsibility, sustainability reporting, and intellectual capital. He has presented his research at many recognized conferences. His published work appears in outlets such as Journal of Business Ethics, Journal of Management Accounting Research, Journal of Cleaner Production, Journal of Intellectual Capital, and Methodological Issues in Accounting Research.

https://beedie.sfu.ca/profiles/JamalA.Nazari

Kim Trottier

Biography

Professor Trottier is an Associate Professor of Accounting at the Beedie School of Business. She holds a Masters degree and PhD in Accounting and Economics from the University of British Columbia, and a BCom from l’Université d’Ottawa. Her PhD covers archival research as well as mathematical modeling and econometrics. Her research spans several areas of the literature such as valuation models, event study methodology, experiments, behaviour studies, classification classification models, and topical issues in the banking and pharmaceutical industry. Her current focus is on forensics, analytics, big data, and machine learning. Dr. Trottier’s teaching experience ranges from theoretical to applied, across all levels of education from undergraduate to PhD students and Executive MBAs. With years spent in professional practice as a Chartered Accountant, Dr. Trottier brings real-world experience to her teaching and research, applying insight from her work as a financial analyst, consultant, manager, corporate controller, and external auditor in corporations ranging in size from $500 million to $270 billion in assets. She holds board positions at the Canadian Academic Accounting Association and at 460 MIC.
Payman Jula

Biography

Payman Jula is an Associate Professor at Beedie School of Business, SFU, where he teaches courses related to operations management, and decision making under uncertainty. Payman has a PhD in Industrial Engineering and Operations Research from University of California at Berkeley. His research interests are in transportation and logistics, and applications of operations management in the manufacturing and service (particularly healthcare delivery) industries. Payman has studied the economics of Asia - North America supply chains. He has worked with many international high tech companies such as Samsung Semiconductor, Cypress Semiconductor, Micron Technology, and IMFlash Technologies on issues related to cycle time reduction, production planning, scheduling, and supply chain management.

Payman enjoys Vancouver ski hills in winter and soccer fields in summer.

https://beedie.sfu.ca/profiles/paymanjula

Michael Johnson

Biography

Michael Johnson is a Lecturer at the Beedie School of Business at Simon Fraser University. He is passionate about teaching statistics, quantitative methods and operations management courses and is the recipient of the 2011 Canada Trust Excellence in Teaching Award. Michael spent 10 years teaching in the Operations Management program at BCIT prior to joining the Beedie School of Business. Prior to carrying out his PhD, Michael worked for several years as an engineer improving productivity and operational work flows in high-tech, automotive and process related industries. He has also worked as a consultant on a number of industry and research related projects related to operations research and management science.

https://beedie.sfu.ca/profiles/michaeljohnson
MEMORANDUM

ATTENTION: Senate

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

RE: CSAR Graduate Certificate in Accounting with Digital Analytics

DATE: October 18, 2018

For information:

At its meeting of September 11, 2018, SGSC approved the Cohort Special Arrangements proposal for Graduate Certificate in Accounting with Digital Analytics in the Beedie School of Business. The proposal was received by SCUP at its meeting on October 10, 2018.

The following program proposal and new courses are to be effective Summer 2019.

Beedie School of Business

1) Program proposal: Graduate Certificate in Accounting with Digital Analytics (Cohort Special Arrangements)
2) New calendar entry for Graduate Certificate in Accounting with Digital Analytics
3) New Courses:
   - BUS 830 Foundations of Business Systems and Data
   - BUS 831 Analyzing and Visualizing Accounting Data
   - BUS 832 Data Analytics for Auditing Practice
   - BUS 838 Collaboration, Teaming, and Agile Methods
   - BUS 839 Applied Project
MEMORANDUM

ATTENTION Senate Committee on University Priorities (SCUP)

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

RE: Cohort Special Arrangements proposal for a Graduate Certificate in Accounting with Digital Analytics

DATE September 24, 2018

For Information:

At its meeting of September 11, 2018, SGSC approved the Cohort Special Arrangements proposals for a Graduate Certificate in Accounting with Digital Analytics, effective Summer 2019.
Memo to SGSC

To: Senate Graduate Studies Committee  
From: Andrew Gemino, Associate Dean, Graduate Programs  
Re: CSAR New Program Proposals  
Date: August 23, 2018 REVISED: September 17, 2018

The following curriculum revisions have been approved by the Beedie School of Business and are forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for Summer 2019.

Please include them on the next SGSC agenda.

- CSAR new program proposal: Graduate Certificate in Accounting with Digital Analytics
- CSAR new program proposal: Master of Science in Accounting with Cognitive Analytics

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino  
Professor, Management Information Systems  
Associate Dean, Graduate Programs, Beedie School of Business
Additional Rationale Memo

To: Senate Graduate Studies Committee
From: Andrew Gemino, Associate Dean, Graduate Programs
Re: CSAR New Program Proposals
Date: September 17, 2018

The following curriculum revisions have been approved by the Beedie School of Business and are being forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for Summer 2019:

- New program proposal (Cohort Special Arrangement):
  - **Graduate Certificate in Accounting with Digital Analytics**
- New program proposal (Cohort Special Arrangement):
  - **Master of Science in Accounting with Cognitive Analytics**

The credential names differ to reflect the different levels of knowledge associated with the graduate certificate and MSc degree. The graduate certificate program is intended to solidify the foundation for digital analytics, and the MSc builds upon this foundation with applications of predictive analytics and machine learning techniques that are signature to cognitive analytics approaches.

Students will receive either the graduate certificate credential or the MSc credential, depending on their entry pathway. Not all students will proceed from the graduate certificate to the MSc credential. As such, these programs are presented as stand-alone credentials which the naming now reflects.

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino
Professor, Management Information Systems
Associate Dean, Graduate Programs, Beedie School of Business
Graduate Certificate
in Accounting with Digital Analytics

Cohort Special Arrangement Program Proposal

August 2018
Beedie School of Business
Executive Summary

As institutions and their audit committees are increasingly concerned with technology and data analysis, providing instruction in the form of a Certificate in Accounting with Digital Analytics will mobilize the data analysis knowledge expected of professional financial services employees in order for them to advance professionally. By creating educational programs that support the development of data analysis skills, financial service professionals will be prepared to embrace the changes coming to the auditing profession and obtain the skills they need to play a vital role in helping client organizations create value. This will enable auditors to:

• leverage enterprise data to enhance audit quality with more granular analysis
• uncover data patterns and relationships that can improve audit quality
• leverage investments that other institutions are making in technology

The emergence of data analysis is a critical component of audit technique and practice. This provides a clear need to develop and maintain leading analytical capabilities within the financial industry, and an opportunity for SFU to become a leading educational provider for these capabilities through the proposed Graduate Certificate in Accounting with Digital Analytics.

PART A [3 pages maximum]

Proposed credential to be awarded
Graduate Certificate in Accounting with Digital Analytics

Location of program
Primarily online, with some face-to-face sessions (Vancouver: Segal campus, and offsite)

Academic unit(s) offering proposed program
Beedie School of Business

Anticipated program start date
Summer 2019

Anticipated completion time
Two terms
Summary of proposed program

a) Aims, goals and/or objectives of the proposed program

Creating “next generation” accountants through innovative programming. To prepare finance industry employees with the skills for data and analytics and develop the “next generation” accountant, who will be:

- knowledgeable about how the profession has evolved and advanced technologically
- accomplished in best practices in accounting, auditing, tax, and financial reporting
- empowered with data and able to use advanced data and analytic technologies
- prepared to collaborate and innovate with teams of business professionals

The purpose of the proposed certificate is to further develop auditing with data analytics capabilities. With analytical capabilities at the heart of the program, Beedie aims to design practical and interactive courses empowering this next generation of auditors for excellence, embracing change, innovation, and critical thinking. To accomplish this objective, the integration of four skill dimensions is proposed:

i. advanced auditing techniques
ii. data and visualization skills
iii. statistical and analytical capabilities
iv. advanced leadership/teaming skills

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

In 2017, the Beedie School identified its vision as the following statement: “We develop innovative and socially responsible business leaders with a global perspective through education, inspired by research and grounded in practice.”

A focus on innovation and collaborative capabilities, with attention on data and analytical skills, educates business professionals by developing these skills and grounding them in everyday business practice. The program is therefore highly aligned with Beedie’s mission statement. In turn, Beedie’s focus on innovation also aligns with the SFU Innovates overall strategy (http://innovates.vpr.sfu.ca/ourstrategy). The proposed certificate stands on the entrepreneurial education pillar of the SFU Innovates strategy, and challenges financial business professionals to innovate their practice with data and analytic capabilities.

c) Potential areas/sectors of employment for graduates and/or opportunities for further study

As the proposed program is geared towards students with high levels of familiarity with accounting, possibly at the Junior Accountant level, promotion within company and/or industry is a key target area for potential graduates. In addition, Beedie is proposing a
Graduate Certificate in Accounting with Digital Analytics

one-year Master of Science in Accounting with Cognitive Analytics, allowing for further study opportunities.

d) Delivery methods
A cohort-based, blended education delivery approach including face-to-face sessions integrated with an online learning management system (LMS). Online programming through CANVAS will provide the core of learning environment, enabling students to immerse themselves in learning on their own schedule while encouraging a collaborative, team-based approach. This collaborative approach is further supported by face-to-face sessions for each cohort. A cohort model is proposed in order for students to apply cumulative skills in the final course, an integrative applied project centered around teaming and applying data analytic skills learned in the first four courses.

e) Related programs in the institution or other British Columbia post-secondary institutions
There are several big data and analytic academic programs in post-secondary institutions within BC, primarily at the Master’s level. Most of these programs are focused on developing computing science and technical skills for data scientists. The demand for these skills is high and the need for new programs is clear. The proposed certificate focuses on bringing basic data and analytic skills to accounting professionals. Business professionals in accounting see the value of adding data and analytical skills, but do not intend to become data scientists nor data management professionals. As the proposed certificate program is intended to teach data and analytic skills in a business context. It will not duplicate programs with a more technical, statistical focus.

BCIT – Applied Data Analytics (ADA) Certificate www.bcit.ca/study/programs/5512cert

The BCIT ADA certificate program provides a computer science foundation for data analytics systems. It is designed to educate data analyst. The proposed certificate program does not duplicate the program described in this proposal because the proposed program assumes students are business professionals and the area of study is data and analytical skills within the accounting practice.

Contact information
Ali Daastmalchian, Dean, Beedie School of Business: beedie_ea@sfu.ca 778.782.7664
Andrew Gemino, Associate Dean, Graduate Programs: gemino@sfu.ca 778.782.3653
Maria Szymczak, Executive Director, Graduate Programs: mdelguer@sfu.ca 778.782.5023
Jamal Nazari, Associate Professor, Accounting: jnazari@sfu.ca 778.782.4604
PART B [2 pages maximum]

PROGRAM DETAILS

a) Graduation requirements, target audience
The proposed Graduate Certificate in Accounting with Digital Analytics consists of course requirements and an applied project for a minimum of 15 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted at the discretion of the academic director.

Students must complete all of:
BUS 830 – Foundations of Business Systems and Data (3)
BUS 831 – Analyzing and Visualizing Accounting Data (3)
BUS 832 – Data Analytics for Auditing Practice (3)
BUS 838 – Collaboration, Teaming, and Agile Methods (3)
And a project:
BUS 839 – Applied Project (3)

Students are expected to complete the program requirements within two terms.

The proposed certificate is geared towards employees already working within the accounting and auditing sector, primarily at the Junior Accountant level. Therefore, financial services employees will be the targeted recruitment group. Due to the blended delivery model, it is predicted that primarily domestic students will be interested. The primarily online delivery model, with limited face-to-face sessions, allows for maximum flexibility for full-time employees to complete the program while remaining employed full-time.

b) Admission requirements
Applicants must satisfy the University admission requirements as stated in Graduate General Regulations 1.3 in the SFU Calendar. An undergraduate degree in business, management, commerce, or other suitable quantitatively oriented programs is required and a minimum of two years of applicable work experience. Candidates holding a professional designation such as a CPA and evidence of strong mathematics competency would also be ideal candidates.
c) Evidence of student interest and labour market demand

The Graduate Management Admissions Council (GMAC) owns and administers the Graduate Management Admission Test® (GMAT®) exam. The GMAT is used by more than 7,000 graduate programs worldwide. Approximately 9 out of 10 new MBA enrollments globally are made using a GMAT score and more than 200,000 candidates take the GMAT exam every year. The information they provide is perhaps the best source for considering student demand. In recent papers, GMAC has noted the significant demand for Masters of Analytics programs.¹ A 2011 report from McKinsey Consulting² has suggested that “by 2018, the United States alone could face a shortage of between 140,000 and 190,000 of works with analytical skills”. Each of these reports suggests strong general demand for analytics programming. Evidence of the demand within the accounting profession is also significant. The Chartered Professional Accountant (CPA) has recognized the changes data and analytical skills are bringing to the profession.³

These articles suggest a significant unmet need for further education in the area of data analytics, and specifically in the area of accounting/audit/tax. The type of jobs that candidates are likely to access after graduation include analytic team leads, lead business analysts, managers of business analytics teams, and promotions to senior levels.

d) Eligibility for scholarships, awards, and financial aid

Not eligible for scholarships, awards, and financial aid at this time. The Certificate in Accounting with Digital Analytics is proposed as a Cohort Special Arrangement program, which is not eligible for awards adjudicated by the Senate Graduate Awards Adjudication Committee.

RESOURCES

a) Enrolment Plan

We expect to run the proposed Certificate in parallel with a proposed MSc in Accounting with Cognitive Analytics. Given current expressions of interest from potential students, we expect to be able to recruit 60-70 Certificate students in the first year (Summer 2019). Our expectations are that 50% of students who enroll in the Certificate will move immediately into the proposed MSc in Accounting with Cognitive Analytics.

³ See for instance the following g article accessed June 20, 2018: https://www.cpaajournal.com/2017/06/26/big-data-business-analytics-implications-audit-profession
b) **Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments**

Existing resources will be utilized. Canvas will be the online course delivery tool. Face-to-face sessions are minimal, meaning limited physical resources are needed. Face-to-face sessions will be held at the Segal Graduate School or offsite utilizing corporate space with an industry partner organization, with no requirement for additional lab space, library space, or other on-campus facilities. Students will not utilize in-house Beedie resources such as the Career Management Centre or student engagement opportunities. Administrative resources will come from existing Beedie Graduate Program staff at the Segal Graduate School. Existing faculty will be utilized, with no new hires planned.

c) **Faculty member’s teaching/supervision**

SFU Beedie has exceptional, world class faculty with skills and expertise in data and analytics. Below provides example of credentials and profiles of some of our outstanding faculty in this area.

**Accounting**

Dr. Michael Favere-Marchesi: Ph.D. (University of Southern California), Master of Accountancy, B.Sc. (Brigham Young University), C.P.A. (California), Certified Internal Auditor [profile](#)

Dr. Jamal Nazari: Ph.D. Accounting (U of Calgary), MSc Accounting (U of Tehran), BA Accounting (U of Mashhad), CPA (BC), CMA, CGA (Alberta) [profile](#)

Dr. Kim Trottier: Ph.D. Accounting (UBC), MSc Accounting (UBC), BComm (Ottawa University), CPA, CA (Ontario) [profile](#)

**Information Systems**

Dr. Andrew Gemino: Ph.D. (University of British Columbia); M.B.A., M.A., B.A. (Simon Fraser University) [profile](#)

Dr. Nilesh Saraf: Ph.D. (University of Southern California), M.B.A. (Indian Institute of Management, Lucknow), B.Eng. (Maharaja Sayajirao U., India) [profile](#)

Dr. Peter Tingling: Ph.D. (U. of Western Ontario), M.B.A. (Wilfrid Laurier), CPA, CGA [profile](#)

**Operations Management**

Dr. Payman Jula: Ph.D. (UC Berkeley), M.Sc. (Western Michigan), B.Sc. (Tehran) [profile](#)

Dr. Michael Johnson: Ph.D., M.A.Sc., B.Eng, (Windsor) [profile](#)

Dr. Srini Krishnamoorthy: PhD (Columbia), PGDB (Indian institute of Management Lucknow), B.Tech. (Indian Institute of Technology, Madras) [profile](#)

**Marketing**

Dr. Bob Krider: Ph.D., M.Sc., B.Sc. (University of British Columbia) [profile](#)
Graduate Certificate in Accounting with Digital Analytics

Dr. Jason Ho: Ph.D. (University of British Columbia), Master of Philosophy in Marketing (Chinese University of Hong Kong) profile
Dr. Srabana Dasgupta: Ph.D. (University of Southern California), M.A. (Delhi School of Economics), B.A. (Jadavpur University) profile

d) Proposed tuition and other program fees including a justification

Tuition is to be charged on a per credit basis, using the existing Masters of Science in Finance (MSc Fin) tuition of $666.88 per unit plus additional student fees of approximately $200 per term (without a U-Pass, as the proposed program is primarily delivered online) as per the academic calendar. Certificate budget:

<table>
<thead>
<tr>
<th>Certificate Cohort FINANCIAL SUMMARY (2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue</strong></td>
</tr>
<tr>
<td>Tuition Certificate (80 students)</td>
</tr>
<tr>
<td>Total Revenue</td>
</tr>
<tr>
<td>Tuition to Beedie minus VPA share (35.1)</td>
</tr>
<tr>
<td>One Time Development Fee</td>
</tr>
<tr>
<td><strong>Total Revenue To Beedie</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Salaries</strong></td>
</tr>
<tr>
<td>Academic Salaries:</td>
</tr>
<tr>
<td>Certificate Faculty Salary</td>
</tr>
<tr>
<td>MSc Faculty Salary</td>
</tr>
<tr>
<td>TA</td>
</tr>
<tr>
<td>Program Assistant Salary &amp; Benefits (shared)</td>
</tr>
<tr>
<td><strong>Total Program Salaries</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operations Cost</th>
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<tbody>
<tr>
<td>Software Purchase Costs</td>
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<tr>
<td>General Office Expenses</td>
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<td>Courier/Messenger Expense</td>
</tr>
<tr>
<td>Program &amp; Course Development</td>
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<tr>
<td>Computing Services Charges</td>
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<tr>
<td><strong>Total Operations</strong></td>
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<table>
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<tr>
<th>TOTAL EXPENSES</th>
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<tbody>
<tr>
<td>336,225</td>
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<tr>
<td>Revenue - EXPENSES</td>
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</tbody>
</table>

Specialized software/simulations may be used
PART C: Appendices

Appendix 1 Calendar entry

Appendix 2 New course forms with course outlines

Appendix 3 Letter of support

Appendix 4 Faculty biographies
Accounting with Digital Analytics
Graduate Certificate

Description of Program

As institutions and their audit committees are increasingly concerned with technology and data analysis, providing instruction in the form of a Certificate in Accounting with Digital Analytics delivers the data analysis knowledge expected of professional financial services employees in order for them to advance professionally. Through educational programs that support the development of data analysis skills, financial service professionals will be prepared to embrace the changes coming to the auditing profession and obtain the skills they need to play a vital role in helping client organizations create value.

Admission Requirements

Applicants must satisfy the University admission requirements as stated in Graduate General Regulation 1.3 in the SFU Calendar. An undergraduate degree in business, management, commerce, or other suitable quantitatively oriented programs is required and a minimum of two years of applicable work experience. Candidates holding a professional designation such as a CPA and evidence of strong mathematics competency would also be ideal candidates.

Program Requirements

The Graduate Certificate in Accounting with Digital Analytics consists of course work and an applied project for a minimum of 15 units. Courses from other SFU graduate business programs, or a special topic course, may be substituted at the discretion of the academic director.

Students must complete all of

BUS 830 – Foundations of Business Systems and Data (3)
BUS 831 – Analyzing and Visualizing Accounting Data (3)
BUS 832 – Data Analytics for Auditing Practice (3)
BUS 838 – Collaboration, Teaming, and Agile Methods (3)

And a project
BUS 839 – Applied Project (3)

Program Length

Students are expected to complete the program requirements within two terms.

Academic Requirements within the Graduate General Regulations

All graduate students must satisfy the academic requirements that are specified in the graduate general regulations, as well as the specific requirements for the program in which they are enrolled.
# New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
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</thead>
<tbody>
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<td>830</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

## Course Title

### Foundations of Business Systems and Data

**Short title (for enrollment/transcript - max. 30 characters)**

Bus Systems & Data

**Course description for SFU Calendar**

Enterprise information systems, the relational database systems that underlie them, and creating value through competitive analytics. Develop an understanding of database querying and analytical applications to inspect, summarize, and transform data.

**Rationale for introduction of this course**

New course for the Graduate Certificate in Accounting with Digital Analytics

**Term of initial offering (eg. Fall 2019)**

Summer 2019

**Course delivery (eg. 3 hrs/week for 13 weeks)**

3 hrs/week for 13 weeks

**Estimated enrollment per offering**

40-50

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

n/a

**Prerequisite and/or Corequisite**

n/a

**Criminal record check required?**

[ ] Yes [X] No

If yes is selected, add this as prerequisite

**Additional course fees?**

[ ] Yes [X] No

**Campus where course will be taught**

Burnaby [ ] Surrey [X] Vancouver [ ] Great Northern Way [ ] Off campus

**Course Components**

[ ] Lecture [ ] Seminar [ ] Lab [ ] Independent [ ] Capstone

**Grading Basis**

[ ] Letter grades [ ] Satisfactory/ Unsatisfactory [ ] In Progress / Complete

**Repeat for credit?**

[ ] Yes [X] No

**Total repeats allowed?**

0

**Repeat within a term?**

[ ] Yes [X] No

**Required course?**

[ ] Yes [X] No

**Final exam required?**

[ ] Yes [X] No

**Capstone course?**

[ ] Yes [X] No

**Combined with a undergrad course?**

[ ] Yes [X] 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
Andrew Gemino, Nilesh Saraf, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON
Academic Unit / Program
Beedie Graduate Programs
Name (typically, Graduate Program Chair)
Lesley McKay
Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Department Chair
Signature
Date

FACULTY APPROVAL
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

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
Andrew Gemino
Signature
Date
August 23, 2018

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

JEFF DERKSEN
Signature
Date
SEP 24, 2018

ADMINISTRATIVE SECTION (for DGS office only)
Library Check: SEP 07 2018
Course Attribute:
Course Attribute Value:
Instruction Mode:
Attendance Type:

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
COURSE DESCRIPTION

Introduces the foundations of business processes and the business value of data in enterprise systems. A focus is placed on business processes and the relational database management systems underlying these processes. Introductions to business process mapping (MS Visio), Structured Querying Language (SQL) and visual querying methods (MS Access) for accounting data are provided. Skills in using spreadsheets (MS Excel) to summarize, transform and clean imported accounting data are developed in addition to introductory skills in attaching to a relational database and developing descriptive summaries of accounting data using visual analytic software (Tableau).

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Understanding fundamental technology elements underlying competitive analytics in organizations.
- Identifying business processes that could benefit from process redesign.
- Mapping business processes
- Interacting with relational database management systems that include structured and unstructured accounting data.
- Utilizing SQL to design and interpret basic join queries from a relational database.
- Importing data from SQL queries into spreadsheets (MS Excel) to further summarize, clean and transform accounting data as a basis for analysis.
- Attaching visual analytic applications (Tableau) to relational databases in order to generate descriptive visual summaries of accounting data.

COURSE WORKLOAD EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignments with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS


LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.
Individual BEEDIE SCHOOL OF BUSINESS

<table>
<thead>
<tr>
<th>Individual</th>
<th>Weekly Quizzes</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual Querying Assignment</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Individual Visual Analysis Assignment</td>
<td>20%</td>
</tr>
<tr>
<td>Group</td>
<td>Group Process Mapping Assignment</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Group In-class Exercise</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Weekly Quizzes Due: Weekly, Sunday at 11:00 pm

A series of weekly multiple-choice quizzes will be provided through Canvas. Questions are drawn randomly from a question pool and provided to students in a timed format. Questions are focused on the material to be presented in the week to come and quizzes serve as a preparation for this material. Students have 30 minutes to answer 10 questions in an open book format. Students will receive feedback on their mark once the quiz closes.

Group Business Process Assignment

Students will work in groups of 3-4 to create a process map for a business process defined in a case. Students will be required to use MS Visio to map the business process. Assignment requirements also include a short analysis of the process along with 2 recommendations for how to improve the overall process. Groups will be assessed on their ability to effectively visualize the business process along with the quality of the process improvement recommendations.

Individual Querying Assignment

Students will work through a series of questions and provide the SQL code for each of the proposed queries. In addition, students will be asked to query data compiled in a relational database and then import this data into MS Excel. Students then use spreadsheet features to clean and transform data as described in the project. Students will be evaluated on the quality of the resulting transformed Excel worksheet.

Individual Visual Analysis Assignment

Students will compile a brief visual analysis of an accounting dataset. The data set will be created from a database query that the students design. Students will use a visual analytic tool (Tableau) to provide a summary of the data in the query. Students will be evaluated on the quality of the visual summary and a short write-up of the analysis.

Group In-class Exercise

Students will work in groups of 3-4 in a time-limited, in-class assignment to integrate their learning about processes, querying and visual analysis. Students will be given a business process analysis case and then will be required to develop a business process map, develop queries that provide data about the process and then create a brief analysis of the process with some suggestions for improvement. Groups will be assessed on their ability to effectively visualize the business process, create the necessary queries and provide high-quality process improvement recommendations.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements.
READING SCHEDULE

Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Competing on Analytics

Session 2: Business Process Mapping

Session 3: Business Process Mapping and Validation

Session 4: Business Process Improvement

Session 5: Business Process Improvement Reporting

Session 6: Introduction to SQL in Accounting

Session 7: Introduction to Database Querying

Session 8: Visual Querying using MS Access

Session 9: Developing Reports

Session 10: Introduction to Data Visualization
Session 11: Data Visualization in Accounting


Session 12

No readings. In-class exercise.

**ACADEMIC HONESTY**

Plagiarism is the unacknowledged use of other people's ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university's strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
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- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: [http://www.sfu.ca/policies/gazette/student.html](http://www.sfu.ca/policies/gazette/student.html)
### New Graduate Course Proposal

**Course Subject (eg. PSYC)** BUS  
**Number (eg. 810)** 831  
**Units (eg. 4)** 3

**Course title (max. 100 characters)**  
**Analyzing and Visualizing Accounting Data**

**Short title (for enrollment/transcript - max. 30 characters)** Analyzing & Visualizing Data

**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)**

An exploration of financial and non-financial data using summary measures, predictive models for decision-making, and graphic visualizations.

**Rationale for introduction of this course**

New course for the Graduate Certificate in Accounting with Digital Analytics

**Term of initial offering (eg. Fall 2019)**  
**Summer 2019**

**Course delivery (eg. 3 hrs/week for 13 weeks)**  
3 hrs/week for 13 weeks

**Estimated enrollment per offering**  
40-50

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

n/a

**Prerequisite and/or Corequisite**

n/a

**Criminal record check required?**  
Yes if yes is selected, add this as prerequisite

**Additional course fees?**  
No

**Campus where course will be taught**

Burnaby  
Surrey  
Vancouver  
Great Northern Way  
Off campus

**Course Components**

- Lecture  
- Seminar  
- Lab  
- Independent  
- Capstone

**Grading Basis**

- Letter grades  
- Satisfactory/ Unsatisfactory  
- In Progress / Complete

**Repeat for credit?**

- Yes  
- No

**Total repeats allowed?** 0

**Repeat within a term?**

- Yes  
- No

**Required course?**

- Yes  
- No

**Final exam required?**

- Yes  
- No

**Capstone course?**

- Yes  
- No

**Combined with a undergraduate course?**

- Yes  
- No

* 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
Michael Favere-Marchesi, Jamal Nazari, Kim Trottier

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON
Academic Unit / Program
Beedie Graduate Programs
Name (typically, Graduate Program Chair)
Lesley McKay
Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL
A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL
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

Overlap check done? 

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.

Andrew Gemino
Signature
Date

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

Jeff Derksen
Signature
Date

ADMINISTRATIVE SECTION (for DGS office only)
Library Check: SEP 07 2018
Course Attributes:
Course Attribute Value:
Instruction Mode:
Attendance Type:

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
BUS 831: Analyzing and Visualizing Accounting Data

Instructor: 
Office Phone: 
Email: 
Semester: Summer 2019 
LMS: canvas.sfu.ca

COURSE DESCRIPTION
Explores accounting data using univariate descriptive statistics, sampling and testing procedures for summary measures. Develops exploratory data analysis techniques and graphic visualizations to display relationships in accounting data that can be communicated to an executive audience. Introduces basics for multivariate predictive models that support accounting decision making. Develops basic multivariate predictive models to explore and validate data relationships and develops skills in communicating these relationships to business professionals.

OBJECTIVES
The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Apply spreadsheet function (Excel) to create randomized samples and validate procedure.
- Use pivot tables in spreadsheet (Excel) for exploratory data analysis of accounting data.
- Apply visual analytic software (Tableau) to visualize descriptive statistics from accounting data.
- Perform a confirmatory data analysis and identify outliers in an accounting data population.
- Identify appropriate statistical techniques and test statistic(s) for several business hypotheses.
- Understand the value of data mining and using a data analysis method (e.g. CRISP-DM).
- Utilize several multivariate predictive techniques for an accounting related issue.
- Develop and validate a multivariate predictive analytic model for an accounting issue.

COURSE EXPECTATIONS
You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS
5. Selected readings and custom courseware may be provided on Canvas.

LEARNING AND ASSESSMENT
Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.
Individual Assignment: Sampling Procedure Due:
Students will work on business questions and apply their knowledge of spreadsheets to create randomized samples and validate these procedures. Student will then work toward a confirmatory data analysis with a holdback sample to identify outliers in an accounting data population. Students will be evaluated on the quality of the analysis and depth of analysis on identification of outliers.

Individual Descriptive Statistics Assignment Due:
Students will develop an exploratory data analysis using pivot tables in spreadsheets (Excel) combined with visual analytic (Tableau) techniques to communicate important aspects of accounting data. A concise report will be developed that focuses on the business value of the exploratory analysis. Students will be evaluated on the quality of the combination of exploratory and visual summaries as well as the identification and communication of the business value associated with the exploratory analysis.

Group Predictive Modeling Report Due:
Students will work in groups of 3-4 to create a predictive model from an accounting data set. The report will be written for a business executive audience, so an emphasis on the business impacts of the predictive model is essential. Groups will be assessed on their ability to effectively communicate the business implications of the predictive model along with the quality of the predictive modeling process recommendations.

Group Predictive Modeling Presentation Due:
In the final session, students will make a time restricted, business presentation in groups of 3-4. This presentation should integrate their learning about sampling, exploratory analysis and predictive modeling. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the business issue and on the quality of the recommendations emerging from their analysis.

COURSE STRUCTURE
This course will consist of a blended approach with face-to-face and online components. Students work individually and as part of a group to complete course requirements.

READING SCHEDULE
Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Visual Storytelling with Tableau
Session 2: Visual Analytics and Choosing the Right Visual Aid

Session 3: Intermediate Visual Analytics I

Session 4: Intermediate Visual Analytics II

Session 5: Analysis with MS Excel I

Session 6: Analysis with MS Excel II

Session 7: Analysis with MS Excel III

Session 8: Analysis with MS Excel IV

Session 9: Sampling and Sample Distributions

Session 10: Hypothesis Testing I

Session 11: Hypothesis Testing II

Session 12
No readings. In-class group presentations.

ACADEMIC HONESTY

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# New Graduate Course Proposal

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<thead>
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<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
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<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>832</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

## Data Analytics for Auditing Practice

### Course title (max. 100 characters)
Data Analytics for Auditing Practice

### Short title (for enrollment/transcript - max. 30 characters)
Data Analytics for Auditing

### Course description for SFU Calendar
The use of information technology across audit processes. Applying analytics to deliver a high-quality audit and improve internal and external reporting quality.

### Rationale for introduction of this course
New course for the Graduate Certificate in Accounting with Digital Analytics

### Term of initial offering (eg. Fall 2019)
Summer 2019

### Course delivery (eg. 3 hrs/week for 13 weeks)
3 hrs/week for 13 weeks

### Frequency of offerings/year
Once/year

### Estimated enrollment per offering
40-50

### Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)
n/a

### Prerequisite and/or Corequisite
n/a

### Criminal record check required?
Yes

### Campus where course will be taught
- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

### Course Components
- Lecture
- Seminar
- Lab
- Independent
- Capstone

### Grading Basis
- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

### Repeat for credit?
Yes

### Total repeats allowed?
0

### Repeat within a term?
Yes

### Required course?
Yes

### Final exam required?
Yes

### Capstone course?
Yes

### Combined with a undergrad course?
Yes

* 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

Andrew Gemino, Nilesh Saraf, Peter Tingling

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedie Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL

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

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.

Andrew Gemino

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

Jeff Derksen

LIBRARY REVIEW

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:______________
COURSE DESCRIPTION

Learn to apply information technology across the end-to-end audit and accounting process. Access large quantities of accounting data, and use analysis to dig deeper, and deliver a high-quality audit, that provide clients with valuable insights to make better informed business decisions and improve their internal and external reporting quality.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate a proficiency in the following:

- Recognizing how data analytics can address accounting and business questions
- Understand the process to clean and prepare financial and non-financial data for analysis
- Recognize how completeness, reliability, or validity can affect data quality
- Perform basic data analysis to address business and accounting issues.
- Communicate the results of analysis to relevant stakeholders

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

2. Additional selected readings will be provided on Canvas

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Weekly Quizzes</th>
<th>20%</th>
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<tbody>
<tr>
<td></td>
<td>Final Exam</td>
<td>40%</td>
</tr>
<tr>
<td>Group</td>
<td>Group Case 1</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Group Case 2</td>
<td>20%</td>
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<tr>
<td></td>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
Weekly Quizzes

Due: Every week, Saturday at Midnight

A series of weekly multiple-choice and short answer quizzes will be provided through Canvas. Students will have about 40 minutes to answer 10 multiple-choice questions and two short answer questions. Students will receive feedback within 48 hours after finishing each quiz.

Final Exam

Due:

Final exam will be based on all the materials and concepts covered in the course.

Group Case 1

Due:

Students will work in groups of 3-4 to develop an audit plan from the available financial and non-financial datasets. Students will set up a could folder, review the changes to the working papers, identify audit data requirements, and prepare an audit plan. The audit plan developed by the groups will be assessed based on the procedures outlined in the audit plan. Each of these procedures should be supported by supplemental information and analysis.

Group Case 2

Due:

Students will work in groups of 3-4 on a case of financial statement analytic tool. Students will use XBRLAnalyst to access XBRL data, use XBRLAnalyst to create dynamic common size financial statements, and use SQL to query an XBRL database. Students will be assessed based on the quality of analysis performed using the XBRLAnalyst.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.

READING SCHEDULE

Additional selected readings are available electronically and can be found on Canvas. Solution to select cases and exercises will also be posted to Canvas. Students are expected to read the background materials and related chapters prior to attending each module.

TENTATIVE TIMETABLE

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Data Analytics in Accounting:</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>- Explain why data analytics matter to accountants and how it affects auditing, financial accounting, and tax</td>
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<tr>
<td></td>
<td>- Describe the data analytics process using the IMPACT cycle</td>
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<tr>
<td></td>
<td>- Identify accounting and auditing issues that data analytics can address</td>
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<tr>
<td></td>
<td>- Describes the skills needed by accountants to perform data analysis</td>
<td></td>
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<tr>
<td>Week 2</td>
<td>Accounting Data Preparation and Cleaning:</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>- Understand how data are organized in an accounting information system</td>
<td></td>
</tr>
</tbody>
</table>
| Week 3 | Accounting Data Preparation and Cleaning:  
| • Understand how financial data are stored in a relational database  
| • Explain and apply extraction, transformation, and loading technique  
| 3 |
|  |  
| Week 4 | Data Visualization and Summaries to Communicate With Stakeholders  
| • Identify the objective of data visualization  
| • Selecting the best charts to present data  
| • Chart refinement for effective and efficient communication  
| • Identifying the audience, tone and content of the reports  
| 4 |
|  |  
| Week 5 | The Modern Audit and Continuous Auditing  
| • Understand modern auditing techniques  
| • Evaluate an audit plan  
| • Understand the nature, extent, and timing of audit tests  
| • Select appropriate audit tasks and approaches  
| • Evaluate audit alarms as part of continuous auditing  
| • Understanding working paper platforms  
| 5 |
|  |  
| Week 6 | Introduction to Caseware IDEA Analytics tools  
| • IDEA data analytics  
| • IDEA Sampling techniques  
| • IDEA Statistical methods  
| 6 |
|  |  
| Week 7 | Audit Data Analytics  
| • Understand different types of analysis for auditing and when to use them  
| • Understand basic descriptive audit analyses  
| • Understand more complex statistical analyses, including Benford’s law  
| • Understand advanced predictive and prescriptive audit analytics  
|  |  
| Week 8 | Introduction to KPMG Automated Audit Procedures  
| Using KPMG Automated Audit Procedures to:  
| • Detection of unusual transaction data  
| • Preparation of analysis data by collecting data from ERP (Enterprise Resource Planning)  
| • Statistical Evaluation of audit risk by using financial and non-financial data  
|  |  

Week 12
Introduction to Electronic Account Analysis Tool (eAAT)
Using eAAT to:
- Detection of unusual transaction data
- Preparation of analysis data by collecting data from ERP (Enterprise Resource Planning)
- Statistical Evaluation of audit risk by using financial and non-financial data

Week 10
Generating Key Performance Indicators
- Evaluate management requirements and identify useful KPIs from a list
- Evaluate underlying data quality used for KPI
- Create dashboard using KPIs

Week 11
Financial Statement Analytics
- Describe how XBRL tags financial reporting data
- Understand how different types of ratio analysis can be facilitated by XBRL
- Explain how to create and read visualizations of financial statement data
- Describe the value of text mining and sentiment analysis of financial reporting

Week 12
FINAL EXAM

ACADEMIC HONESTY

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<th>838</th>
<th>Units (eg. 4)</th>
<th>3</th>
</tr>
</thead>
</table>

**Course title (max. 100 characters)**

**Collaboration, Teaming, and Agile Methods**

**Short title (for enrollment/transcript - max. 30 characters)**

**Collaboration & Teaming**

**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)**

Working collaboratively to practice agile project management techniques through team-based learning.

**Rationale for introduction of this course**

New course for the Graduate Certificate in Accounting with Digital Analytics

**Term of initial offering (eg. Fall 2019)**

**Summer 2019**

**Course delivery (eg. 3 hrs/week for 13 weeks)**

3 hrs/week for 13 weeks

**Frequency of offerings/year**

Once/year

**Estimated enrollment per offering**

40-50

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

n/a

**Prerequisite and/or Corequisite**

n/a

**Criminal record check required?**

Yes

**Additional course fees?**

Yes

**Campus where course will be taught**

- Burnaby
- Surrey
- Vancouver
- Great Northern Way
- Off campus

**Course Components**

- Lecture
- Seminar
- Lab
- Independent
- Capstone

**Grading Basis**

- Letter grades
- Satisfactory/ Unsatisfactory
- In Progress / Complete

**Repeat for credit?**

- Yes
- No

**Total repeats allowed?**

0

**Repeat within a term?**

- Yes
- No

**Required course?**

- Yes
- No

**Final exam required?**

- Yes
- No

**Capstone course?**

- Yes
- No

**Combined with a undergrad course?**

- Yes
- No

*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

Andrew Gemino, Payman Jula, Michael Johnson

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedie Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee | Signature | Date
Department Chair | Signature | Date

FACULTY APPROVAL

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

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.

Andrew Gemino

Date
August 23, 2018

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Jeff Derksen

Date
SEP 24, 2018

ADMINISTRATIVE SECTION (for DGS office only)

Library Check: SEP 07, 2018

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

If different from regular units:
Academic Progress Units:
Financial Aid Progress Units:
BEEDIE SCHOOL
OF BUSINESS

BUS 838: Collaboration, Teaming, and Agile Methods

Instructor:  
Office Phone:  
Email:  

Semester: Summer 2019  
LMS: canvas.sfu.ca

COURSE DESCRIPTION

Analytic projects in accounting require significant collaboration, project management and teaming skills. No individual alone has all the requisite skills for a complete, complex analysis. Students will work collaboratively practising agile project management techniques. Learning how to work productively in agile project environments is a critical skill for project success. These skills will be developed throughout the course in team-based assignments.

OBJECTIVES

The following are course level goals. It is expected that participants completing the course will demonstrate proficiency in the following:

- Understanding the elements of creating effective teams and how to support other team members.
- Using aspects of “teaming” in short term project teams.
- Utilizing traditional project management methods to create a project plan.
- Applying agile project management techniques, focusing on Scrum methodology, to deliver a short-term project.

COURSE EXPECTATIONS

You can expect 8 - 10 hours of work weekly for each course you are registered in. These activities will include participating in online activities, preparing readings and cases, answering practice questions, doing library research and working on group assignment with other students. Courses may be scheduled in a compressed format where classes are held in intensive session, but expectations of consistent preparation and participation remain for the length of the course.

BOOK AND MATERIALS

4. Selected readings may be provided on Canvas

LEARNING AND ASSESSMENT

Evaluation in this course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

| Individual | Weekly Quizzes | 15% |
| Team Feedback Assignment | 20% |
| Self-report – Final report | 20% |
Weekly Quizzes

A series of weekly multiple-choice quizzes will be provided through Canvas. Questions are drawn randomly from a question pool and provided to students in a timed format. Questions are focused on the material to be presented in the week to come and quizzes serve as a preparation for this material. Students will have 30 minutes to answer 10 questions in an open book format. Students will receive feedback on their mark once the quiz closes.

Team Feedback Assignment

Students will work in groups on the proposal and project plan. This group work will enable team members to gauge the effectiveness of other groups members. Each team member will commit to a process of providing feedback to other group members and listening to feedback from others. Each student will be evaluated on the quality of the feedback provided to team members by both instructors and team members.

Self-report Final Report

A final self-report will be collected for each team member. This reflexive self-report should consider the experiences and knowledge gained in completing the project proposal and project plan. Students are asked to demonstrate how they have improved their ability to team and participate in project-based work. Students are asked to integrate readings and other experiences and include specific examples whenever possible. Students will be evaluated on the breadth and depth of the reflexive narrative and the quality of the writing provided in the document.

Group Project Proposal and Presentation

Students will work in groups of 3-4 to create a proposal for their final project to be completed in the final Year 1 course BUS 839: Applied Project. Students will make a time restricted, business presentation of this proposal in their groups. The proposal will follow a project management format including introduction, work breakdown structure proposed schedule and budget along with risk analysis. Groups will be assessed on the quality of the proposal and the group's ability to effectively communicate project details and create a compelling proposal for further development.

Group Project Plan and Presentation

The Group Project Plan builds on the Group Project Proposal document. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for the final project for BUS 839. In the final sessions, students will make a time restricted, business presentation in groups of 3-4. This presentation should integrate their learning about traditional and agile project management. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project plan emerging from their team work.

COURSE STRUCTURE

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements. A mixture of case study discussions, small group exercises, case analysis, and group assignments may be utilized.
READING SCHEDULE

Readings are available electronically and can be found on Canvas or from the library. They are labelled accordingly on the course website under the heading “Resources”.

Session 1: Essentials of Teaming


Session 2: Building Effective Teams

   - *reWork*, [https://rework.withgoogle.com/print/guides/5721312655835136/](https://rework.withgoogle.com/print/guides/5721312655835136/)

Session 3: Essentials of Project Management I


Session 4: Essentials of Project Management II


Session 5: Essentials of Project Management III


Session 6: In-class Presentations

No readings. In-class group presentations.

Session 7: Introduction to Agile Project Management


Session 8: Agile Project Management Methods I


Session 9: Agile Project Management Methods II

Session 10: Hybrid Approaches to Project Management


Session 11: In-class Presentations
No readings. In-class group presentations.

Session 12: In-class Presentation
No readings. In-class group presentations.

ACADEMIC HONESTY

Plagiarism is the unacknowledged use of other people’s ideas or work. Plagiarism is often unintentional and can be avoided through careful work habits and familiarity with academic conventions. But whether intentional or unintentional, plagiarism is recognized as a serious academic offence. The university’s strong stance against plagiarism reflects our shared commitment to intellectual honesty, and the original contributions of each student and faculty member validate and sustain the university as a vital centre of knowledge and research. It is your responsibility, as a student and a member of the academic community, to ensure that you have correctly acknowledged and cited all the resources you have used in writing your work.

The following examples are representative but not exhaustive of activities constituting academic dishonesty:

- Plagiarism (presenting the work of another person as your own)
- Submitting the same work more than once without prior approval
- Translating a work from one language to another without complete and proper citation.
- Cheating
- Impersonation (having someone else write your exam)
- Submitting false records or information (forged medical notes)
- Stealing or destroying the work of another student
- Unauthorized or inappropriate use of computers, cell phones, calculators and other forms of technology in course work, assignments or examinations
- Falsifying material that is subject to academic evaluation
- Any activity not specifically outlined in this document that is intended to circumvent the standards of academic honesty

You are expected to post comments, and write reports and exams in your own words. Whenever you take an idea or passage from another author, you must acknowledge it by appropriately citing the source. If you are struggling to complete an assignment, please see your instructor or the program office for additional assistance.

Ignorance of these standards will not preclude the imposition of penalties for academic dishonesty.

For more information you will find the full SFU policy on Academic Honesty (from which the above was summarized) at: http://www.sfu.ca/policies/gazette/student.html
New Graduate Course Proposal

<table>
<thead>
<tr>
<th>Course Subject (eg. PSYC)</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>839</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Course title (max. 100 characters)**

**Applied Project**

<table>
<thead>
<tr>
<th>Short title (for enrollment/transcript - max. 30 characters)</th>
<th>Applied Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (eg. 810)</td>
<td>839</td>
</tr>
<tr>
<td>Units (eg. 4)</td>
<td>3</td>
</tr>
<tr>
<td>Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as &quot;This course will...&quot; or &quot;The purpose of this course is...&quot; If the grading basis is satisfactory/unsatisfactory include this in the description)</td>
<td>A team-based strategic business analysis and essay supervised by a Simon Fraser University faculty member with support from a senior industry partner. Graded on a satisfactory/unsatisfactory basis.</td>
</tr>
</tbody>
</table>

**Rationale for introduction of this course**

New course for the Graduate Certificate in Accounting with Digital Analytics

**Term of initial offering (eg. Fall 2019)**

<table>
<thead>
<tr>
<th>Frequency of offerings/year</th>
<th>Once/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course delivery (eg. 3 hrs/week for 13 weeks)</td>
<td>3 hrs/week for 13 weeks</td>
</tr>
<tr>
<td>Estimated enrollment per offering</td>
<td>40-50</td>
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</table>

**Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)**

| n/a |

**Prerequisite and/or Corequisite**

| n/a |

**Criminal record check required?**

| Yes | No |

**Campus where course will be taught**

| Burnaby | Surrey | Vancouver | Great Northern Way | Off campus |

**Course Components**

| Lecture | Seminar | Lab | Independent | Capstone |

**Grading Basis**

| Letter grades | Satisfactory/ Unsatisfactory | In Progress / Complete |

**Repeat for credit?**

| Yes | No |

**Total repeats allowed?**

| 0 |

**Repeat within a term?**

| Yes | No |

**Required course?**

| Yes | No |

**Final exam required?**

| Yes | No |

**Capstone course?**

| Yes | No |

**Combined with a undergrad course?**

| Yes | No |

*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

Andrew Gemino, Michael Johnson, Peter Tingling, Jamal Nazari

Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program
Beedle Graduate Programs

Name (typically, Graduate Program Chair)
Lesley McKay

Email
buscoord@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee
Signature
Date

Department Chair
Signature
Date

FACULTY APPROVAL

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

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
Andrew Gemino
Signature
Date
August 23, 2018

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
Jeff Derksen
Signature
Date
SEP 24, 2018

ADMINISTRATIVE SECTION (for DGS office only)

Library Check: SEP 07 2018

Course Attribute:

Course Attribute Value:

Instruction Mode:

Attendance Type:

If different from regular units:

Academic Progress Units:

Financial Aid Progress Units:
COURSE DESCRIPTION

The applied project is designed for students to undertake a team-based strategic business analysis to further their learning and career goals. Students will undertake a strategic business analysis and write an extended essay jointly supervised by a Simon Fraser University faculty member and an industry partner. A faculty member will negotiate the purpose, content and deliverables of each project with the students and the sponsoring organization. Common topics include a broad strategic analysis, an in-depth analysis of a specific business problem, a business plan, or a detailed functional strategy.

OBJECTIVES

The Applied Project course is an opportunity for students to use their knowledge and ability to create a team-based, high quality analysis to develop strategic value for themselves and a client (typically, the student's organization).

The project provides students with an opportunity to comprehensively integrate the various subjects studied during the certificate program. Collaborative learning is facilitated through a final presentation to the industry partner organization.

BOOK AND MATERIALS

There are no required readings for this course. Resources provided on Canvas:

1. Detailed information and schedule of deadlines
2. Selected readings and information about resources
3. Submission requirements information
4. Examples of various project types

LEARNING AND ASSESSMENT

Each project is assessed on a satisfactory/unsatisfactory basis and will be approved only after it meets a minimum quality threshold determined by the course instructor. Students will be expected to revise their work until that threshold is met. The quality threshold is a function of content, including analytical processes and conclusions, and University standards for written communications.

<table>
<thead>
<tr>
<th></th>
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<td>Team Presentation</td>
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<td></td>
<td>Peer review</td>
<td>20 %</td>
<td>Team Report</td>
<td>20 %</td>
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<td></td>
<td>Participation</td>
<td>10 %</td>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Group Project Plan

Previously developed in Summer 2019 in BUS 838

Students will work in groups of 3-4 to operationalize the applied project proposal and plan created in BUS 838: Collaboration, Teaming, and Leading Change. A project management format including introduction, work breakdown structure, proposed schedule, and budget along with risk analysis will be
used. The plan should include all elements of the proposal plus a detailed schedule and work breakdown structure for the term.

**Group Project Presentation**  
Due:

In the final sessions, students will make a business presentation in groups of 3-4. This presentation should integrate their learning across Certificate courses. The presentation should be formatted for a business executive audience. Groups will be assessed on their ability to effectively visualize and communicate the project plan and on the quality of the project that emerges from their team work.

**Team Report**  
Due:

Management requires you to deliver a report to accompany your presentation. In it, you should include detailed charts, projections, figures, and analysis, etc., that would be inappropriate to include in your presentation, but which would be necessary to develop a complete picture of your proposed solution. You should also include a copy of your slide deck with your report.

**Self-reflective Essay**  
Due:

An individual paper (5 pages - 1200 words max) reflecting on your learnings throughout the Certificate program. Some considerations are as follows:
- What did you learn from the team-based applied project?
- What did you learn about managing organizations?
- What experiences did you find most interesting/informative? Why?
- Any impact on future career moves?

You are strongly encouraged to do additional research, as well as integrate relevant material from other Certificate courses.

**COURSE STRUCTURE**

This course will consist of a blended approach with face-to-face and on-line components. Students work individually and as part of a group to complete course requirements.

<table>
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<tr>
<th>Session</th>
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<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>September</td>
<td>Introductions, Teams and Project Plans, High-level Overview</td>
</tr>
<tr>
<td>2</td>
<td>Sept-Nov</td>
<td>Teams work with instructor and industry partner to develop applied project content</td>
</tr>
<tr>
<td>3</td>
<td>November</td>
<td>Practice Presentations</td>
</tr>
<tr>
<td>4</td>
<td>Late November</td>
<td>Practice Presentations and Adjudication Panel</td>
</tr>
<tr>
<td>5</td>
<td>December</td>
<td>Presentations to organization executives</td>
</tr>
</tbody>
</table>

**ACADEMIC HONESTY**

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ABOUT THE COURSE INSTRUCTOR

Instructors may write their own short biography, or use the existing one on the Beedie staff directory.
Dear Dr. Gemino,

Re: New Program Proposal for Certificate and Masters of Science Program focused on data & analytics and technology skills

This letter communicates KPMG’s support for the creation of both a Certificate and a Masters of Science Program to provide technology and data and analytics (D&A) education for KPMG employees (program name to be determined). The proposed graduate-level education programs would fill an existing skills gap for KPMG employees.

Institutions and their audit committees are increasingly concerned with the impacts of technology and D&A on the audit. KPMG is mobilizing to provide the D&A knowledge its people need to bring innovation to the audit to advance audit quality. In developing educational programs to support the development of D&A skills, KPMG will be preparing its professionals to embrace the changes facing the profession and develop the skills they need to play a vital role in helping client organizations create value.

Developing internal D&A programs to more widely educate KPMG professionals will require significant resources. Given the rapid pace of industry change, and the short supply of D&A expertise world-wide, KPMG Canada could reduce its timeframe and resource use while maintaining high quality outcomes by utilizing an academic partner to deliver professional D&A programming within KPMG.

In forming an educational partnership with SFU Beedie, we are excited to work with an institution that has demonstrated strength in D&A programming, a successful history of innovative programming, as well as experience in working with corporations to provide custom and online programming.

We look forward to news about the program being implemented and to providing this opportunity to our people. If you have any questions, please contact the undersigned.

Yours sincerely,

Kristen Carscallen
Canadian Managing Partner, Audit
Andrew Gemino

Biography

Dr. Andrew Gemino is an award-winning teacher who has twice received the Canada Trust Distinguished Teacher award from the Beedie School of Business and also received two teaching awards during his years at the University of British Columbia. Andrew's academic research focuses on information technology project management, business systems analysis and the design of technology-mediated collaborative environments that includes examining how corporate teams can best collaborate using technologies such as instant messaging. Andrew holds a National Sciences and Research Council of Canada (NSERC) grant to study the effective communication of information system requirements. He is also the co-founder of a software company that develops commercial software for professional sports teams in the NHL and NBA, as well as automated employee scheduling for sports and entertainment companies. Andrew also provides his expertise to the Surgeon Information System Working Group for the Provincial Surgical Oncology Council which is affiliated with the BC Cancer Agency. An accomplished bass and piano player, Andrew played for many years in a local rock and roll band, a gig he says was “more than fun”.

https://beedie.sfu.ca/profiles/AndrewGemino

Nilesh Saraf

Biography

Professor Saraf is currently on sabbatical at the Department of Business Economics, Erasmus University, Rotterdam, Netherlands

Professor Saraf focuses his research on the diffusion of enterprise information technology and its role in creating business value. He also conducts research on open source software development, strategic behavior of IT product and service vendors and on the emergence of technology standards.

Professor Saraf's research has appeared in top journals namely, MIS Quarterly and Information Systems Research. His research has won competitive awards including the Emerald Management Reviews Citations of Excellence Awards for 2011 & 2014, and the runner-up award for the Best Doctoral Dissertation competition (ACM-SIGMIS) in 2004. He
has also won competitive external grants from the Social Sciences and Humanities Research Council of Canada. His current academic service roles include the following:

- Associate Editor for Management Information Systems Quarterly (2018-)
- Editorial board of IEEE Transactions on Engineering Management
- Academic Director, Business Technology Management (BTM) Certificate Program

Professor Saraf completed his Ph.D. in Business Administration from the Marshall School of Business, University of Southern California, Los Angeles. He has an undergraduate degree in Electronics Engineering from M.S. University, India, and an MBA from the Indian Institute of Management. He is married and has two children.

https://beedie.sfu.ca/profiles/nileshsarat

Peter Tingling

Biography

Peter joined the Beedie School of Business at SFU from the Richard Ivey School of Business at the University of Western Ontario where his thesis examined organizational decision-making. Peter has had a long association with higher education and has taught at several business schools. Prior to academia, Peter had more than two decades of industrial experience working in a number of senior line and staff positions as well as consulting to a diverse range of Fortune 500, government, and start-up organizations across North America.

The University, says Peter, meets several of his life goals, allows him to make a greater contribution to society and offers new challenges. “Many industry practitioners are preoccupied with 'what' rather than the more useful 'why' and how' of theory,” he says. “These are my interests.”

Peter has always considered himself a 'closet academic' with a curious passion for eclectic reading. Some of his favourite authors include Daniel Kahneman (Thinking Fast and Slow), James Gleick (Genius: The biography of Richard Feynman), Peter Bernstein (Against the Gods: The Remarkable Story of Risk), David Halberstam (The Coldest Winter), Margaret MacMillan (Paris 1919, Six Months that Changed the World) and Neil Postman (Amusing Ourselves to Death: Public Discourse in the Age of Show Business).

Peter is a member of the Senate Committee on University Priorities (SCUP), the Senate Committee on University Honours (SCUH), the Electoral Standing Committee (ESC), Calendar Committee (CC (Chair)) and the Senate Committee on Agenda and Rules (SCAR). He serves as Vice-Chair of the Senate and as Associate Dean Undergraduate Programs he serves on a
number of Beedie committees.

Outside of the University, Peter is the president and CEO of Octothorpe Software Corporation, a decision sciences company.

https://beedie.sfu.ca/profiles/PeterTingling

Michael Favere-Marchesi

Biography

After several years in public and private accounting practice, Dr. Michael Favere-Marchesi started an academic career to fulfill his love for research and teaching. Today, as an associate professor of accounting and auditing, his public accounting and industry experiences enhance his lectures in auditing and managerial accounting. Prior to joining the Beedie School of Business, Dr. Favere-Marchesi taught at the Monterey Institute of International Studies in California, the National Institute of Development Administration (NIDA) in Thailand, and the University of Southern California. His research interests include audit judgment and decision-making, audit quality, fraud and international accounting. Dr. Favere-Marchesi earned his undergraduate and graduate degrees in the U.S. and spent several years in Thailand as director of NIDA'S Global MBA program in Bangkok. He speaks French, Spanish and conversational Thai. He served for several years as Chair of the international activities committee for SFU Business. This position included arranging a quality portfolio of university exchange arrangements between SFU Business and leading business schools around the world. Dr. Favere-Marchesi is currently a member of the University Senate and serves on the Senate’s Committee on International Activities and the Senate’s Committee on Disciplinary Appeal. Externally, Dr. Favere-Marchesi serves as the President-Elect of the Canadian Academic Accounting Association, and served as a member of the Board of Examiners of the American Institute of Certified Public Accountants and the Chair of its International Uniform CPA Qualification Examination Committee. Dr. Favere-Marchesi is currently a reviewer for Auditing, Behavioral Research in Accounting, Accounting Perspectives, and various accounting conferences.

https://beedie.sfu.ca/profiles/MichaelFavere-Marchesi
Jamal A. Nazari

Biography

Dr. Jamal Nazari came to Vancouver from Alberta. He completed his Ph.D. in accounting at the University of Calgary. He has taught various financial and management accounting courses at the undergraduate and graduate levels at Simon Fraser University, Mount Royal University, University of Calgary, and Sharif University. Jamal holds the designations of Chartered Professional Accountant, Certified General Accountant, and Certified Management Accountant. He has facilitated courses and programs for CMA and CPA Canada. He is currently serving on the Sustainability Advisory Board of the CPA Canada. His past industry experience includes holding the position of CFO for an investing and a trading company in the automotive industry. Jamal's research interests include corporate social responsibility, sustainability reporting, and intellectual capital. He has presented his research at many recognized conferences. His published work appears in outlets such as Journal of Business Ethics, Journal of Management Accounting Research, Journal of Cleaner Production, Journal of Intellectual Capital, and Methodological Issues in Accounting Research.

https://beedie.sfu.ca/profiles/JamalA.Nazari

Kim Trottier

Biography

Professor Trottier is an Associate Professor of Accounting at the Beedie School of Business. She holds a Masters degree and PhD in Accounting and Economics from the University of British Columbia, and a BCom from l'Université d'Ottawa. Her PhD covers archival research as well as mathematical modeling and econometrics. Her research spans several areas of the literature such as valuation models, event study methodology, experiments, behavioural studies, classification classification models, and topical issues in the banking and pharmaceutical industry. Her current focus is on forensics, analytics, big data, and machine learning. Dr. Trottier's teaching experience ranges from theoretical to applied, across all levels of education from undergraduate to PhD students and Executive MBAs. With years spent in professional practice as a Chartered Accountant, Dr. Trottier brings real-world experience to her teaching and research, applying insight from her work as a financial analyst, consultant, manager, corporate controller, and external auditor in corporations ranging in size from $500 million to $270 billion in assets. She holds board positions at the Canadian Academic Accounting Association and at 460 MIC.
Payman Jula

Biography

Payman Jula is an Associate Professor at Beedie School of Business, SFU, where he teaches courses related to operations management, and decision making under uncertainty. Payman has a PhD in Industrial Engineering and Operations Research from University of California at Berkeley. His research interests are in transportation and logistics, and applications of operations management in the manufacturing and service (particularly healthcare delivery) industries. Payman has studied the economics of Asia - North America supply chains. He has worked with many international high tech companies such as Samsung Semiconductor, Cypress Semiconductor, Micron Technology, and IMFlash Technologies on issues related to cycle time reduction, production planning, scheduling, and supply chain management.

Payman enjoys Vancouver ski hills in winter and soccer fields in summer.

Michael Johnson

Biography

Michael Johnson is a Lecturer at the Beedie School of Business at Simon Fraser University. He is passionate about teaching statistics, quantitative methods and operations management courses and is the recipient of the 2011 Canada Trust Excellence in Teaching Award. Michael spent 10 years teaching in the Operations Management program at BCIT prior to joining the Beedie School of Business. Prior to carrying out his PhD, Michael worked for several years as an engineer improving productivity and operational work flows in high-tech, automotive and process related industries. He has also worked as a consultant on a number of industry and research related projects related to operations research and management science.
To: Senate

From: Kris Nordgren, Secretary
Senate Nominating Committee

Date: October 19, 2018

Subject: Senate Committee Elections

This is a summary of the nominations received and outstanding vacancies for Senate committees.

All nominations must be received by the Senate Office from the Nominating Committee in time to be included in the documentation sent out for the next Senate meeting. Senators will be informed that further nominations may be made by individual members of Senate. Any such nominations must reach the Committee Secretary the Friday before the meeting of Senate, and no further nominations will be accepted after this time. The Committee Secretary will provide members of Senate at the Senate meeting with such further nominations as may have been received. Oral nominations during the meeting of Senate will not then be allowed.

If only one nomination is received for a position, the position will be elected by acclamation. If more than one nomination is received for a position, online voting will be held during the week following the Senate meeting on Monday, November 5, 2018. An email will be sent to all Senators with information about the candidates and a link to the online voting system. Voting will be permitted for 48 hours and election results will be released within three days of the end of voting.

<table>
<thead>
<tr>
<th>COMMITTEE</th>
<th>POSITION</th>
<th>TERM (from June 1, 2018)</th>
<th>NOMINATIONS RECEIVED (after October Senate elections)</th>
<th>CANDIDATES ELECTED (from October Senate meeting)</th>
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<tbody>
<tr>
<td>ESC</td>
<td>Senator</td>
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<tr>
<td>REB</td>
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<tr>
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<tr>
<td>SCAR</td>
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<td>Committee/Academic Unit</td>
<td>Position</td>
<td>Tenure</td>
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<tr>
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<td>SLC/LPAC/Dual Positions</td>
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<tr>
<td></td>
<td>Graduate Student</td>
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<tr>
<td>SPCSAB/SGAAC</td>
<td>Graduate Student</td>
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<tr>
<td>SPCSAB/ SUAAC</td>
<td>Faculty Member</td>
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* SCIA Faculty members: In the event that the Faculty Member is unable to attend, the Faculty Dean is authorized to appoint an alternate replacement.

CC - Calendar Committee  
DQAC - Diverse Qualifications Adjudication Committee  
ESC - Electoral Standing Committee  
LPAC - Library Penalties Appeal Committee  
REB - Research Ethics Board  
SAB - Senate Appeals Board  
SCAR - Senate Committee on Agenda and Rules  
SCCS - Senate Committee on Continuing Studies  
SCEMP - Senate Committee on Enrolment Management and Planning  
SCIA - Senate Committee on International Activities  
SCODA - Senate Committee on Disciplinary Appeals  
SCUH - Senate Committee on University Honours  
SCUP - Senate Committee on University Priorities  
SCUS - Senate Committee on Undergraduate Studies  
SCUTL - Senate Committee on University Teaching and Learning  
SGAAC - Senate Graduate Awards Adjudication Committee  
SGSC - Senate Graduate Studies Committee  
SLC - Senate Library Committee
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>SNC</td>
<td>Senate Nominating Committee</td>
</tr>
<tr>
<td>SPCSAB</td>
<td>Senate Policy Committee on Scholarships, Awards &amp; Bursaries</td>
</tr>
<tr>
<td>SUAAC</td>
<td>Senate Undergraduate Awards Adjudication Committee</td>
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</tbody>
</table>