McMaster University

School of Graduate Studies

1280 Main Street West
Hamilton, Ontario, Canada
L8S 4L8

Phone 905.525.9140
Ext. 23679
http://graduate.mcmaster.ca

To : Members of Graduate Council

From : Christina Bryce
Assistant Graduate Secretary

The next meeting of Graduate Council will be held on **Tuesday March 21st at 1:30 pm in Council Chambers (GH-111)**

Listed below are the agenda items for discussion.

Please email *cbryce@mcmaster.ca* if you are unable to attend the meeting.

A G E N D A

I. Minutes of the meeting February 21st, 2017

II. Business arising

III. Report from the Associate Vice-President and Dean of Graduate Studies

IV. Report from the Graduate Associate Deans

V. Report from the Associate Registrar and Graduate Secretary

VI. Report from the Assistant Dean, Graduate Student Life and Research Training

VII. Faculty of Health Sciences Graduate Policy and Curriculum Committee Report

VIII. Faculty of Engineering Graduate Curriculum and Policy Committee Report

IX. Change to Scholarship Committee Membership

X. New Scholarships

XI. Graduate Degrees in the Ontario Environment

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A G E N D A

I. Minutes of the meeting January 17th, 2017

The minutes of the meeting of January 17th 2017 were approved on a motion by Dr. Hayward, seconded by Dr. Thompson.

II. Business arising

There was no business arising.

III. Report from the Associate Vice-President and Dean of Graduate Studies

Dr. Welch noted that the academic accommodation policy would not be reviewed at the meeting as they're still working on it.

Dr. Welch noted that with respect to graduate admissions one of the things that everyone was in favour of was better turnaround in terms of graduate offers. To that end after the review SGS was given an additional permanent position in admissions. There have also been two different working groups, one for process improvements and one for Mosaic-specific improvements. He said that this had been working very well so far and that as of that day there was a one business day turnaround for offers. He noted that there is also a system where departments can get application packages picked up rather than having them sit in campus mail.

He reported that the provincial government is in the process of renegotiating the Strategic Mandate Agreements. This agreement is the contract between universities and province about what will be supported

in terms of funding to universities and total provincial grant and what the limitations on new program development will be during the three year period covered by the agreement. Each university negotiates with a representative from the Ministry. The negotiation is partially to determine what elements are put in various envelopes that ministry is defining. Universities are starting with same total grant but now there will be a corridor model for funding: a fixed amount of money and from there the university decides how it will deploy the money. This differs from the previous grant which had specific money for graduate expansion. The other thing that the agreement will do is identify caps on enrollment. As of the start of planning, every university has lost its current cap and if it chooses to have a higher cap it's up to the university to justify that to province. The SMA also includes a definition of strengths and growth areas that the university and province agree on.. The goal is to have similar set of areas identified for new programs in the new SMA. There is a fairly short turnaround for the development of the new SMA. The Provost and President made themselves available at a meeting last Thursday to engage with the community on this topic. Dr. Welch also noted that five boundary conditions for the upcoming SMA are known and include: student experience, innovation in teaching and learning excellence, access and equity, research excellence and impact, and innovation, economic development and community engagement. In the first SMA, one of those areas of focus was graduate expansion. That is no longer province-wide priority and it is now the responsibility of universities to decide if this is a priority. The Provost and senior administration have made clear as research-intensive university they do want to continue to grow graduate education at McMaster.

Dr. Welch noted that there had been a question at the previous meeting about graduate pay over the holidays and he had checked into the situation. He said that the issue in question was that if you looked at the distribution of TA pays, up until the end of December and then when they started in January, there was a two week date where a student might have expected a pay where they didn't get a pay. He spoke with Student Accounts and Cashiers and noted this has to be done because the pay has to be paid out when the work is done. There is a gap between when the work is done in December and when it resumes in January. There wasn't any error in that pay schedule. He said it was something they could draw attention to in the salary distribution letter given to graduate students.

A council member asked how the cap on graduate enrollment would work and who would manage it. Dr. Welch responded that the change should have no effect on programs per se because any growth beyond what is allowed would be an expense that the university as a whole would absorb. When the money comes in from the province, it is distributed to the Faculty where the decision can be made. They can absorb the risk and give guidance to programs about the number of graduate spots they can afford. They haven't had an issue with caps here in the past as the university had negotiated very high caps in the past. However, other universities

went over their caps which meant they had unfunded domestic students they accepted. The university/Faculty took the hit in those cases, generally.

A council member asked about the portion of the SMA where it ties job outcomes to success. He noted that if a student is not working in a related field, it could be seen as a failure and he thought it might not be the best way to manage outcomes. Dr. Welch responded that one of the things each university has been asked to provide are the metrics that it wishes to be measured by. Universities will produce metrics and there will be a joint province-university survey which will ask about student experience and how work relates to training but that is not likely to be available until SMA 3. The government line is that nothing much is going to change right now. What they clearly say is, they're asking universities to define these metrics and if they're not met SMA 3 is where there is potential to experience true risk.

IV. Report from the Graduate Associate Deans

Dr. Hayward reported that they were busy planning the FHS research plenary. She noted FHS was working on a number of initiatives after reflecting on admission changes over the years. They have seen challenges in programs who rely on CIHR funding. They hope that the situation at CIHR improves but are also working on efforts to ensure that students do feel there is a future for programs that had been primarily funded in this way. She also reported that they had had Bernice Downey talk to the FHS Graduate Program Executive about Truth and Reconciliation to ensure they're making good efforts to promote recruitment of indigenous students. She asked a couple of programs who had pro-active initiatives to discuss and they noted the issue of dealing with a non-standard academic record. Dr. Hayward wondered if this is an issue Graduate Council should also have more discussion about. Dr. Welch responded that he thought it would be very timely to start a conversation about the TRC and the way it intersects with the Access and Equity area from the new SMA.

Dr. Hayward noted the importance of the indigenous student support office on campus.

Dr. Welch said that apart from the TRC, there are also issues with mature students who are deciding to retrain perhaps from an entirely different field. He said this is an area where a lot of thought would be welcome.

Dr. Thompson reported that the Faculty of Engineering had held their Ph.D. retreat a couple of weeks ago. He noted that a number of industry people had attended as well as Susan Porter from UBC. It was very successful and there was far more discussion than anticipated. They are trying to see what information they can utilize/implement in small pilot projects. Beyond that the only message is that there seems to be a lot of appetite for change in both industry and academia. He noted there is a push and pull between regulations and flexibility. Dr. Welch responded that he could give an introduction to what is required by the province, noting that there is a lot of flexibility.

Drs. Agarwal, Ibhawoh and Porter had no report.

V. Report from the Associate Registrar and Graduate Secretary

There was no report.

VI. Report from the Assistant Dean, Graduate Student Life and Research Training

Mr. Self reported on the IUSRS – Indigenous Undergraduate Summer Research Scholars program. He noted an email about supervising had been circulated. The program was initially created on a two year grant from the Provost. Five offices will partner to fund for the program for the upcoming year. They're planning to run the program with 15 students this year and they're quite excited it's going to run again this year. His team is working with University Advancement to get donor support for the program on an ongoing basis. He noted that the deadline for supervisors was coming up. They want to have the information up on the website for better research matches and also want to do testimonials about what's happening with those students.

He noted that the thesis boot camp started the following day and ran for three days. 62 students signed up for three days of support to get their writing jump-started and they can do this during reading week because library allows exclusive use of space.

He also noted that the Three Minute Thesis finals are at 4:00 pm on Thursday. There are four heats throughout the day and the top 3 from each of those heats goes on to the final. There is an award for the top three in final. They did a bigger push to get students from non-STEM fields to sign up but still have had issues in this respect. Mr. Self noted that he is going to contact colleagues at other institutions about this.

He reported on Arrive and Thrive which is a wellness initiative funded by some provincial money that involves workshops about mindfulness, stress-relief and help with procrastination among other things. He said this is still available to graduate students and noted that pilot funding ends in March but they are discussing with the organizers to see how they can maintain services.

A council member noted that in the minutes of the previous Graduate Council about mental health initiatives at McMaster there was discussion about a positive vote in March and asked what a positive vote would entail. Mr. Self responded that from the university's perspective this would be graduate students voting to agree to pay the same fees as undergraduate students. The council member noted an issue of not being sure about what's going on with services. Mr. Self responded that one thing to note related to that is that referendums are controlled by students. University leadership can help drive it but can't dictate. Student leadership has to take it to graduate students for a vote and that decision is made at the GSA level.

The council member noted that one issue around fees that was raised is that most graduate students have families and financial constraints. The amount that undergraduate students are paying is a lot higher than what graduate students were paying. If the referendum comes back and asks graduate students to pay the same amount as undergraduate she feared that the outcome would be the same. She asked if there had been

any thought about how to solve it in a more positive manner and thought that graduate students need the service more than undergraduates because of the amount of stress they're under. Mr. Self responded that the University has not moved away from the premise that grads should pay the same as undergraduates and that it's being treated as an equity issue

A council member noted that in the case of undergraduate oftentimes their parents are paying their fees which is not the case with graduate students, who are being funded through TA ships, research grants and their own savings. He agreed that there was an argument to be made around the additional challenges of graduate students and the additional benefit they add but that the will of the university had to be behind this argument. Mr. Self also noted that Mr. van Koughnett is trying to run his unit with the funds available to him.

A council member asked if they can advocate for something other than a referendum, particularly in light of the focus on Access and Equity in the new SMA. Dr. Welch recognized many different facets of this issue and also recognized that it's currently entirely in the AVP Student's budget. Graduate Council is not involved in any decision making for this particular type of work. He said they were free to gather opinions and express themselves as groups of faculty and groups of graduate students to make their feelings known. He did not think a vote at the Graduate Council level would have a positive effect.

Dr. Hayward said that it was a matter of a group of people who want benefits over and above what everyone in the province already receives, so it has to be funded somehow. Dr. Welch responded that that was what Mr. van Koughnett was here to explain. He said there were valid arguments on both sides and everyone agrees that it would be better if everyone had more access. The goal is to get to the place where there is more support. Dr. Hayward said this is support offered beyond what OHIP is already funding. Dr. Welch agreed and further noted that it was on campus support.

A council member noted he had sat on a student services committee that looks at the budgets for different departments. He also noted the constraints by different provincial acts about where money can go. He wanted to state that graduate students do not necessarily have more stress than undergraduates but simply a different kind. He noted that there is also data that parents are not necessarily paying undergraduate fees and noted the need for reconciliation in the conversation around the issue. It's not graduate students over undergraduates or vice versa.

Dr. Welch clarified part of the issue here is the very reasonable rule that students have to agree to changes in fees. He thought Mr. van Koughnett communicated that very well.

A council member said she didn't know how the previous referendum question was formulated and suggested that the question should include more information including documentation about exactly what students have access to. Dr. Welch agreed and said it was his understanding is that Sean and the GSA are working toward this.

A council member suggested a note to department Chairs to advise them that there is a lack of equity and that the Chair could be a resource to provide information to grad students. Dr. Welch responded that they actually have circulated this information and noted that it might be worth doing again to explain what's happening.
The GSA attendee noted that a GSA council member is attending the student services meetings and discussions about what do next are happening there.
A council member commented on the services available and the difficulties of the transition away from counselling services being available to graduate students. She found the level of support provided after the change to be unhelpful and wondered if services for graduate students and undergraduate students could be looked at separately. Regarding the emails to chairs she noted that one thing she found is that her supervisor doesn't understand mental health issues and suggested an information session for supervisors.
Dr. Welch noted that Graduate Council is an academic body that makes academic decision. Business about wellness and treatment is something that Mr. van Koughnett's office is responsible for. There's not really a version of this body that exists which communicates with the AVP Student's office on a regular basis but he can make sure that there's an ability for all who are concerned to interact with Mr. van Koughnett. The main message that they want to get across to Chairs is to not make decisions themselves. Student Wellness isn't going to abandon anyone who shows up there. Students are not supposed to have to do it on their own he suggested there should be feedback from the people who have experienced issues in that respect to those in charge.

VII. Faculty of Humanities Graduate Curriculum and Policy Committee Report

Dr. Ibhawoh noted that there were just has a couple of changes for History and French. He said Dr. Grodek would speak about the French changes and the rest of the items are for information.
Dr. Grodek noted that French had submitted a few changes at the Faculty of Humanities GCPC meeting including the introduction of a Milestone requirement, a change to their language requirement, a change in course requirements to give direction to students who had taken their Masters at McMaster and had already completed a mandatory required course (705) about how this course could be replaced. The program also added more details around the comprehensive exam process and clarified that the part of the comprehensive is related to primary sources and critical approaches and the second is related to theoretical framework.
Dr. Ibhawoh noted that History proposed minor changes in the language in their calendar copy, removing a reference to OGS that no longer applies.
A council member asked for a French course title to be translated. Dr. Grodek responded that 6DD3 was Literature and Animals.
Dr. Ibhawoh moved and Dr. Hayward seconded, 'that Graduate Council approve the proposed changes as described in the documents.'

The motion was carried.

VIII. Faculty of Social Sciences Graduate Curriculum and Policy Committee Report

Dr. Porter presented the items noting that Graduate Council was being asked to approve the calendar copy for the new Labour Studies Ph.D. program. It had been approved at GCPC and the Faculty Council.

Dr. Proter moved and Dr. Thompson seconded, 'that Graduate Council approve the proposed changes as described in the documents.'

The motion was carried.

IX. Comprehensive Examination Working Group Recommendations

Dr. Welch explained that these recommendations constituted the work of a subcommittee that was formed at Graduate Council in September. As Chair of the subcommittee Dr. Thompson explained that they reviewed policies as listed in calendar and a committee was formed. The document constitutes contribution from folks all over campus. They were asked to discuss if there was any need to change the policy around comprehensives in the graduate calendar. He said there were two recommendations: one is that for any degree of flexibility to be added it was their opinion that the grad calendar should be revised such that SGS does not oversee comprehensives. All departments can continue the evaluation that they currently have but can also change the way they judge comprehensive knowledge in the future. They proposed changes to section 4 of the graduate calendar. He noted that in the document they are not saying that programs shouldn't assess comprehensive knowledge but that ultimately departments should be allowed to oversee the best way to test for this. The other suggestion is that if this recommendation is adopted that SGS provide a retreat where the best ideas to test comprehensive knowledge get put forward. Following the retreat they could create a guidance document to post on SGS website. He noted that they're not intending to vote today as there are still some concerns around evaluation component.

Around this component Dr. Welch clarified that a student can pass a comprehensive with distinction, pass, or fail. Currently students can fail once and retry. If they fail a second time they're out of the program completely. The expectations about what happens after a failure has to be very clear to ensure it's a fair system. If that is being changed, it will need to be clearly defined by the program so there isn't an absence of clarity about what to do once someone's failed.

A committee member asked if this was only related to the comprehensive examination and noted that an evaluation for committee meetings would be helpful. Dr. Welch responded that that had been added this year. The supervisory committee form was upgraded to explain precisely what each grade meant. The council member commented that they knew there had been a revision on the grading scheme but is looking for a more

detailed breakdown. Dr. Welch responded that most graduate program guidelines have information about the comprehensive exam.

Dr. Hayward asked if any program wanting to keep a comprehensive would have to clarify what would happen with a failure (including the potential for remediation) and asked if it would be dealt with like a course failure. Dr. Welch responded that this is exactly what he was concerned about. Right now the proposed changes edit out that information. They either have to change it to describe well the new situation or require that the programs do so – it has to be done clearly somewhere.

Dr. Hayward noted that program level changes would require a coordinated effort. She discussed the state of program handbooks and saw the advantage of keeping something in the graduate calendar about this. She suggested some language to the effect that: if the comprehensive is a requirement, students should have a second attempt. Dr. Welch agreed and suggested that this is the kind phrasing that needs to be worked on. Dr. Thompson also agreed and noted the opportunities and challenges of opening the doors to flexibility in the future.

Dr. Agarwal noted there was agreement within the group that there is a need for comprehensive knowledge at the Ph.D. level. The intent behind the recommendation is to give programs flexibility to think about other ways to assess this. One way to address this is to give each program ability to judge what a comprehensive would entail and to mandate that they have to include the method of assessment and provision of two chances.

A council member wondered if there had been examination of other universities. One of the concerns is that comprehensive is not just a measure of knowledge but also a teaching tool. He asked if there would be any impact on future employability. Dr. Thompson responded that he is on the CAGS comp committee review. They're seeing a survey of what is happening throughout Canada. He noted that there is a smattering of everything. Most programs have comprehensives. A little under 50% have no requirement for a comprehensive at the university level but most programs still adopt it. Dr. Welch noted that basically all universities in Europe don't have them.

Dr. Thompson said that all universities are asking the exact same question. They have done an extensive review of the research – there is a great deal on the dissertation but almost none on the comprehensive and their outcomes. He wanted to stress that this is not a way to minimize the amount of supervision required from the department and faculty. All they're trying to do is offer programs some flexibility to look at alternate ways of delivery. Comprehensive knowledge still needs to be developed.

Dr. Ibhawoh noted that he thought the committee had struck a good balance. Ultimately these decisions are going to be made a program level and they will look at comparators for a benchmark within the discipline. SGS can allow for that flexibility.

Dr. Thompson noted that CAGS is planning on putting out a white paper fairly soon on the comprehensive review process.

Dr. Welch asked if they reach the ability to describe the ways in which a student might pass or fail if the approach outlined is something that Grad Council members want. A council member said not if they're going to allow departments to do what's outside of the box and they define a failure. Dr. Welch clarified that they would reach an agreement of describing what constituted a failure if this the way forward. He saw the change as a broadening of the timeline for testing acquisition of knowledge. The council member responded it was great.

Dr. Welch noted that apart from the business of deciding what the calendar copy needs to be for pass/fail that all these changes would still need to go through the faculty curriculum and policy committees to be approved.

A council member asked Dr. Thompson to comment on defining rules for specific programs. Dr. Thompson responded that he thought that most departments would hold to current best practices. There has been an evolution in the last 20 years and that most programs have moved to project-based evaluation of a research proposal. They have already moved a good step forward. The wording in the calendar says examination and that's what they're concerned with. Dr. Welch noted that the period of time is also proscribed. Dr. Thompson said that with the changes program could now add more flexibility while still respecting what they want to achieve.

The council member asked if Mike foresaw creating a document within the faculty of engineering that all of the departments would have to follow. Dr. Thompson responded that he didn't as he knew there was a great deal of variability. Dr. Agarwal noted that a survey of comprehensive exam practices had been done and what they saw there was a lot of variation between programs. Partially the intent of the current work is to legitimize practices that have already been changed.

A council member noted that something that isn't being taken into account are the committee members. They matter too. She said that someone could have a personal opinion that fails a student. She highlighted the concern around personality issues on committee and noted the example of a student whose comprehensive result was not representative of their ability. She reiterated the need for a specific rubric so that a student couldn't be failed on the whim of a faculty member. Dr. Hayward responded that one way to deal with this is administratively. If they're assessing comprehensive knowledge at a supervisory committee report there could be a box on the form to be completed if the program has a different format for a comprehensive.

Dr. Welch said he thought everyone agreed on goals at the end of the degree: a full-fledged scholar who does good research and has good comprehensive knowledge of field. He noted there are probably many reasonable paths to get there and that there is some restriction now, but it's not incredibly restrictive.

The GSA representative made the point that this is Ph.D. level education and wanted to ensure that the university is not offering subsidized four-year internships. She asked if that was what the institution was trying to be as opposed to an institution generating students with comprehensive knowledge.

Dr. Welch said that was an interesting point. At the Masters level there are clear distinctions between research and professional Masters but Ph.D.s are declared to be exclusively research-based. He noted that as there are over 70 graduate programs, that can mean many different things and perhaps it always should. As an institution the best McMaster can do is to set the target to good goals and reinforce behaviours in faculty members.

X. New Scholarships

Dr. Hayward asked how one of the awards was paid out. Dr. Welch said as there was no longer quorum the vote would have to be delayed.

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To : Graduate Council

From : Christina Bryce
Assistant Graduate Secretary

At its meetings on February 8th and March 9th the Faculty of Health Sciences Graduate Policy and Curriculum Committee approved the following recommendations.

Please note that these recommendations were submitted for approval at the February 22nd and March 22nd meetings of the Executive Committee of the Faculty of Health Sciences.

For Approval of Graduate Council:

1. **Biomedical Discovery and Commercialization**
   - **Change to Program Requirements**

2. **Occupational Therapy**
   - **Change to Admission Requirements**

For Information of Graduate Council:

3. **Child Life and Pediatric Psychosocial Care**
   - **New Course:** 717 Program Planning and Evaluation

4. **Health Research Methodology**
   - **Change in Course Title**
     i. 736 Health Care System Financing and Innovation
   - **Change in Prerequisite and Description**
     i. 743 Systematic Review Methods
   - **Change in Course Title and Description**
     i. 790 Advanced Analysis of Survey Data
   - **Change in Course Descriptions**
     i. 741 Introduction to Health Technology Assessment
     ii. 748 Population and Public Health

5. **Rehabilitation Science**
   - **New course**
     i. 718 Mobility Across the Adult Lifecourse: A Rehabilitation Perspective

Biomedical Discovery and Commercialization

The Master of Biomedical Discovery and Commercialization (MBDC) Program is a one-year course-based Master's that provides students with the scientific and technical knowledge and understanding that underlies breakthrough discoveries in the biomedical sciences and drug discovery. The program also provides an understanding of business fundamentals that are necessary to market such discoveries. The program is offered full-time and preference will be given to those applicants who completed the Honours Bachelor of Health Sciences in Biomedical Discovery and Commercialization Program at McMaster University.

One of the most important features of the program, the integration of business and science, is achieved through the Team Project, Scholarly Paper and two M.B.A. level Business courses. Experiential learning is obtained through a four to eight-month community internship that provides students with an opportunity for creative exploration of Biomedical Research and Commercialization. The internship also provides students with an invaluable opportunity to expand their professional network and to develop and refine a sound career plan.

Program Director:	Eric Brown, Ph.D.
Program Manager:	Nancy McKenzie, Ph.D.
Enquiries:	905 525-9140 Ext. 27335
E-mail:	bdcprogram@mcmaster.ca
Fax:	905 522-9033
Website:	http://www.bdcprogram-mcmaster.ca

Master of Biomedical Discovery and Commercialization, M.B.D.C.

Admission

Admission and program requirements conform to the general University regulations at the front of this Calendar. For additional information regarding the MBDC application (e.g., important deadlines and how to apply online) please refer to the following website:
http://gs.mcmaster.ca/programs/biomedical-discovery-and-commercialization.

Applicants applying from outside the BDC undergraduate program will have their course work assessed for equivalencies before being considered further. Short-listed applicants who did not complete the Honours Bachelor of Health Sciences in Biomedical Discovery and Commercialization Program, but who have an equivalent Bachelor's degree from an accredited university, will be subject to an interview process.

General Requirements

The general requirements for the Master's degree appear under the "Regulations for Master's Degrees" near the beginning of this Calendar.

Course Requirements

The candidate must complete three full, 700-level BIOMEDDC graduate courses (BIOMEDDC 701, 702, 703), and two half, 700-level M.B.A courses (BUSINESS B733 and one of BUSINESS B730 or BUSINESS C727). All graded courses require at least a B- standing.

The required courses for the Master of BDC Program are as follows:

Fall

- BIOMEDDC 701 / Team Project
- BUSINESS B733 / Multidisciplinary Entrepreneurship

One of:

- BUSINESS B730 / Strategic Management of Technology
- BUSINESS C727 / Pharma/Biotech Business Issues

Winter; Spring/Summer

- BIOMEDDC 702 / Community Internship
- BIOMEDDC 703 / Scholarly Paper

Additional Information

The community internship provides students with an invaluable work-integrated learning opportunity. Emphasis is placed on the learning gains associated with a structured integration of theory and practice and the building of a professional network. Depending on the nature of the position, students may or may not receive any monetary compensation for the internship. Students have the option of securing their own internship placements, subject to the approval of the BDC Program Office. NOTE: as the majority of internship placements are expected to be in the GTA, students will be required to travel/and or relocate during their internship placement.

In addition to completing the required courses, students will also be required to complete the **Career Plan and Employability Preparation Milestone**. The milestone will provide students with pre-employment career skills and strategies for securing an internship within the health/life sciences, pharmaceutical, and biotechnology industries. Students will evaluate their personal strengths, values and goals to create a career plan. Employability strategies, including the creation of a

targeted job application portfolio, active job search techniques, networking with industry, and building interviewing skills, will establish career development skills. Students will directly apply the knowledge they gain to their interactions with Hiring Managers and Recruiters for the purposes of securing an internship.

BIOMEDDC Course Descriptions
BIOMEDDC courses are administered by the Department of Biochemistry and Biomedical Sciences.

BIOMEDDC 701 / Team Project

6 units (full course)

Students will work in small teams leveraging their training and developing career interests to create business plans and an entrepreneurial pitch for a new venture in biomedicine. Each team will be paired with an entrepreneur/company and will gain first-hand experience in entrepreneurship by helping to advance innovative Life Sciences products and services out of the lab and into the market. BIOMEDDC 701 (Team Project) will run concurrently with BUSINESS B733 (Multidisciplinary Entrepreneurship), which will allow students to apply the theory they learn in the classroom to the real world.

Prerequisite(s): Registration in the Biomedical Discovery and Commercialization Master's program
Course capacity: 50 Categories: NIL
Evaluation: Graded

BIOMEDDC 702 / Community Internship

6 units (full course)

The internship will provide students with the opportunity to explore career options and integrate academic learning through an experiential placement in the community sectors related to the pharmaceutical/biotechnology industry. Students will participate in the job search, application, and interview process. Upon securing a position they will gain invaluable industry experience through the role. Academic requirements will include completion of a learning portfolio where students will document the fulfillment of individual learning objectives. Students will also share aspects of their experiences in a student symposium.

Prerequisite(s): Registration in the Biomedical Discovery and Commercialization Master's program

Course capacity: 50 Categories: NIL
Evaluation: pass/fail

BIOMEDDC 703 / Scholarly Paper

6 units (full course)

Students will prepare a scholarly paper on a selected topic of interest that demonstrates integration of learning across science and business disciplines. To be completed by June 1, the scholarly paper should reflect an understanding of current biomedical discovery and commercialization challenges and the tools and techniques needed to evaluate, plan, and implement solutions.

Prerequisite(s): Registration in the Biomedical Discovery and Commercialization Master's program
Course capacity: 50 Categories: NIL
Evaluation: Graded

BUSINESS Course Descriptions
BUSINESS courses are administered by the DeGroote School of Business.

BUSINESS B733 / Multidisciplinary Entrepreneurship

3 units (half course)

This course examines issues associated with mounting entrepreneurial ventures from a heterogeneous university base and addresses such concerns as intellectual property, marketing, strategic human resources, raising capital, and starting and growing a business in that context. The course is open to students from all faculties at McMaster and provides an opportunity to develop networks for accessing varied resources for entrepreneurial ventures.

BUSIENSS B730 / Strategic Management of Technology

3 units (half course)

In today's competitive environment technology has become a central component of the strategic process of many innovative organizations. This course surveys the issues involved in this new role for technology including competitive advantage, analytical tools, technology based strategies, partnerships and alliances, and the process for managing technology so that it is closely integrated with the activities of the firm.

Prerequisite(s): BUSINESS B600 / Organizational Behaviour

BUSINESS C727 / Pharma/Biotech Business Issues

3 units (half course)

This course will allow students to familiarize themselves with the strategic and management issues currently facing the Pharma/Biotech industries through a consideration of the structure and challenges of the industry at the global, national and provincial levels.

Prerequisite(s): Registration in the Health Services Management specialization of the MBA or permission of the instructor.

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	Biochemistry and Biomedical Sciences
NAME OF PROGRAM and PLAN	**Program Name: GHSMB - Health Sciences MBDC** **Plan Name: BIOMEDDCMBDC – Biomedical Discovery and Commercialization**
DEGREE	**Master of Biomedical Discovery and Commercialization**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes X No

CREATION OF NEW MILESTONE X

CHANGE IN ADMISSION REQUIREMENTS	No	**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**	No	**CHANGE IN COURSE REQUIREMENTS**	No

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR	No	**EXPLAIN:**

OTHER CHANGES	NA	**EXPLAIN:** Addition of a milestone into the degree requirements.

DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:

There are currently no mandatory internship preparation milestones set up within the MBDC Program. Students can attend the workshops and meetings offered; however, these are not formally recognized as part of their degree requirements.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

The Career Plan and Employability Preparation milestone will assist students in developing the knowledge, research, and communication skills required to secure an internship for the BIOMEDDC 702 Community Internship course. This milestone will ensure each student has completed the critical elements highlighted below:

1_Development of a career plan
The students will be required to establish well-researched learning goals, including a self-assessment, investigation into various career paths, and a goal oriented career plan. The career plan will demonstrate knowledge of the potential career paths, and a development plan to increase the student's candidacy post completion of the internship.

2_Creation of an application portfolio
The application portfolio will include a resume, cover letter and LinkedIn profile. Each item will be targeted to an audience of hiring managers in the health/life sciences, pharmaceutical, and biotechnology industries. The application package will highlight transferable skills, industry keywords, and student achievements. The application package will ensure that students can communicate their skills, experiences, and accomplishments to prospective internship employers.

3_ Attend internship recruitment preparation workshops
Students will develop and apply their knowledge through participation in multiple workshops focused on internship recruitment preparation. Topics will include but not be limited to: resume creation, building cover letters, creating and using a LinkedIn account, conducting a self-initiated job search, interview preparation and an internship departure meeting. Each workshop will be focused on increasing the student's competitiveness in the job market and developing skills and techniques to be applied to the internship recruitment process.

4_Complete a weekly log of recruitment efforts
A high level of autonomy will be required from students as they engage in their job search activities. In a weekly log, students will track their submitted applications, interviews attended (phone, video conferencing, in person), and activities related to self-initiated job searches. Self-initiated job search activities may include but are not limited to: attending networking events, expanding networks on LinkedIn, career chats with industry professionals, cold calling hiring mangers, and applying to positions on open job boards.

Presentations and workshops on topics such as job search techniques, resume writing, cover letters, networking, LinkedIn, and interview preparation, will be delivered to equip students with the knowledge and skills required throughout the course. One-on-one support will be available to students as needed. Students will have access to guides, templates, external links and videos to provide additional resources around these topics on Avenue to Learn.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

A mandatory milestone will ensure that each student is developing the skills and investing the time needed to secure an internship for the BIOMEDDC 702 Community Internship course. In Fall 2016 the first cohort of MBDC students attended workshops, meetings and completed assignments to ensure they were developing the skills required to secure an internship position. The Career Plan and Employability Preparation milestone will ensure all students participate in these activities in a more structured, formal manner. It will also allow students to receive formal recognition for doing so as the Career Plan and Employability milestone will appear on their transcript.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 4th, 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

Students will be required to successfully complete this milestone as a pre-requisite to the required BIOMEDDC 702 Community Internship course. To account for the additional workload associated with the milestone, we will make adjustments to our BIOMEDDC 701 Team Project course, which also runs in the fall term.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

In addition to completing the required courses, students will also be required to complete the **Career Plan and Employability Preparation Milestone**. The milestone will provide students with pre-employment career skills and strategies for securing an internship within the health/life sciences, pharmaceutical, and biotechnology industries. Students will evaluate their personal strengths, values and goals to create a career plan. Employability strategies, including the creation of a targeted job application portfolio, active job search techniques, networking with industry, and building interviewing skills, will establish career development skills. Students will directly apply the knowledge they gain to their interactions with Hiring Managers and Recruiters for the purposes of securing an internship.

Calendar copy has been attached to illustrate where this section will be included.

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Dr. Brian Coombes Email: Coombes@mcmaster.ca Extension:22159 Date submitted: February 21, 2017

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	School of Rehabilitation Science
NAME OF PROGRAM and PLAN	Occupational Therapy Program
DEGREE	**MSc (OT)**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☒ Yes ☐ No

CREATION OF NEW MILESTONE ☐					
CHANGE IN ADMISSION REQUIREMENTS	X	**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	
CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR	X	**EXPLAIN:** Changes to graduate calendar to reflect the change in admission requirements.			
OTHER CHANGES		**EXPLAIN:**			

DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:

Currently, the admission requirement states: To be eligible for admission to the M.Sc.(OT) program, applicants must have completed a four-year baccalaureate degree or the equivalent number of courses (120 units/credits) and have achieved a minimum grade-point average of "B" or 75%, or 3.0/4.0 or 8.0/12.0 in their final 60 units of credit. Post-graduate coursework is also considered in this GPA calculation, and calculated on a case-by-case basis.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

We propose raising the minimum GPA requirement from B or 3.0/4.0 to B+ or 3.3/4.0.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

The current minimum GPA of B or 3.0/4.0 is lower than the School of Graduate Studies standard of a B+, and was carried forward from the time when the Occupational Therapy program was offered as an undergraduate rather than graduate degree. Thus, the primary rationale for this change is to align our program expectations with those of other graduate programs. We want applicants to understand that this program has similar expectations and standards as others. In addition, the IQAP reviewers encouraged us to look at data from past years to optimize efficiency of admissions processes for applicants and the program. From our review of data, applicants invited to interview in recent years have had increasing GPAs; applicants with a GPA of less than B+ are unlikely to be invited to interview. We do not want to encourage applicants to incur expenses to apply to the program if there is little chance they will be invited to interview.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

For 2017-2018 graduate calendar for students to be admitted in Sept. 2018.

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

With Track Changes: To be eligible for admission to the M.Sc.(OT) program, applicants must have completed a four-year baccalaureate degree or the equivalent number of courses (120 units/credits) and have achieved a minimum grade-point average of "B+" or 7~~5~~5%, or 3.3~~0~~0/4.0 or ~~8~~9.0/12.0 in their final 60 units of credit. Post-graduate coursework is also considered in this GPA calculation, and calculated on a case-by-case basis.

Final version: To be eligible for admission to the M.Sc.(OT) program, applicants must have completed a four-year baccalaureate degree or the equivalent number of courses (120 units/credits) and have achieved a minimum grade-point average of “B+” or 77%, or 3.3/4.0 or 9.0/12.0 in their final 60 units of credit. Post-graduate coursework is also considered in this GPA calculation, and calculated on a case-by-case basis.
CONTACT INFORMATION FOR THE RECOMMENDED CHANGE: Name: Lori Letts Email: lettsl@mcmaster.ca Extension: 27816 Date submitted:

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University **School of Graduate Studies**

1280 Main Street West
Hamilton, Ontario, Canada
L8S 4L8

Phone 905.525.9140
Ext. 23679
http://graduate.mcmaster.ca

To : Graduate Council

From : Christina Bryce
Assistant Graduate Secretary

At its meetings on November 21st and February 9th the Faculty of Engineering Graduate Curriculum and Policy Committee approved the following recommendations.

Please note that these recommendations were submitted for approval at the February 23rd meeting of the Faculty of Engineering.

For Approval of Graduate Council:

- **Co-op and Work Experience Option***
- **Engineering Physics**
  - **Change to Calendar Copy**
- **Materials Science & Engineering**
  - **Change to Course Requirements and Calendar Copy**
- **School of Engineering Practice and Technology**
  - **Engineering Entrepreneurship and Innovation and Technology Entrepreneurship and Innovation**
    - Change to Course Requirements
    - Change to Program Length
  - **Engineering Design**
    - **Change to Course Requirements**

For Information of Graduate Council:

- **Co-op and Work Experience Option Courses**
  - ENG 701 Work Term Preparation
  - ENG 702 Work Term Placement
- **Chemical Engineering**
  - **Change to Course Title**
    - 765 Multivariate Statistical Methods for Process Analysis and Monitoring
- **Computing and Software**
  - **New Course**
    - 772 Mobile data analytics

- **School of Engineering Practice and Technology**
    - **Engineering Design**
        - **Course Cancellations**
            - SEP 762 Prototyping Tools and Methods
        - **Course Title Change**
            - 6TB3 Biotechnology III/Advanced biotechnology
        - **New Courses**
            - 6BI3 Bioinformatics
            - 6BL3 Biomaterials and Biocompatibility
            - 6BM3 Biopharmaceuticals
            - 6BS3 Biotechnology Regulations
            - 6DA3 Data Analytics and Big Data
            - 6ES3 Real-Time Systems
            - 6PQ3 Power Quality
            - 6SS3 System Specification and Design
            - 757 Hardware Prototyping Tools and Methods
            - 758 Software Prototyping Tools and Methods

*also submitted for approval to the Faculty of Health Sciences

McMaster University

SCHOOL OF GRADUATE STUDIES

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	Faculty of Engineering, all programs except UNENE
NAME OF PROGRAM and PLAN	Coop and work experience option
DEGREE	**PhD, M.A.Sc, M.Eng, M.Sc.**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes ☒ No

CREATION OF NEW MILESTONE ☒

CHANGE IN ADMISSION REQUIREMENTS		**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR		**EXPLAIN:**
OTHER CHANGES		**EXPLAIN:**

DESCRIBE THE <u>EXISTING</u> REQUIREMENT/PROCEDURE:

No existing requirement

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

Details outlined in the attached document.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

The proposed option aligns with recent announcements (News Release, June 23, 2016) by the Ontario government and its highly skilled workforce expert panel (set up December 2015) looking to integrate the education system of Ontario with professional skills development.

As an option under each graduate degree program in the Faculty of Engineering (excluding UNENE and non-participating interdisciplinary graduate programs with which the faculty is involved), this proposal introduces additional program learning outcomes onto each program that may be considered at the time of each program's normal IQAP audit. This document only outlines these additional program learning outcomes that are unlikely to be currently delivered by the programs and does not cover all learning outcomes under each degree program within the faculty to which this option will be offered. The learning outcomes are expected to be the same for both the Coop option and Work Experience option, since the only difference between the two is that the former is more structured in an attempt to comply with Citizenship and Immigration Canada's 'scheduled break' requirement for international students to be allowed to work while as a full time student.

Graduate students completing the Coop or work experience option will:

- Be able to develop a realistic career plan
- Be able to carry out an interview with an expectation of the types of questions given, the level of preparedness necessary, and understand how their mannerisms reflect upon them at that interview
- Be able to draft a professional looking resume
- Be able to identify the professional skills that they can provide to an employer
- Develop a broader set of problem-solving skills to interdisciplinary problems
- Gain increased awareness towards evaluating technology-based business or government opportunities that solve real world problems.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND

POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

Full time graduate students in the Faculty of Engineering can enroll in a paid *Coop* or in a *Work Experience* (non-Coop) option while in their graduate programmes (Master of Engineering, Master of Applied Science, Master of Science and Doctoral degrees). Students enrolled in the Coop version will be required to complete 12 months (Doctoral) or 8 months (Master's) of a paid work experience at an industrial, government or NGO employer and must return to their program for at least one term prior to graduation. The 8- or 12-months *Coop* experience may be acquired through a combination of 4-months scheduled breaks, sequential or not sequential. The *Work Experience* offers flexibility in regards to the duration of the work term and does not require the student to return for one term prior to graduation, though the cumulative work term duration may still not exceed 12 months (Doctoral) or 8 months (Master's). The time that the student is off-campus on an approved coop or work experience will not be counted towards their time-to-degree completion though their term count will continue. Students may not generally switch from the *Coop* option to the *Work Experience* option once they have begun their first work term placement, but under special circumstances may be allowed with the permission of the Coop manager. *Participating in either option will increase the length of the time to degree completion by up to one year and may only be done with the permission of the student's supervisor.*

Students must remain enrolled as full-time students while off-campus at the work placement, enrolled in a zero-credit placeholder course, but will be ineligible to collect any scholarship or stipend from their department/supervisor/university for its duration. No tuition will be collected for the term(s) while on an approved placement but the student will be responsible for normal supplementary fees as well as a 'career training fee', which will normally occur in the terms before a placement.

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Michael Thompson Email: adeangse@mcmaster.ca Extension: 23213 Date submitted: January 11, 2017

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University

NEW OPTION PROPOSAL

Engineering Graduate COOP

July 2016

Revised January 2017

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NEW OPTION PROPOSAL

"Our government believes that all people, regardless of background or circumstance, should have access to effective employment and training programs that give them the skills they need to succeed." Reza Moridi, Ontario Minister of Training, Colleges and Universities (February 2016)

"The problem is not that today's graduates are less skilled than those of previous generations, but that expectations for performance are much higher today than ever before." Oblinger and Verville (What Business Wants from Higher Education. American Council on Education /ORYX, Phoenix, USA 1998)

1 PROGRAM CHANGE

1.1 OPTION DESCRIPTION

Full time graduate students in the Faculty of Engineering can enroll in a paid *Coop* or in a *Work Experience* (non-Coop) option while in their graduate programmes (Master of Engineering, Master of Applied Science, Master of Science and Doctoral degrees). Students enrolled in the Coop version will be required to complete 12 months (Doctoral) or 8 months (Master's) of a paid work experience at an industrial, government or NGO employer and must return to their program for at least one term prior to graduation. The 8- or 12-months *Coop* experience may be acquired through a combination of 4-months scheduled breaks, sequential or not sequential. The *Work Experience* offers flexibility in regards to the duration of the work term and does not require the student to return for one term prior to graduation, though the cumulative work term duration may still not exceed 12 months (Doctoral) or 8 months (Master's). The time that the student is off-campus on an approved coop or work experience will not be counted towards their time-to-degree completion though their term count will continue. Students may not generally switch from the *Coop* option to the *Work Experience* option once they have begun their first work term placement, but under special circumstances may be allowed with the permission of the Coop manager. *Participating in either option will increase the length of the time to degree completion by up to one year and may only be done with the permission of the student's supervisor.*

Students must remain enrolled as full-time students while off-campus at the work placement, enrolled in a zero-credit placeholder course, but will be ineligible to collect any scholarship or stipend from their department/supervisor/university for its duration. No tuition will be collected for the term(s) while on an approved placement but the student will be responsible for normal supplementary fees as well as a 'career training fee', which will normally occur in the terms before a placement, to cover the administration expenses of the office of the Career Development and Relationship Manager (including courses, workshops, one-on-one placement preparation, resume critiques, etc) and access to the OSCAR plus (McMaster's online career portal). There will be no fee related to getting a placement and no promise made of getting a placement.

Each graduate programme in the Faculty of Engineering will include the *Coop* and *Work Experience* option. Enrolled students must complete ENG 701 – 'Work Term Preparation' to go on a work term placement, which is a 1.5-unit extra credit course; this course will not count toward the course requirements of a degree programme. Returning students under the *Coop* option must provide a work term report to fulfill the milestone on the transcript.

Neither *Coop* nor *Work Experience* option constitutes a curriculum requirement for any degree programme. Students may enter the Coop option at any time up to what would normally be the last term of their degree program. International students must consult with Citizenship and Immigration Canada and their own consulate about visa requirements for a Coop work visa.

1.2 PROPOSAL PREPARATION AND CONSULTATION PROCESS

1.3 CONSISTENCY WITH MCMASTER'S MISSION AND ACADEMIC PLAN

i. McMaster's Strategic Mandate Agreement:

Being an option under existing degree programs within the Faculty of Engineering, applying to the School of Engineering and Applied Science (SEAS) and School of Engineering Practice and Technology (SEPT), the proposal corresponds to the SMA identified institutional strengths of *Engineering and sustainability, Digital economy, and Materials and manufacturing – from technology to policy*. In all cases, the option is envisioned to strengthen the excellence of our research by introducing a broader set of experiential learning experiences into our curricula and offering closer ties with the social and technological communities that utilize our research. By providing the Coop and Work Experience options, we support the priorities of McMaster to strengthen graduate education and training in Engineering, seeking to realize graduates with complementary skills related to their field of study and their future careers.

ii. McMaster's current priorities:

The proposal aligns closely with the intent of *Forward with Integrity*, by supporting broader experiential learning in an interdisciplinary environment, reaching out into our respective communities to translate skills and knowledge learned from courses and research activities into practice, bringing new ideas and practices back from the workplace into our research mission, and ensuring that our internationally diverse population of graduate students each are given the opportunity to grow their professional skills. This latter point is important to stress, as the reasons for developing this option are weaker without the consideration that it gives our international graduate students the same opportunities to prepare for their future careers in Engineering along side of our domestic students. The scheduled break that this option creates in our curricula, particularly following the Coop stream, should allow international students to stand along with our domestic students in seeking work placement without concerns for visa restrictions.

The priorities of *Forward with Integrity* outline a mission by McMaster's administration to take new knowledge out to the community, whether regionally or globally, and likewise, bring new approaches and needs back to the university to add relevance

and vigor into our research. Placing graduate students, who have developed specialized analytical and knowledge capabilities while engaged in their studies, into industrial, government or NGO environments supports this knowledge translation. These graduate students have honed their research skills through working in Engineering's labs, offering companies skill sets not found in undergraduate Coop programs. In fact, we expect the job placements will be unique for the graduate students, not impacting our undergraduate Coop program. The interdisciplinary environment of most job placements will enrich our students, challenging their capabilities in a new way compared to their research at the university, resulting a more mature, and more broadly capable individual returning to McMaster to complete their studies. Since it is reasonable to believe that a graduate student, having such specialized skill sets built up through their studies, will only seek placement opportunities that fit within their career trajectory, it should be expected that the new knowledge gained out on the job placement will be beneficial to the ongoing studies to which they return. As a result, the research programs in Engineering gain improved relevance, new sets of practices, and potentially new collaborators along with the return of our graduate students.

1.4 OPTION LEARNING OUTCOMES

As an option under each graduate degree program in the Faculty of Engineering (excluding UNENE and non-participating interdisciplinary graduate programs with which the faculty is involved but not hosting), this proposal introduces additional program learning outcomes onto each program that may be considered at the time of each program's normal IQAP audit. This document only outlines these additional program learning outcomes that are unlikely to be currently delivered by the programs and does not cover all learning outcomes under each degree program within the faculty to which this option will be offered. The learning outcomes are expected to be the same for both the Coop option and Work Experience option, since the only difference between the two is that the former is more structured in an attempt to comply with Citizenship and Immigration Canada's 'scheduled break' requirement for international students to be allowed to work while as a full time student.

Graduate students completing the Coop or work experience option will:

- Be able to develop a realistic career plan
- Be able to carry out an interview with an expectation of the types of questions given, the level of preparedness necessary, and understand how their mannerisms reflect upon them at that interview
- Be able to draft a professional looking resume
- Be able to identify the professional skills that they can provide to an employer
- Develop a broader set of problem-solving skills to interdisciplinary problems
- Gain increased awareness towards evaluating technology-based business or government opportunities that solve real world problems.

1.5 CONSISTENCY WITH DEGREE LEVEL EXPECTATIONS

This section maps the specific program learning outcomes listed in Section 1.4 against required Degree Level Expectations for Graduate Students, without differentiation of Doctoral and Masters candidates.

Completion of the Coop or Work Experience will…	Degree Level Expectations	Teaching Activities and Learning Opportunities	Assessment and Evidence
Be able to develop a realistic career plan	• Application of Knowledge • Awareness of Limits of Knowledge • Communication Skills	• Engineering Career Planning milestone • Job placement	
Be able to carry out an interview with an expectation of the types of questions given, the level of preparedness necessary, and understand how their mannerisms reflect upon them at that interview	• Research and Scholarship • Communication Skills • Awareness of Limits of Knowledge	• ENG 701 – 'Work Term Preparation' • Mock interview by Career Development and Relationship Manager • Company interview	Oral defense of program thesis or project requirement
Be able to draft a professional looking resume	• Application of Knowledge • Awareness of Limits of Knowledge • Communication Skills	• ENG 701 – 'Work Term Preparation'	
Be able to identify the professional skills that they can provide to an employer	• Communication Skills • Autonomy and Professional Capacity • Application of Knowledge	• ENG 701 – 'Work Term Preparation' • Job placement •	• Work term report for Coop option
Develop a broader set of problem-solving skills to interdisciplinary problems	• Depth and Breadth of Knowledge • Research and Scholarship • Application of Knowledge • Awareness of Limits of Knowledge	• Job placement	• Work term report for Coop option • Program thesis or project defense
Gain increased awareness towards evaluating technology-based business or government opportunities that solve real world problems.	• Research and Scholarship • Awareness of Limits of Knowledge • Autonomy and Professional Capacity	• Job placement • Work term report	

1.6 DEMAND FOR PROGRAM

I. EVIDENCE OF SOCIETAL/LABOUR MARKET NEED

The proposed option aligns with recent announcements (News Release, June 23, 2016) by the Ontario government and its highly skilled workforce expert panel (set up December 2015) looking to integrate the education system of Ontario with professional skills development. The six main areas of the report's recommendations are:

- **Building stronger partnerships between educators and employers**
- **Increasing access to job market information**
- **Expanding opportunities for learning by experience** (corresponding to direct funding of student placements)
- **Promoting both traditional and non-traditional career paths**
- **Investing in human capital**
- **Closing gaps in skills and competencies**

McMaster is demonstrating its educational leadership in Ontario by implementing this proposed work placement option in support of the goals of our provincial government, following the example of the University of Victoria which pioneered this concept of a flexible 'opt-in' job placement option that was not a program requirement for degree completions. At the University of Victoria, there are currently over 400 (out of 3400) graduate students going out on work placements per term, by either following a Coop model compliant with CAFCE (Canadian Association For Co-operative Education) or Graduate Work Experience Program, which offers more flexibility as the student can join or leave the option without an requirements or returning for a specific time frame afterwards.

Since the Faculty of Engineering hired its Career Development and Relationship Manager, in August 2015, as a leader for developing professional skills within our graduate population, 214 companies have expressed interest in participating in our work placement plan of which 47 companies have provided actual postings. Of the 47 employers who have provided opportunities, 44 are based in Canada and 3 in the United States. On a pilot scale, 3 students have gone out on a work placement with the assistance and mentorship of the Career Development and Relationship Manager; the Career Development and Relationship Manager is interchangeably referred to as the Coop manager in this proposal.

II. EVIDENCE OF STUDENT DEMAND

There is significant – nearly unanimous – demand among our graduate student population for access to career development experiences and services. As evidence of the demand for services, between August 2015 and August 2016 the Career Development and Relationship Manager has held 316 career services meetings with 141 individual students - an average of 29 meetings per month. These individual meetings typically consist of

resume/cover letter critiques, career path planning, skills assessment, job search strategies, developing networking and interviewing skills, job offer negotiation strategies, and work place professionalism. In addition to these meetings, the Career Development and Relationship Manager has delivered a job search strategies workshop in December 2015 resulting in 45 registered students and a resume/cover letter writing workshop in July 2016 resulting in 46 registered students.

Student demand for work placement experiences has been qualified by two recent surveys. In September 2015, the Career Development and Relationship Manager, with assistance from the Engineering Graduate Society, conducted a survey of all engineering graduate students using the Survey Monkey platform. The following question was asked, "If it were offered, would participation in a co-op/work experience program be of interest to you?" There were 100 responses with 87% of respondents indicating they *would* be interested, 4% indicating they wouldn't be interested, and 9% indicating they didn't know. This survey was updating data from a previous survey conducted in December 2014 by Jeff Ollinger, the former manager of Engineering Co-op and Career Services (ECCS), which received a similar result – 85% of the 80 respondents indicated they would be interested in a graduate level coop/internship program. The second recent survey was conducted by the Engineering Graduate Society, a student-elected body that is a formally recognized society within the faculty. Their survey asked students, "Would you be interested in having the OPTION of coop/work placements during your degree program?" 100% of the 62 respondents indicated they *would* be interested in having the option. 58.1% of the respondents were international students and 41.9% were domestic students. The survey also indicates male (58.1%) and female (41.9%) students are interested in having the option of a coop/work term program while they pursue their degree.

These surveys illustrate there is interest from across the graduate student population for a co-op/work experience option and participation would occur.

III. JUSTIFIABLE DUPLICATION

The only other program known of this type in Canada is at the University of Victoria. Simon Fraser University has some aspects of this structured/flexible work placement as an option but it does not appear as broadly delivered. There is currently no such option in Ontario. The distance between the two institutions negate too much overlap in companies participating, however, based on the density of undergraduate Coop programs across our province, each reporting high placement statistics, there should be no concerns for duplication in Ontario, even when other universities in the province decide to follow suit.

Our experience over the past year with approaching companies suggests that the majority of the opportunities they offer for posting are specific to graduate students. They will often indicate that they do not wish the posting to show for undergraduate students. We have had interest from major companies like Apple, Google, IBM, for example, that are very specific in this regards. Only a small percentage (12%) have been placements that would accept both undergraduate and graduate student applicants. As a result, we believe we are collecting mostly new placement opportunities for our graduate students and thus, this new option is not expected to impact our undergraduate Coop program.

1.7 DEGREE NOMENCLATURE

No degree nomenclature comes from participating in either the Coop or Work Experience options. Upon completion of either, notifying the Career Development and Relationship Manager for Engineering will initiate a milestone report being sent to the School of Graduate Studies. A transcript notation will acknowledge completion of either the Coop or Work Experience option.

2 ADMISSION & ENROLMENT

2.1 ADMISSION REQUIREMENTS

Participation in this option will require the permission of the student's supervisory committee or in the case of the Professional Masters programs, the permission of the faculty advisor. Participants will be enrolled as full-time students in an Engineering graduate degree program (excluding UNENE or non-participating interdisciplinary programs*) and be in good standing. Students who are having difficulties with progress in their course/thesis projects, are over-time in status, or otherwise deemed to not be in good standing by the department, should not be allowed to participate. *No student may begin a work placement experience* ***for the first year of their program****, in order for them to complete the majority of their course load and to give supervisors the chance to evaluate the progress of the student, ensuring the work experience will not impede timely completion of the student's degree requirements.*

There will be no grade requirement and no work experience requirement to participate in the program, though the student must be considered to be in *good standing* with their department.

Participants in the program will enroll through their department with the Career Development and Relationship Manager for Engineering. The student will then be allowed to enroll in ENG 701 – 'Work Term Preparation' and required to pay the option's fees. The *career training* fee will cover the administration expenses of the office of the Career Development and Relationship Manager (including courses, workshops, one-on-one placement preparation, resume critiques, etc) and access to the OSCAR plus (McMaster's online career portal). The fee is not related to actual placement at a company and there will be no promise of a placement made by paying this fee nor will this fee be waived if the student choses to use the offered services but elects to not go on a Coop or work experience.

2.2 ENROLMENT PLANNING AND ALLOCATIONS

Program Year	2018	2019	2020	**Maturity**
Masters, Thesis	15	30	35	35
Masters, Professional	5	10	15	15
Doctoral	20	40	50	50
Total Enrolment	40	80	100	100

With projected graduate student enrollment of 800 by 2018-2020, the planned numbers above indicate that we expect 12% of the population to participate in this option. Furthermore, our experience so far has shown that doctoral candidates are more likely to feel they have time to pursue a work placement opportunity than Masters, and among the Masters it is more likely that a candidate in a thesis-based program will pursue a placement compared to one in a professional-based program. The course load and duration of the program appears to impact the perception of the student on whether they feel they have the time for a placement opportunity.

2.3 ALTERNATIVE REQUIREMENTS

No alternatives are foreseen. The authority of the supervisory committee or department must not be undermined by alternatives, lest the applied research to which the student is contributing be jeopardized.

3 STRUCTURE

3.1 ADMINISTRATIVE, GOVERNANCE AND COMMUNICATION

The administration of this option will be the responsibility of the Associate Dean of Graduate Studies for the faculty. Its operation will be overseen by the Career Development and Relationship Manager, who reports to the Director of Outreach and the Associate Dean.

The Career Development and Relationship Manager is responsible for communication with companies, collection of posts, setting up posting in our online career services website (OSCAR Plus), scheduling professional skills workshops, assisting students with resume and interview preparation, and occasionally visiting companies while students are there on a job placement. On occasions, we have found that this person will also generate job placements for the undergraduate students, or find a research collaboration.

Notification of job postings, interview scheduling with companies, scheduling of ENG 701 and extra workshops will be done through a module of OSCAR plus set up exclusively for the graduate students of Engineering. Additional notification of urgent postings and the extra workshops will be done through the Engineering Graduate Society (EGS) website and through departmental communications.

3.2 STRUCTURE AND REGULATION

The coop option will be structured to follow most of the guidelines set out by the Canadian Association for Co-Operative Education (CAFCE), but is not intended to be fully compliant in the same manner that our current undergraduate Coop program is not fully compliant. The guidelines that we are compliant on include:

- A student will work a minimum of 35 hours per week for the duration of the work term.
- The student's time spent in work terms must be no less than 30% of the time spent in academic study. For example, a four-year program with 8 academic terms requires a cumulative work period of 12 months. For programs of two years or less the total amount may be a minimum of 25%.
- The coop option will align to academic terms, starting at the start of a term and finishing at the end of either the same term or a later term.
- A work term will consist of a minimum of 12 weeks.
- Students will be remunerated by the employer while on a work term.
- Students will submit a formal work term report to be reviewed by the Career Development and Relationship Manager.
- Students will not be registered as taking courses full time during a work term, with the exception of the placeholder course.

Similar to the Faculty of Engineering's undergrad coop program, the graduate coop option intends to follow most of the guidelines set out by CAFCE; however, will not be seeking accreditation at this time. By not seeking accreditation, Masters and PhD students participating in the graduate Coop option will be allowed to complete a consecutive 8- or 12-month work term, respectively. This continuity has been a recurring request from employers interested in hiring engineering graduate students.

Additionally, the coop option attempts meet the guidelines set out by Citizenship and Immigration Canada (CIC) for international students interested in Coop opportunities, but acknowledges that only CIC determines eligibility and they may change these guidelines without consultation and so international students are always advised to consult with the CIC before participating. These guidelines include:

- A student must hold a valid study permit.
- The student's intended employment must be an essential part of their program of study in Canada.
- The employment must be a part their academic program offered by a designation learning institution as well as certified by a letter from a responsible academic official of the institution.
- The coop or internship employment cannot form more than 50% of the total program of study.

The coop option will be the only eligible pathway for international students to participate in a work term without jeopardising their study permit. Ideally, interested international students apply for the coop work visa at the time of

electing the option, and wait on that visa being processed while completing the coursework involved.

3.3 GRADUATE PROGRAMS - PROGRAM LENGTH

Not specifically relevant. This option operates under the existing degree programs. The length of the existing programs will be increased by up to 8 months for Masters and up to 12 months for doctoral degrees. The time that the student is off-campus on an approved coop or work experience will not be counted towards their time-to-degree completion, though their term count will continue. This means that the 'in-time' term count will be extended corresponding to the duration of the work placement. This extension of the term count does not correspondingly necessitate any extension in the duration of funding support by scholarship, stipend, or teaching assistantship. Students are required to negotiate any requested extension of funding support with their department and supervisor prior to going on a work placement.

Under the Coop option the student must return for one additional term, likely used to defend their thesis.

4 CURRICULUM AND TEACHING

4.1 PROGRAM CONTENT

The option will involve:

- ENG 701 – 'Work Term Preparation'. This 1.5-unit extra credit course may not be counted towards degree requirements. Delivery by staff in Engineering. It must be taken before a student goes on a Coop placement and ideally, should be taken before going on a Work Experience (though special tutor sessions may be requested if timing of the course does not work for the student under this more flexible option). Course content includes writing an effective resume/cover letter, job search strategies, interview skills, negotiating skills, and workplace professionalism. Evaluation is based on participating on Pass/Incomplete basis.
- ENG 702 – 'Work Term Placement'. This is a 0-unit extra credit course which registers the job placement (name of company, duration of placement). This course will appear on the transcript in order to document the work term.
- Work term report. Participants in the Coop option must provide a work term report at the end of their placement. The work term report will be reviewed by the Career Development and Relationship Manager before a milestone report form is submitted to the School of Graduate Studies as an indication of completing the Coop. Students on the Work Experience option may notify the Career Development and Relationship Manager upon completion of their placement if they wish a milestone notation on their transcript.

4.2 INNOVATION

The innovation of this option is that it is not a degree requirement but rather an enhancement to existing programs for which graduate students may choose to participate or not. It is very common to see Coop or work placement programs in undergraduate degrees nowadays and not uncommon to find specific graduate programs, often

professional, that require a placement in order to complete the degree. However, it is quite rare that graduate students, especially doctoral candidates are given the opportunity to elect to enhance their employment skills in order to be career ready upon degree completion. Doctoral candidates are generally trained for academia as a career, but recent conversations among graduate studies faculty and their related associations (for example, "Doctoral Studies and Reality: A Deepening Gap", Canadian Association of Graduate Studies – CAGS – annual conference 2015; Calgary, AB) have highlighted that few PhDs go on to this vocation and that universities bear a responsibility to offer better career preparation to the majority. According to a 2016 survey (Jonker, L. (2016). Ontario's PhD Graduates from 2009: Where are they now? Toronto: Higher Education Quality Council of Ontario.) "just under 30% of Ontario's PhD graduates from 2009 are full-time tenure or tenure-track professors at a university"; specific to Engineering PhD graduates, this number is closer to 25%. More than 35% of Ontario's graduating PhDs go on to industry as a career, according to that survey; for Engineering this number is much higher at nearly 50%. Across Canada, only 18% of graduating PhDs work as professors, with a total of 39% having some job in post secondary education and the remainder working in industry or government (*Inside and Outside the Academy: Valuing and Preparing PhDs for Careers, The Conference Board of Canada, November 24, 2015*). In fact, these results are higher than US statistics where only 26% of graduating PhDs from Engineering work in post secondary education (National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2013). While debate rages over the accuracy of these numbers, the overall message is that more PhDs go on to work outside of academia than stay in academia, and we want to introduce more professional skills initiatives to foster the development of more workplace 'savvy' graduates.

It should be stressed that this is a new concept for Ontario's graduate education curricula but not new to Canada. The University of Victoria (UoV) was the innovator of the program as far as we understand and we are modeling ourselves after their success. Simon Fraser University has a flexible Coop/work experience as well, but it seems to only be delivered by certain programs whereas UoV's approach is campus wide. In fact, we have consulted quite extensively with UoV and Citizenship and Immigration Canada on the implementation of what is proposed in our program. However, since our labour markets are largely different between British Columbia and Ontario, we feel there is ample differentiation for both options to exist and probably from our neighbouring institutions should they wish to build similar options as well.

4.3 MODE(S) OF DELIVERY

The course, ENG 701 will be delivered in a workshop style, providing modules over the course of a term – each term. The course will feature classroom activities and lectures, coupled with take-home 'assignments' such as resume writing or practicing ones' interview.

Supplementary material will be found in a collection of five online modules being created for the faculty to introduce engineering graduate students to professional skills development with very engineering-specific content as well as the more discipline-independent online resource, www.mygradskills.ca.

The work placement, similar to a practicum in some professional degrees, provides a paid work experience where students can apply their learned research skills from their thesis project and acquire new skills related to the interdisciplinary environment of most work places.

The work term report (for the Coop option) will require self-reflection upon the skills learned through the course and job placement.

4.4 EXPERIENTIAL LEARNING

The option is considered to be 100% experiential learning. The course ENG 701 will provide a practice environment to graduate students preparing their resume and interview skills for job placement, and receiving experienced feedback. The job placement will require students to display their research skills, address deficiencies in those skills and learn new skills related to its interdisciplinary environment.

4.5 ACCESSIBILITY

The components of this option conducted at the university will be compliant with our own student accessibility policies; however, we offer no guarantee of a placement. Potential employers are expected only to be compliant with the provincial Ministry of Labour and federal statues on labour. We will monitor our students out on placements and reject further postings by companies who exhibit non-compliance with Canada's labour policies.

4.6 RESEARCH REQUIREMENTS (IF APPLICABLE)

Not applicable

5 ASSESSMENT OF LEARNING

5.1 METHODS FOR ASSESSING STUDENTS

Assessment for the course ENG 701 is based solely on participation. Students not participating in the course will not be permitted to go out on a Coop placement and strongly urged to not go out on a work experience placement. Grading will either be PASS or Incomplete.

Completion of the Coop program will be based on submission of a work term report to the Career Development and Relationship Manager, who will review the report for completeness and submit a milestone completion form to the School of Graduate Studies.

5.2 CURRICULUM MAP

As this option may be undertaken at any time while the student is full-time in an Engineering graduate program, a specific map can not be provided. The typical steps to this program will be:

1. Decision to seek a job placement based on the Coop or Work experience options and seeking the permission of their supervisory committee and department. Must be in good standing and have completed one full year of the program requirements so that the supervisory committee can assess progress.
2. Admission in ENG 701, paying the service fee for the workshops and placement assistance, and getting access to the graduate OSCAR plus employment tool.

3. Completion of ENG 701, obtaining necessary visas, and searching job postings in OSCAR plus.
4. Upon receipt of a job offer, enroll in ENG 702, and notify the School of Graduate Studies by completion of a full-time off-campus form of its duration and completing RMM #801 Field Trip and Elective Planning and Approval Program forms. The duration may not exceed 8-months for a Masters or 12-months for a doctoral program. The student's RA stipend and TA will be suspended until the student returns from the placement. No tuition will be charged while on an approved work placement; however, annual supplementary fees will still be charged.
5. Midway through the job placement, the student will be contacted by the Career Development and Relationship Manager and a site visit may be arranged for an update on the job experience, and to be reminded of deliverables required upon return (if any).
6. Upon return, students under the Coop option will provide a work term report to the Career Development and Relationship Manager. They must be enrolled for at least one additional term before graduation under the Coop option. Students under the Work Experience program may notify the Career Development and Relationship Manager if they wish a milestone notation on their transcript.

5.3 DEMONSTRATING STUDENT ACHIEVEMENT

Success of learning from the course ENG 701 will be evident through the deliverables of a professional style resume, critiqued mock interview, and class participation in communication exercises. Presumably, obtaining a job placement is further evidence that the learning objectives of the course were achieved.

Evidence that the learning objectives of the job placement were achieved will be provided by the work term report (Coop option) or by the confidence and preparedness of the student at their thesis defence (Coop/Work Experience options).

6 RESOURCES

6.1 GRADUATE PROGRAMS

6.1.1 ADMINISTRATIVE, PHYSICAL AND FINANCIAL RESOURCES

The option will be administratively overseen by the Career Development and Relationship Manager. The Career Development and Relationship Manager may receive support from the Engineering Coop and Career Services staff but only on an over-load basis.

Workshop room bookings will be managed through Engineering's THE HUB, being made by the Career Development and Relationship Manager.

Students will be expected to pay coop fees. Supplementary fees will still be required to be paid on a yearly basis and will not be discounted by going on a work placement. The coop fees will be further broken down into a fee for the course, and a fee for the use of services. Students going on multiple placements or needing access to career development services longer than a term may be charged the service fee again. The fee

is not related to successfully obtaining a job placement.

6.1.2 LIBRARY, TECHNOLOGY, AND LABORATORY RESOURCES

Students will require access to a graduate specific OSCAR plus module to search job postings, schedule interviews and see when course workshops are being given.

6.1.3 FACULTY

None

6.1.4 STUDENT FINANCIAL SUPPORT

No support will be provided by the university or faculty while the student is on a job placement. All job placements are expected to be paid and at a reasonable market rate consistent with the skills being provided. The student will not be required to pay tuition will on an approved placement but will be required to pay yearly supplementary fees as normal.

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	Engineering Physics
NAME OF PROGRAM and PLAN	N/A
DEGREE	**M.A.Sc. MEng, PhD**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes ☒ No

CREATION OF NEW MILESTONE ☐					
CHANGE IN ADMISSION REQUIREMENTS		**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	
CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR	yes	**EXPLAIN:** add a specialization on Biomedical Engineering, and change the calendar copy accordingly			
OTHER CHANGES		**EXPLAIN:**			

DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:

The Department of Engineering Physics offers programs of study leading to the M.A.Sc., M.Eng. and Ph.D. degrees in Engineering Physics. Areas of specialization include Photonics Engineering and Nuclear Engineering.

The department conducts research in three designated fields:

Photonics
Nano- and Micro-Device Engineering
Nuclear Engineering and Energy Systems

Photonics research activities comprise a broad range of efforts in optoelectronic devices, materials processing, and laser physics and applications. Specific topics include, for example, semiconductor lasers, photo detectors, biosensor development, ultrafast phenomena and processes, display devices, planar light wave structures, nonlinear photonic devices, and optical fiber technologies. Traditionally the department has been strongly focused on III-V semiconductors, but more recently have broadened the scope to research in silicon photonics. Overall the efforts in photonics interface closely with the work in nano- and micro- devices, and in addition link with new directions in energy systems.

Nano- and Micro-Device Engineering is based on a number of materials fabrication technologies, including molecular beam epitaxy (MBE), thin film deposition, plasma processing, and laser machining. The research is aimed at the development of devices for deployment in a number of industrial and medical sectors. The study of fundamental systems is often conducted in parallel with the engineering of targeted devices. Examples of research topics in this area include MEMS (Micro-Electro-Mechanical Systems), high temperature superconductors, microfluidics, defect spectroscopy, low dimensional quantum structures, and biological systems.

Nuclear Engineering and Energy Systems cover a wide range of areas related to long term sustainable energy including nuclear power and alternative energy sources. The specific research areas include nuclear reactor physics, plant thermalhydraulics, critical heat flux, post-dryout heat transfer and rewetting mechanisms, reactor simulations and probabilistic methods, safety system performance, nuclear instrumentation, generation IV reactor designs, fusion technology, and photovoltaics. In addition to the facilities within Engineering Physics, there are opportunities for collaboration with other McMaster Engineering Departments in the areas of wind energy, fuel cells, and pollution control technologies. The NSERC/UNENE Chair and Associate Chair in Nuclear Safety Analysis are also located at McMaster University.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE ***(Attach additional pages if space is not sufficient.)***

- Add Biomedical Engineering into the calendar;
- Re-word the calendar accordingly.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

Add Biomedical Engineering into the calendar to reflect the research area of some faculty members at the department.

PROVIDE IMPLEMENTATION DATE: ***(Implementation date should be at the beginning of the academic year)***

Effect immediately after the approval of GCPC committee.

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

The Department of Engineering Physics offers programs of study leading to the M.A.Sc., M.Eng. and Ph.D. degrees in Engineering Physics. Areas of specialization include Photonics Engineering, Nano- and Micro-device Engineering, Nuclear and Energy Systems Engineering, and Biomedical Engineering.

The department conducts research in four designated fields:

Photonics Engineering
Nano- and Micro-Device Engineering
Nuclear Engineering and Energy Systems Engineering

Biomedical Engineering

Photonics research activities comprise a broad range of efforts in optoelectronic devices, materials processing, and laser physics and applications. Specific topics include, for example, semiconductor lasers, photo detectors, biosensor development, ultrafast phenomena and processes, display devices, planar light wave structures, nonlinear photonic devices, and optical fiber technologies. Traditionally the department has been strongly focused on III-V semiconductors, but more recently have broadened the

scope to research in silicon photonics. Overall the efforts in photonics interface closely with the work in nano- and micro- devices, and in addition link with new directions in energy systems.

Nano- and Micro-Device Engineering is based on a number of materials fabrication technologies, including molecular beam epitaxy (MBE), thin film deposition, plasma processing, and laser machining. The research is aimed at the development of devices for deployment in a number of industrial and medical sectors. The study of fundamental systems is often conducted in parallel with the engineering of targeted devices. Examples of research topics in this area include MEMS (Micro-Electro-Mechanical Systems), high temperature superconductors, microfluidics, defect spectroscopy, low dimensional quantum structures, and biological systems.

Nuclear Engineering and Energy Systems cover a wide range of areas related to long term sustainable energy including nuclear power and alternative energy sources. The specific research areas include nuclear reactor physics, plant thermalhydraulics, critical heat flux, post-dryout heat transfer and rewetting mechanisms, reactor simulations and probabilistic methods, safety system performance, nuclear instrumentation, generation IV reactor designs, fusion technology, and photovoltaics. In addition to the facilities within Engineering Physics, there are opportunities for collaboration with other McMaster Engineering Departments in the areas of wind energy, fuel cells, and pollution control technologies. The NSERC/UNENE Chair and Associate Chair in Nuclear Safety Analysis are also located at McMaster University.

Biomedical Engineering reflects our department's specializations on biophotonics and biosensors. Biophotonics is the development of photonics technologies, particularly imaging, to the applications in life sciences and medicine. For example, advanced optical microscopy technologies can be developed for drug discovery, precision medicine, and in situ diagnosis applications; miniaturized optical spectroscopy and imaging sensors can be integrated into wearable devices monitoring pulse rate and blood oxygenation. In addition to photonics, we are using electronics to detect the presence and quantity of specific analytes present at biofunctional surfaces. Integrating electronic circuits with biorecognition layers enables biologically-relevant analytes to be analyzed for the purpose of managing diseases and monitoring health. Furthermore, researchers in our department are actively involved in using methods based on electromagnetics to process biologically-relevant samples, for example extracting and enriching nucleic acids and proteins present in biological fluidics.

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Chang-qing Xu Email: cqxu@mcmaster.ca

Extension: 24314 Date submitted: Dec.5, 2016

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

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2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	Materials Science and Engineering
NAME OF PROGRAM and PLAN	Materials Engineering, Ph.D
DEGREE	**Ph.D.**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ ~~Yes~~ ☐ No

CREATION OF NEW MILESTONE ☐

CHANGE IN ADMISSION REQUIREMENTS	no	**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**	no	**CHANGE IN COURSE REQUIREMENTS**	yes

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR	Requirements	**EXPLAIN:** Lowering the course load from 24 units (8 half-courses) down to 12 units (4 half-courses). The course work must include: 3 Units MATLS 702 (graduate seminar) 6 Units Technical electives at the 700 level. The remaining 3 units can either be technical courses at the 600 level or non-technical course at the 700 level.

OTHER CHANGES	n/a	**EXPLAIN:**

DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:

All PhD students should complete 24 units of the course work (8 half-courses), of which 3 units (half course) could be at the 600-level and 3 units (half course) could be non-technical electives at the level of 700. The MATLS 702 (seminar half-course) is required. (Please see an attached table with the summary of requirements.)

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

It is proposed to lower the course load down to 12 units (4 half-courses). Of these 3 units must be MATLS 702 (Graduate Seminar) and an additional 6 units must be technical electives at the 700 level. Students will still be allowed to take 600 level courses and non-technical 700 level courses. Note, however, that the seminar and required technical 700 level courses add up to 9 units. This means that a student can either take one 600-level half course OR one non-technical elective 700-level course. The requirements apply to all PhD students, irrespective of whether they have Master degree or not, including students transferred directly into PhD from Master. (Please see the attached table with the summary of requirements.)

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

We are trying to address two recurring criticisms of our program as part of our effort to demonstrate continuous improvement ahead of the IQAP review. The first criticism is that the Department does not offer enough courses for students to complete the 24 unit requirement. As a result students often take many courses that are very far from their areas of expertise and this consumes a lot of their time. This leads to the next criticism which relates to the average time for the completion of the degrees. The heavy course requirement (24 units) has resulted in many students going overtime. The changes will bring the course load in accord with the standards for most PhD programs in Engineering at leading academic institutions.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

n/a

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

Please see the edited version of the calendar description with changes highlighted.

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Oleg Rubel Email: rubelo@mcmatser.ca Extension: 24094 Date submitted: Nov 7, 2016

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

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3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	Materials Science and Engineering
NAME OF PROGRAM and PLAN	Materials Science, Ph.D
DEGREE	**Ph.D.**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ ~~Yes~~ ☐ No

CREATION OF NEW MILESTONE ☐

CHANGE IN ADMISSION REQUIREMENTS	no	**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**	no	**CHANGE IN COURSE REQUIREMENTS**	yes

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR	Requirements	**EXPLAIN:** Lowering the course load from 24 units (8 half-courses) down to 12 units (4 half-courses). The course work must include: 3 Units MATLS 702 (graduate seminar) 6 Units Technical electives at the 700 level. The remaining 3 units can either be technical courses at the 600 level or non-technical course at the 700 level.

OTHER CHANGES	n/a	**EXPLAIN:**

DESCRIBE THE <u>EXISTING</u> REQUIREMENT/PROCEDURE:

All PhD students should complete 24 units of the course work (8 half-courses), of which 3 units (half course) could be at the 600-level and 3 units (half course) could be non-technical electives at the level of 700. The MATLS 702 (seminar half-course) is required. (Please see an attached table with the summary of requirements.)

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

It is proposed to lower the course load down to 12 units (4 half-courses). Of these 3 units must be MATLS 702 (Graduate Seminar) and an additional 6 units must be technical electives at the 700 level. Students will still be allowed to take 600 level courses and non-technical 700 level courses. Note, however, that the seminar and required technical 700 level courses add up to 9 units. This means that a student can either take one 600-level half course OR one non-technical elective 700-level course. The requirements apply to all PhD students, irrespective of whether they have Master degree or not, including students transferred directly into PhD from Master. Please see the attached table with the summary of requirements.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

We are trying to address two recurring criticisms of our program as part of our effort to demonstrate continuous improvement ahead of the IQAP review. The first criticism is that the Department does not offer enough courses for students to complete the 24 unit requirement. As a result students often take many courses that are very far from their areas of expertise and this consumes a lot of their time. This leads to the next criticism which relates to the average time for the completion of the degrees. The heavy course requirement (24 units) has resulted in many students going overtime. The changes will bring the course load in accord with the standards for most PhD programs in Engineering at leading academic institutions.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

n/a

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

Please see the edited version of the calendar description with changes highlighted.

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Oleg Rubel Email: rubelo@mcmatser.ca Extension: 24094 Date submitted: Nov 7, 2016

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

Materials Engineering, Ph.D

Print this Page

Requirements

Students entering the Ph.D. program in Materials Engineering directly with a Bachelor's degree are required to successfully complete at least ~~24~~ 12 units (~~8~~ 4 half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students entering the Ph.D. program in Materials Engineering with a Master's degree are required to successfully complete at least ~~24~~ 12 units (~~8~~ 4 half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students transferred to the Ph.D. program in Materials Engineering from the Master's program are required to successfully complete at least ~~24~~ 12 units (48 half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students are encouraged to consult with their Supervisor to ~~to~~ select some of their courses from areas beyond the focus of their research, including courses offered by other Departments. For courses to be taken for credit outside of the Department but within the Faculties of Engineering, Science and Health Science, written approval from the Supervisor is required. Any other courses

for credit require approval from the Associate Dean Graduate Studies (Engineering).

Students are also required to complete a career planning exercise within the first three terms (12 months) of full time study. Students will participate in a planning session with a career specialist within the Faculty and subsequently produce (at most) a two-page report before completion of the first three terms (12 months) of full time study. The report must be submitted to the Associate Chair (Graduate). Students transferring to the Ph.D. program are except from this requirement since they previously submitted such a report while enrolled in the Master's program.

Research Proposal Examination

Students entering the Department's Ph.D. program in Materials Engineering with either a Bachelor's or Master's degree must submit a written Research Proposal for their research program and complete (pass) the associated oral exam after the completion of three terms (12 months), but no more than four terms (16 months). Their Supervisory Committee, augmented by two other members, will give a critical review and examine the student on the content contained in or related to the Research Proposal during the oral exam.

Comprehensive Examination

Students enrolled in the Ph.D. program in Materials Engineering are required to successfully complete (pass) the Comprehensive Examination. The oral exam, which consists of two parts, is meant to ensure that students have a broad understanding of the foundations of the Materials Science and Engineering discipline.

The Part I oral exam covers, at the undergraduate level, topics central to the Materials Science and Engineering discipline. Topics have been divided into core areas that all students are responsible for and into elective areas so that students may choose an area of specialization. The Part I oral exam must be successfully completed prior to the completion of two terms (8 months) of full time study.

The Part II oral exam tests the student's knowledge of three topics related to the research at an advanced level. Students are expected to show the greatest depth of knowledge in their field of research, but also be expected to demonstrate knowledge of fields related to their areas of specialization. The Part II oral exam must be completed within 24 months (two years) of entry into the a Ph.D. program.

Thesis

Students are required to submit a thesis that which embodies the results of original research and to defend the thesis in the Final Oral Examination.

Industrial Ph.D. Option

The general Regulations for the degree Doctor of Philosophy appear earlier in the Calendar. This program option offers the candidate the potential to conduct all or a portion of their research at their company or research institute of employment. To be enrolled under the option, the candidate must be a full-time student in the degree program, have previously completed a Masters of Applied Science or its equivalence, and be employed by a company or research institute outside of McMaster continuously till degree completion. A candidate is required to complete the normal course requirements of their enrolled department as well as any milestones, but is exempt from seminar requirements. As a doctoral candidate they must take the Ph.D. Comprehensive Examination that is designed to test the breadth of knowledge and the ability to synthesize and integrate ideas from within and peripheral to the candidate's research area. The Comprehensive Examination will normally take place between 6 and 18 months after the candidate initially registers in the Ph.D. program. A supervisory committee monitors the progress of a Ph.D. candidate and determines when he/she is ready to write the thesis. The student is required to defend the thesis at a Final Oral Examination.

Print this Page

Materials Science, Ph.D

Print this Page

Requirements

Students entering the Ph.D. program in Materials Science directly with a Bachelor's degree are required to successfully complete at least ~~24~~ 12 units (~~8~~ 4 half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students entering the Ph.D. program in Materials Science with a Master's degree are required to successfully complete at least ~~24~~ 12 units (~~48~~ half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students transferred to the Ph.D. program in Materials Science from the Master's program are required to successfully complete at least ~~24~~ 12 units (~~48~~ half-courses) of course work, which includes the mandatory seminar ~~half~~ course ~~(3 units)~~ MATLS 702 (3 units) and 6 units of technical courses at the 700 level. Courses at the 700 level are offered as either a half course (3 units) or a quarter course (1.5 units), whereas courses offered at the 600-level are offered as half courses (3 units). Only one 600-level course is permitted for graduate credit. Only one non-technical half course (3 units) is permitted for graduate credit with written approval from the Supervisor.

Students are encouraged to consult with their Supervisor to ~~to~~ select some of their courses from areas beyond the focus of their research, including courses offered by other Departments. For courses to be taken for credit outside of the Department but within the Faculties of Engineering, Science and Health Science, written approval from the Supervisor is required. Any other courses

for credit require approval from the Associate Dean Graduate Studies (Engineering).

Students are also required to complete a career planning exercise within the first three terms (12 months) of full time study. Students will participate in a planning session with a career specialist within the Faculty and subsequently produce (at most) a two-page report before completion of the first three terms (12 months) of full time study. The report must be submitted to the Associate Chair (Graduate). Students transferring to the Ph.D. program are except from this requirement since they previously submitted such a report while enrolled in the Master's program.

Research Proposal Examination

Students entering the Department's Ph.D. program in Materials Science with either a Bachelor's or Master's degree must submit a written Research Proposal for their research program and complete (pass) the associated oral exam after the completion of three terms (12 months), but no more than four terms (16 months). Their Supervisory Committee, augmented by two other members, will give a critical review and examine the student on the content contained in or related to the Research Proposal during the oral exam.

Comprehensive Examination

Students enrolled in the Ph.D. program in Materials Science are required to successfully complete (pass) the Comprehensive Examination. The oral exam, which consists of two parts, is meant to ensure that students have a broad understanding of the foundations of the Materials Science and Engineering discipline.

The Part I oral exam covers, at the undergraduate level, topics central to the Materials Science and Engineering discipline. Topics have been divided into core areas that all students are responsible for and into elective areas so that students may choose an area of specialization. The Part I oral exam must be successfully completed prior to the completion of two terms (8 months) of full time study.

The Part II oral exam tests the student's knowledge of three topics related to the research at an advanced level. Students are expected to show the greatest depth of knowledge in their field of research, but also be expected to demonstrate knowledge of fields related to their areas of specialization. The Part II oral exam must be completed within 24 months (two years) of entry into the a Ph.D. program.

Thesis

Students are required to submit a thesis that which embodies the results of original research and to defend the thesis in the Final Oral Examination.

Industrial Ph.D. Option

The general Regulations for the degree Doctor of Philosophy appear earlier in the Calendar. This program option offers the candidate the potential to conduct all or a portion of their research at their company or research institute of employment. To be enrolled under the option, the candidate must be a full-time student in the degree program, have previously completed a Masters of Applied Science or its equivalence, and be employed by a company or research institute outside of McMaster continuously till degree completion. A candidate is required to complete the normal course requirements of their enrolled department as well as any milestones, but is exempt from seminar requirements. As a doctoral candidate they must take the Ph.D. Comprehensive Examination that is designed to test the breadth of knowledge and the ability to synthesize and integrate ideas from within and peripheral to the candidate's research area. The Comprehensive Examination will normally take place between 6 and 18 months after the candidate initially registers in the Ph.D. program. A supervisory committee monitors the progress of a Ph.D. candidate and determines when he/she is ready to write the thesis. The student is required to defend the thesis at a Final Oral Examination.

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McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	W Booth School of Engineering Practice and Technology
NAME OF PROGRAM and PLAN	Masters of Engineering Entrepreneurship and Innovation, Masters of Technology Entrepreneurship and Innovation. Proposed change in program duration.
DEGREE	Masters of Engineering Entrepreneurship and Innovation, Masters of Technology Entrepreneurship and Innovation.

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes x **No**

CREATION OF NEW MILESTONE ☐

CHANGE IN ADMISSION REQUIREMENTS		**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	Y

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR		**EXPLAIN: This proposed change would make an existing course, SEP 770, Total Sustainability Management, a required course for the MEEI and MTEI degrees.**
OTHER CHANGES		**EXPLAIN: A proposed lengthening of the program back to 20 months from 16 months allows for the addition of an additional required course.**

DESCRIBE THE <u>EXISTING</u> REQUIREMENT/PROCEDURE:

SEP 770, Total Sustainability Management, is currently offered as an elective for all Masters programs in the W Booth School of Engineering Practice and Technology.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

This proposed change would make an existing course, SEP 770, Total Sustainability Management, a required course for the MEEI and MTEI degrees. The course is currently an elective. The course learning outcomes were envisioned as part of overall School learning outcomes in 2013 but there was not room in the shortened program duration for implementation.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

This course is designed to produced learning outcomes associated with sustainability from a triple bottom line perspective. It is particularly relevant to early stage business development in which sustainability principles can be integrated into company operations as part of the company design. Offering this course as a required course simply responds to the changing business environment and the educational needs of graduates who are expected to competently operate in that environment.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

This proposal is made concurrent with a proposal to lengthen the duration of the two affected programs from 16 months to 20 months.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

The calendar copy for both the MEEI and MTEI programs contain the following:

"The module courses will be delivered in an intensive format; and it is expected that students will take the module courses in sequenced numerical order. The module courses are:

- SEP 6E03 / Entrepreneurial Opportunity Identification (Module 1)
- SEP 773 / Leadership for Innovation
- SEP 753 / Enterprise Opportunity Development
- SEP 755 / Business Launch and Development
- All full-time candidates are required to successfully complete:
- SEP 771 / W Booth School of Engineering Practice and Technology Practitioner's Forum
- SEP 772 / Innovation Studio

"

For both programs, this would change to:

"The module courses will be delivered in an intensive format; and it is expected that students will take the module courses in sequenced numerical order. The module courses are:

- SEP 6E03 / Entrepreneurial Opportunity Identification (Module 1)
- SEP 773 / Leadership for Innovation
- SEP 753 / Enterprise Opportunity Development
- SEP 755 / Business Launch and Development
- SEP 770 / Total Sustainability Management
- All full-time candidates are required to successfully complete:
- SEP 771 / W Booth School of Engineering Practice and Technology Practitioner's Forum
- SEP 772 / Innovation Studio

"

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: David Potter Email: potterd@mcmaster.ca Extension: 23442 Date submitted: Feb. 1, 2017

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University **SCHOOL OF GRADUATE STUDIES**

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	W Booth School of Engineering Practice and Technology
NAME OF PROGRAM and PLAN	Masters of Engineering Entrepreneurship and Innovation, Masters of Technology Entrepreneurship and Innovation. Proposed change in program duration.
DEGREE	Masters of Engineering Entrepreneurship and Innovation, Masters of Technology Entrepreneurship and Innovation.

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes x No

CREATION OF NEW MILESTONE x

CHANGE IN ADMISSION REQUIREMENTS		**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR		**The program descriptions of these two programs would change in the calendar to increase the program expected duration.**
OTHER CHANGES		**EXPLAIN:**

DESCRIBE THE <u>EXISTING</u> REQUIREMENT/PROCEDURE:

These programs are currently identifyed in the calendar as being 16 months in length. The change proposed here would make these programs 20 months in length.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

EXPLAIN: The length of the program was recently changed from 20 months to 16 months. This change was an experiment that has demonstrated that the time line is too compressed given the current program learning outcomes and deliverables. The change proposed here is to return both of these programs back to a total program length of 20 months.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

This change allows program learning outcomes to be met in a meaningful way. The 16 month program time line is too compressed for students to be able to meet deliverables and outcomes which involve starting a real business. The effect of the time compression has recently been noted by the students advisory committees, with some committees agreeing to continue to meet with the students even after the end of their program.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017.

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

As a consequence of lengthening the program, it is also being proposed that an existing additional core course be added to the curriculum of both programs, SEP 770, Total Sustainability Management. The addition of this course as a core offering is consistent with School wide learning objectives that were proposed in 2013.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

The calendar copy for both the MEEI and MTEI programs contain the following:

"The program will accept full- or part-time students. The full program is expected to take 16 months full-time study or 28 months part-time. Candidates are admitted for September only."

For both programs, this would change to:

"The program will accept full- or part-time students. The full program is expected to take 20 months full-time study or 32 months part-time. Candidates are admitted for September only."

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: David Potter Email: potterd@mcmaster.ca Extension: 23442 Date submitted: Feb. 1, 2017

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

McMaster University

SCHOOL OF GRADUATE STUDIES

RECOMMENDATION FOR CHANGE IN GRADUATE CURRICULUM - FOR CHANGE(S) INVOLVING DEGREE PROGRAM REQUIREMENTS / PROCEDURES / MILESTONES

IMPORTANT: PLEASE READ THE FOLLOWING NOTES BEFORE COMPLETING THIS FORM:

1. This form must be completed for **ALL** changes involving degree program requirements/procedures. **All** sections of this form **must** be completed.

2. An electronic version of this form (must be in MS WORD **not** PDF) should be emailed to the Assistant Secretary, School of Graduate Studies (cbryce@mcmaster.ca).

3. A representative from the department is **required to attend** the Faculty Curriculum and Policy Committee meeting during which this recommendation for change in graduate curriculum will be discussed.

DEPARTMENT	W Booth School of Engineering Practice and Technology
NAME OF PROGRAM and PLAN	Master of Engineering Design
DEGREE	**M.Eng.**

NATURE OF RECOMMENDATION *(PLEASE CHECK APPROPRIATE BOX)*

Is this change a result of an IQAP review? ☐ Yes ☐ No

CREATION OF NEW MILESTONE ☐

CHANGE IN ADMISSION REQUIREMENTS		**CHANGE IN COMPREHENSIVE EXAMINATION PROCEDURE**		**CHANGE IN COURSE REQUIREMENTS**	X

CHANGE IN THE DESCRIPTION OF A SECTION IN THE GRADUATE CALENDAR		**EXPLAIN:**
OTHER CHANGES		**EXPLAIN:**

DESCRIBE THE EXISTING REQUIREMENT/PROCEDURE:

A combination of mandatory and elective credits for each of the three-streams in the Design Program.

PROVIDE A DETAILED DESCRIPTION OF THE RECOMMENDED CHANGE *(Attach additional pages if space is not sufficient.)*

Readjustment of course requirements to make SEP 7xx / Hardware Prototyping Tools and Methods or SEP 7yy / Software Prototyping Tools and Methods mandatory for all students in Product Design and strongly recommended for students in other streams.

RATIONALE FOR THE RECOMMENDED CHANGE (How does the requirement fit into the department's program and/or tie to existing Program Learning Outcomes from the program's IQAP cyclical review?):

SEP 762 (Prototyping Tools and Methods) was introduced last year as a required for Product Design students. The course was split into two sections, one software and another hardware, taught by separate instructors. Some students wished to take both. By splitting SEP 762 into SEP 7xx and SEP 7yy it is possible for students to take both.

PROVIDE IMPLEMENTATION DATE: *(Implementation date should be at the beginning of the academic year)*

September 2017

ARE THERE ANY OTHER DETAILS OF THE RECOMMENDED CHANGE THAT THE CURRICULUM AND POLICY COMMITTEE SHOULD BE AWARE OF? IF YES, EXPLAIN.

Note, it is preferable to have the two courses sequentially numbered. Since both 761 and 763 are in use, the number 762 should be replaced by two new course numbers in sequence.

PROVIDE A DESCRIPTION OF THE RECOMMENDED CHANGE TO BE INCLUDED IN THE CALENDAR (please include a tracked changes version of the calendar section affected if applicable):

See attached

CONTACT INFORMATION FOR THE RECOMMENDED CHANGE:

Name: Yvonne Maidment Email: maidmeny@mcmaster.ca Extension: 26403 Date submitted: January 27, 2017

If you have any questions regarding this form, please contact the Assistant Secretary, School of Graduate Studies, cbryce@mcmaster.ca

SGS/2013

Graduate
Calendar http://academiccalendars.romcmaster.ca/preview_program.php?catoid=20&poid=12470&returnto=3597

Engineering Design, M. Eng. Design

⇦ Return to: Faculty of Engineering

Innovative new designs and the ability to improve performance of existing systems have become a basis for a competitive advantage in the markets. Performance, environmental sustainability, safety, and efficiency are integral parts of the requirements in the design of industrial products, large-scale systems, or software solutions. Within this complex set of constraints, successful engineers and engineering managers must be able to lead transformation of an idea to a complete design by working in interdisciplinary teams. The Master of Engineering Design program provides its participants with technical expertise and leadership capabilities required to invent novel solutions and to lead technically oriented organizations. Strong emphasis on solving engineering problems from industrial practice is accomplished via industrial motivated and supported projects.

The M.Eng. Design program emphasizes development of competencies in:

Leadership, collaboration, and management skills to lead diverse teams.
Design thinking and innovations methodologies
Engineering disciplines leading to breakthrough design and operation of systems in:
Sustainable community infrastructure (renewable energy systems, environmental systems, sustainable products and systems design, local economy)
Process industries (refining, chemicals, specialty chemicals, pharmaceuticals, power, oil and gas production, and similar)
Manufacturing of industrial and consumer products

Admission

In addition to the general requirements for entry into a graduate program in Engineering, students must hold a 4-year engineering undergraduate degree or equivalent, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work. Students with a degree in Science, Technology and Mathematics background will also be considered.

Strong letters of recommendation are also required. Each applicant will also be interviewed as part of the admission process. Professional work experience will be highly desirable.

Candidates may be enrolled on a full- or part-time basis. Full-time students will complete the degree in twelve consecutive months of study. Students are admitted for September or January. Part-time students will normally be expected to complete the program in two years.

Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the Program Lead. If the experience is deemed sufficient, the Program Lead may then recommend an interview. Evidence of ability to do graduate work will still be required. (See Sections 2.1.1 Admission Requirements for Master's Degree and 2.1.5 Admission of Students with Related Work Experience or Course Work beyond the Bachelor's Degree in the Graduate Calendar.)

Students who take Leading Innovation and/or Entrepreneurial Opportunity Identification may be granted advanced standing for these required courses upon registration in SEP programs.

Curriculum

Candidates will be required to complete satisfactorily the equivalent of at least three full courses, plus full-time students must successfully complete SEP 771.

The curriculum has five main components:

1. Leadership and Management Capabilities courses that will enable M.Eng. Design graduates to deal with complex situations in the work environment, to lead teams, and to manage projects.
2. Interdisciplinary engineering courses in product design, project management, and risk management.
3. Core technical courses that provide expert knowledge in targeted technical areas.
4. Elective courses that allow students to acquire broader expertise in the technical areas which are at the centre of their studies.
5. An industrially oriented project that solves complex problems requiring synthesis of knowledge from several disciplines and presenting the students with an opportunity to develop the solution in an industrial environment.

Process and Production Systems

Master of Engineering Design program in the field of Process and Production Systems provides advanced competencies for engineers and supervisors typically working in:

Process Design
Advanced Process Control
Plant Operations
Process Industry Oriented R&D
Control Systems and Software

The following course requirements need to be fulfilled by the candidate:

Required Courses

Candidates are required to take the following:

SEP 760 / Design Thinking
SEP 763 / Special Topics in Engineering Design
SEP 771 / W Booth School of Engineering Practice and Technology Practitioner's Forum (Full-students only)
SEP 772 / Innovation Studio
SEP 773 / Leadership for Innovation

Electives

Candidates are required to select four half courses which should be selected from graduate courses offered by departments within the Faculty of Engineering. Candidates are required to have their elective course selection approved by the program lead.

Strongly recommended:

SEP 7xx / Hardware Prototyping Tools and Methods

SEP 7yy / Software Prototyping Tools and Methods

Process Design, Process Control, or Plant Operations

Recommended courses for candidates focusing on *Process Design, Process Control, or Plant Operations* include:
SEP 751 / Process Design and Control for Operability
SEP 752 / SYSTEMS MODELING AND OPTIMIZATION
SEP 6C03 / Statistics for Engineers
SEP 754 / Process Design and Integration for Minimal Environmental Impact
CHEM ENG 752 / Optimization of Chemical Processes
CHEM ENG 765 / Multivariate Statistical Methods for Process Analysis and Monitoring

Control Systems Engineering

Recommended courses for students with a background or interest in *Control Systems Engineering* are:
CAS *6CD3 / Distributed Computer Systems
CAS*6EB3 / Database Management System Design
CAS 704 / Embedded, Real-Time Software Systems
CAS 703 / Software Design
CHEM ENG 6E03 / Digital Computer Process Control
ECE*726/ Local Area Networks in Manufacturing Environment
ECE 732 / Non-linear Control Systems
ECE 771 / Algorithms for Parameter and State Estimation
ECE 772 / Neural Networks and Learning Machines

Product Design

Innovation and creative system, solutions, or product design are emphasized through problem solving via interdisciplinary teams in a design studio environment, while learning about the use of materials in product design and design for manufacturing are led by the faculty who are also members of McMaster's advanced centres (including Centre for Automotive Materials, Manufacturing Research Institute, Institute for Polymer Production Technology and the Centre for Advanced Polymer Processing and Design). The interdisciplinary nature of the program enables its participants to work on a variety of designs, such as industrial machinery, consumer products, automotive, etc.

The following course requirements need to be fulfilled by the candidates:

Mandatory Courses

Candidates are required to take the following:

SEP 760 / Design Thinking
SEP 7xx / Hardware Prototyping Tools and Methods or SEP 7yy / Software Prototyping Tools and Methods
SEP 763 / Special Topics in Engineering Design
SEP 771 / W Booth School of Engineering Practice and Technology Practitioner's Forum (full-time students only)
SEP 772 / Innovation Studio

SEP 773 / Leadership for Innovation

Electives

Candidates are required to take three half courses which should be selected from graduate courses offered by departments within the Faculty of Engineering. Candidates are required to have their elective course selection approved by the program lead.

SEP 761 / Human-Centred Design

Sustainable Community Infrastructure

Candidates in this field of study cover various aspects of the design of sustainable communities, including:

Public realm spaces (parks, sidewalks, recreation facilities)
Storm water management
Housing and energy efficient buildings
Development of local business
Sustainable transportation systems
Sustainable energy generation

The following course requirements need to be fulfilled by the candidates:

Mandatory Courses

Candidates are required to take:

SEP 760 / Design Thinking
SEP 763 / Special Topics in Engineering Design
SEP 771 / W Booth School of Engineering Practice and Technology Practitioner's Forum (full-time students only)
SEP 772 / Innovation Studio
SEP 773 / Leadership for Innovation

Electives

Candidates are required to take four elective courses, which should be selected from graduate courses offered by departments within the Faculty of Engineering. Suggested courses in sustainable energy systems and manufacturing are:

Strongly Recommended:

SEP 7xx / Hardware Prototyping Tools and Methods
SEP 7yy / Software Prototyping Tools and Methods
SEP 6I03 / Sustainable Manufacturing Processes
SEP 705 / Green Engineering, Sustainability and Public Policy
SEP 746 / Design of Sustainable Community Infrastructure
SEP 747 / Energy Efficient Buildings
SEP 748 / Development of Sustainable Communities

Candidates are required to have their elective course selection approved by the program lead.

⇦ Return to: Faculty of Engineering

Scholarship Committee Membership Changes

Dr. Kenneth Rosenthal	Medical Sciences	Internal Awards	rosenthl@mcmaster.ca
Dr. Peter Whyte	Medical Sciences	Internal Awards	whytep@mcmaster.ca

Will be replacing:

Dr. Vian Mohialdin	Medical Sciences	Internal Awards	aldinv@mcmaster.ca
Dr. Ari Shali	Medical Sciences	Internal Awards	shalia@mcmaster.ca

Graduate Awards to be approved at March 2017 Grad Council Meeting

NAME OF FUND: Fairley-Gadsby Ontario Graduate Scholarship

TERMS OF REFERENCE FOR FUND:
Established in 2016 by Brad Fairley, B.Sc '79 and Margaret Gadsby, B.Sc '78 to contribute to the Ontario Graduate Scholarship Program. To be awarded by the School of Graduate Studies to a masters or doctoral student in the Faculty of Science who demonstrates outstanding academic achievement. Preference will be given to a student studying with a focus on environmental issues, their causes, effects, mitigation and/or ecosystem restoration.

NAME OF FUND: Fairley-Gadsby Prize

TERMS OF REFERENCE FOR FUND:
Established in 2016 by Brad Fairley, B.Sc '79 and Margaret Gadsby, B.Sc '78 to complement the funding available through their named Ontario Graduate Scholarship. Recipients of the Fairley-Gadsby Ontario Graduate Scholarship are eligible for this companion prize directed to enabling attendance at conferences or for travel related to their research in the Faculty of Science. Preference will be given to a student studying with a focus on environmental issues, their causes, effects, mitigation and/or ecosystem restoration