

**Update on Unit Response to External Reviewers' Report & Action Plan**  
**Programs Being Reviewed: Graduate Programs in Computer Science Joint (OCICS)**  
**Completed by: Michel Barbeau, Director**  
**Approved by Dean: Dr. Maria DeRosa, November 28, 2022**  
**Edited By Michel Barbeau (November 11, 2022)**

**Note: This document is made available for public posting on the Vice- Provost's website.**

**\*\*\* Denotes items that SQAPC would like the unit to pay particular attention to based on their past review of the original action item.**

External Reviewer Recommendation	Original Action Item	Owner & Timeline	Progress Update September 2022	Will the action described require calendar changes? (Y or N)
Concern: Review and realign the OCICS admission process practices between the two organizations	<i>We have reviewed and aligned the OCICS admission process. Starting from Fall 2020, we have implemented a uniform admission process. See Appendix A for the details.</i>	<i>EECS' Graduate Associate Director SCS' Graduate Director (Recruitment and Admissions)  Implemented for the Fall 2021 admission cycle</i>	This concern has already been addressed.	N
Concern: Include EDI priorities in the admission process.	<i>We are committed to continuous progress towards full participation in our joint programs for all groups of individuals. Everyone should feel welcome to apply and join our graduate programs. We need all perspectives and all viewpoints.  In the School of Computer Science, moving towards gender equity is a priority. Carleton's Faculty of Science, comprising the School of Computer Science, has planned, and started initiatives to help encourage and support woman students, and</i>	<i>EECS' Graduate Associate Director SCS' Graduate Director (Recruitment and Admissions)</i>	This is an ongoing concern being addressed as described in the column "Original Action Item".	N

	<p><i>to address gender imbalance at the graduate level. These initiatives include the ACE (Awareness, Collaboration and Engagement) EDI event series, development of inclusivity training to the faculty, inclusive hiring practices and outreach visits to elementary and high school classrooms by woman scientists and professors and by inviting students to university labs. The School of Computer Science has its own EDI committee. Current activities include the design of computer science specific EDI statements, inclusive computer science teaching, hiring policies, student code of conduct and a research project to develop teaching and mentoring approaches aiming to significantly improve experience for students from under-represented minorities in computer science.</i></p> <p><i>Both institutions support societies that encourage women in computer science, including Women in Computer Science (WiCS), Women in Science and Engineering (WISE), Technolgap and coding groups.</i></p>			
<p>Opportunity: Put in place a system to track the graduated M.Sc. and Ph.D. students. It is highly recommended to implement this as an “exit survey” for graduating students.</p>	<p><i>This an excellent idea. This data is of great value internally, and possibly for recruitment. We will develop an online exit questionnaire. We will provide access to students to the exit</i></p>	<p><i>Director of OCICS EECS’ Graduate Associate Director SCS’ Graduate SCS’ Graduate Director (Program Management)</i></p>	<p>The exit questionnaire has been developed and implemented. It went live in September 2022.</p> <p>They are available here:</p> <ul style="list-style-type: none"> <li>Exit Survey Ottawa-Carleton Institute for Computer Science (OCICS) Students – Graduated: <a href="https://carletonu.az1.qualtrics.com/jfe/form/SV_d73r2PY72ursN5c">https://carletonu.az1.qualtrics.com/jfe/form/SV_d73r2PY72ursN5c</a></li> </ul>	<p>N</p>

	<i>questionnaire when they complete their thesis defense.</i>	<i>Form designed and implemented in the upcoming academic year</i>	<ul style="list-style-type: none"> <li>Exit Survey Ottawa-Carleton Institute for Computer Science (OCICS) Students – Withdrawn: <a href="https://carletonu.az1.qualtrics.com/jfe/form/SV_empT5uPtSkUYIj8">https://carletonu.az1.qualtrics.com/jfe/form/SV_empT5uPtSkUYIj8</a></li> </ul>	
Opportunity: Put in place a system to track (i) the cross-organisational co-supervisions of the graduate students between the two organisations, and (ii) the cross-organisational statistics on the course enrolments.	<i>Very good idea! This data will be useful for planning the offered courses and track collaboration in the context of the joint programs. We will review the current information collection process to make sure this data is collected in the future.</i>	<i>EECS' Director SCS' Director Director of OCICS EECS' Graduate Associate Director SCS' Graduate Director (Program Management)</i>  <i>Upcoming academic year</i>	<p>Cross-organisational co-supervisions</p> <p>We are currently working on a full list of all students, their program, thesis, or project and who supervised them. From 2019 to spring 2022, we recorded only one co-supervision-completed thesis.</p> <p>Cross-organisational statistics</p> <p>At Carleton, we have access to the uOttawa daily class registration list. This list is updated weekly and saved on a local drive. We pull specific data from the list. The data contains detailed information about course enrolment and the student's 'academic plan,' i.e., project or thesis).</p>	N
Opportunity: Plan and advertise the graduate courses on a two-year horizon.	<i>We will investigate the possibility to announce a tentative 2<sup>nd</sup>-year schedule.</i>	<i>EECS' Director SCS' Director</i>  <i>Fall 2021 and Winter 2022</i>	<p>This year (2022/23), we will make a list of offered during the 2023/24 academic year and a tentative list of offered graduate courses for 2024/25. To build these two lists, teaching preferences from faculty will be collected for the upcoming two academic years.</p>	N
Opportunity: Put in place a mechanism to review new courses at OCICS BOM level.	<i>The process for the introduction of new courses has been reviewed. It is detailed in Appendix B.</i>	<i>EECS' Graduate Associate Director SCS' Graduate Director (Program Management) Director of OCICS</i>  <i>Effective Winter 2021</i>	<p>This opportunity has been addressed already.</p>	N
Concern: Reevaluate the long-term purpose of the joint programs.	<i>The committee examined the long-term purpose of the joint programs. The committee is in the opinion that the joint program has considerable benefits including 1) the access for the graduate students to a large selection of pooled courses and 2)</i>	<i>EECS' Director SCS' Director Director of OCICS EECS' Graduate Associate Director</i>	<p>This concern has been evaluated.</p>	N

	<p><i>the availability of a wide range of skills for the constitution of thesis examination committees. Graduate students seamlessly register and follow courses in the other institution, no need for a course equivalence recognition mechanism.</i></p> <p><i>Moreover, this environment promotes the creation of research collaborations. In the last five years, researchers from the two institutions have co-signed a good number of joint publications. For example, during the last five years co-authors include Barbeau-Nayak, Bose-Morin-Dujmovic, Flocchini-Kranakis, and Flocchini-Santoro. The committee is in the opinion that this aspect can be further developed in the future. There are also some co-supervisions of graduate students and PhDs. In the past, we co-organized conferences, workshops and schools, where members of both the institutions participated, including the funding applications.</i></p> <p><i>The two institutions are not competitors but rather allies that work together to offer in the Ottawa area the best possible graduate programs in computer science.</i></p>	<p><i>SCS' Graduate Director (Recruitment and Admissions)</i></p> <p><i>SCS' Graduate Director (Program Management)</i></p>		
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<p>Concern: Create a joint (“curriculum”?) program committee, including current students, graduates of the program and industrial contacts.</p>	<p><i>We understand that this refers to the creation of a Program Advisory Board (PAC). We will create a PAC comprising the Directors, Graduate Directors and representative from industry, government, and academia.</i></p>	<p><i>Director of OCICS</i> <i>1<sup>st</sup> meeting expected Fall 2021</i></p>	<p>The creation of such a committee has been delayed but is still under consideration. It is on the agenda of the Board of Management for discussion in the upcoming meetings.</p>	<p>N</p>
<p>Opportunity: Promote success stories (especially in the fourth year of the bachelor program) of the accelerated stream to MSc programs.</p>	<p><i>We will reach out supervisors and graduates to collect success stories and testimonies. We will integrate success stories in open house, poster day, OCICS web site, viewbooks and graduate study booklets.</i></p>	<p><i>Director of OCICS</i> <i>EECS’ Graduate Associate Director</i> <i>SCS’ Graduate Director (Recruitment and Admissions)</i> <i>SCS’ Graduate Director (Program Management)</i>  <i>Fall (Carleton), Winter (uOttawa)</i></p>	<p>The potential of this opportunity has not fully been exploited yet. However, special efforts are invested to promote the accelerated stream to MSc programs by the Graduate Director (Recruitment and Admissions). They include reaching out to the undergraduate students and informing them of the Accelerated Pathway to the Master's in Computer Science (A first email targeted towards students in 3rd year with a minimum overall AND MAJOR CGPA of A-. A second email targeted students in 4th year with a minimum overall AND MAJOR CGPA of A-.</p>	<p>N</p>
<p>Concern: Review the course offerings to reduce the size of popular courses (possibly offering some courses more frequently than others).</p>	<p><i>Look at graduate course enrolment. Consider offering certain courses twice a year. Low enrolment offered every other year.</i></p>	<p><i>EECS’ Director</i> <i>SCS’ Director</i>  <i>Upcoming Academic Year</i></p>	<p>The data about enrolment in the COMP graduate courses have been examined, for the ongoing academic year (2022-23). Currently, there is no excessive enrolment in any course. We will continue to monitor course enrolment and actions will be taken if required.</p>	<p>N</p>
<p>Opportunity: Evaluate the benefit of creating a methodology course for the M.Sc. and Ph.D. programs.</p>	<p><i>The board of management will explore this opportunity.</i></p>	<p><i>Board of Management</i>  <i>Upcoming academic year</i></p>	<p>The benefit of creating a methodology course for the M.Sc. and Ph.D. programs is still under consideration. It is on the agenda of the Board of Management for discussion in the upcoming meetings. The possible content of such a course will be investigated. The resource needs, e.g., contract instructor, will be identified and budgeted.</p>	<p>Y</p>
<p>Weakness: Evaluate the sustainability of the project-based M. Sc., which depends mainly on one of the two organisations and, even then, on only few professors supervising such projects.</p>	<p><i>See Appendix C</i></p>	<p><i>EECS’ Director</i> <i>SCS’ Director</i> <i>Director of OCICS</i> <i>EECS’ Graduate Associate Director</i> <i>SCS’ Graduate Director (Recruitment and Admissions)</i></p>	<p>This is a topic of ongoing discussion.</p>	<p>N</p>

		<i>SCS' Graduate Director (Program Management)</i>		
Weakness: Reevaluate the purpose of the joint programs. They were essential in 1982, are they still necessary?	<i>This echoes the concern "Reevaluate the long-term purpose of the joint programs." The committee reevaluated the purpose of the joint programs. In addition to the benefits listed above, it can be said that OCICS now comprises close to 73 faculty members. In size, the joint institute is comparable to other large computer science graduate programs in Canada, such as programs offered by Toronto and McGill.</i>	<i>EECS' Director SCS' Director Director of OCICS EECS' Graduate Associate Director SCS' Graduate Director (Recruitment and Admissions) SCS' Graduate Director (Program Management)</i>	This concern has been evaluated.	N

### Appendix A: Review of the OCICS admission process practices between the two organizations

The admission process has been reviewed in both institutions. It is effective for the current admission cycle, i.e., students admitted for Fall 2021. The processes are very similar in both organizations, with slight differences due to different student evaluation scales. The processes are outlined in the sequel.

The admission process is managed by the Graduate Director (Recruitment and Admissions), two Graduate Administrators and a Graduate Admission Committee, consisting of four faculty members. The Graduate Administrators pre-screen applications by calculating GPA averages. Then, the Graduate Admissions Committee evaluates each application and offers their recommendations (including comments on applications). The committee considers the applicant's overall academic standing, publication record, recommendation letters, relevant work experience, language proficiency, etc. The recommendations are then shared with faculty for further assessment. Faculty then express their interest in admitting students based on the committee's recommendation, as well as their own communication (email or interview) with the potential student (a common practice). No PhD/thesis-based Master's students are admitted without a supervisor. Project based MCS are typically self-funded. We accept a small percentage of project based MCS.

The actual admission's averages for OCICS programs at Carleton University based on pre-COVID-19 admission's data are listed in Table I. Carleton University uses a scale out of 12 and 11.0 corresponds to A, while 10.0 corresponds to A-.

Table I: Actual Admission's Averages for OCICS Programs at Carleton University.

Program	Average Entrance GPA
PhD - Domestic	11.6
PhD - International	10.5
MSC - Domestic	10.0
MSC - International	10.8

A threshold is enforced for international MCS applications, which is a minimum GPA of B+ (9.0). However, due to the highly competitive nature of the program A- (10.0) is required in practice.

### School of Electrical Engineering and Computer Science, University of Ottawa

The process at EECS is as follows. The applications are processed by the staff in the graduate office of the Faculty of Engineering. A staff member calculates the admission's average which is a credit-weighted average of the 20 last courses taken by an applicant. When an applicant fails to meet the admission averages for the respective program, the file is rejected. We may exceptionally look at PhD applicants and thesis Master's students with identified supervisor. All files that pass the initial screening are reviewed by two members of the admission's committee. The committee considers preparation as indicated by completion of core CS courses, recommendation letters, quality of undergraduate education, work experience, level of English (or French). Then, the Graduate Director makes a decision to either recommend admission, circulate the file if no supervisor is identified or reject. No thesis-based student is admitted without supervisor. We apply the same general process for all programs except that applicants to the project-based programs do not require a supervisor for admissions.

The admission cut-off averages that are currently in place at the University of Ottawa are given in Table II. The University of Ottawa uses a scale out of 10 and the corresponding levels are 8.0 (A-), 7.5 (B+) and 7.0 (B). It should be noted that the averages listed in Table II are minimum admission's standard and in practice students with much higher admission's averages are admitted.

Table II: Admission's Cut-off Averages for OCICS Programs at the University of Ottawa.

Admission Cut-Off Average	CSI
Ph.D.	8.0
Master's Thesis CDN/PR	7.0
Master's Thesis Int.	7.5
Master Project CND/PR	8.0
Master Project Int.	8.0

## Appendix B: Mechanism to review new courses at OCICS BOM level

The process for the introduction of new courses has been reviewed. Here are the details.

### Topics Courses

A faculty member of one institute that wishes to introduce a new topics course contacts the director of the OCICS graduate program within their institution. To initiate the process, the member must provide a course outline of the proposed course for feedback, highlight potential overlap with existing OCICS graduate courses and must identify the area of the course with a justification. A course is deemed to fall within an area provided that at least 40% of the course content falls within that area. A single area is preferred but up to two areas are accepted in exceptional circumstances. The application is then circulated to members with related research or teaching interests. Collegial feedback is incorporated and then the course outline is communicated to the OCICS director of the other institution for further feedback. The topics course is then approved to be scheduled if resources are available to offer the course. The topics course receives a course code in both institutions to easily allow graduate students from both institutions to take the course. A topics course is offered two to three times to gauge interest by students, receive feedback from students and ensure the course is sustainable. The next step is an application to make the course a permanent OCICS course.

### Permanent Courses

Permanent courses have their own dedicated course code in both institutions. To establish a permanent course, the proposed course has to be offered as a topics course at least two or three times with good



student enrolment, i.e., enrolment in-line with other OCICS graduate courses. The faculty member proposing to convert a topics course into a permanent course then forwards the application to the OCICS director in their institution. The application includes an up-to-date course outline, an identification of the area the course falls in and a list of potential overlap with existing graduate courses. The application is then brought to OCICS BoM for discussion and possible approval. The BoM may seek additional clarification and feedback from other faculty members in both institutions. The BoM then decides if the course should be given a permanent course code. When the course is approved by BoM, the process to acquire permanent course codes for new courses at both universities is initiated.

Permanent courses may be removed if they are not offered for several years, the description of the course becomes dated or there is no OCICS member that can teach the course. Removal of the course requires the approval of the BoM and of both the universities.

## **Appendix C: Sustainability of the Project-Based MCS Program**

### Enrolment Trends: No Increase in Recent Years

The project-based Master's program in computer science at the University of Ottawa has stable enrolment. The program is extremely popular and receives many applications. For the Fall 2021, we have received 1525 applications for the project-based Master's as of Feb. 22, 2021. This number represents an increase of 145 applications from the year before despite the impact of Covid-19. Nevertheless, the number of admitted student have been kept stable at a level which can be well-managed given the resources in the School of EECS at the University of Ottawa and within OCICS. This is managed by increasing admission requirements to maintain enrolment at manageable levels.

In the Fall 2019, 42 students registered for the course-based program while in the Fall 2020, 38 students registered. Only a small number of students start their studies in the Winter. There was a small drop due to COVID-19 but the numbers are relatively stable since at least the Fall 2018. The goal for this year is again to keep enrolment stable.

### Range of Supervisors

Several OCICS members chose to supervise MCS project-based student. In the Winter 2021, the following members supervise at least one project: Drs. Diana Inkpen, Burak Kantarci, WonSook Lee, Lucia Moura, Jochen Lang and Hussein Mouftah. In previous terms, additional OCICS members outside the School of EECS have (co-)supervised projects including Dr. Oliver van Kaick from Carleton University or Dr. Pascal Fallavollita from the Faculty of Health Sciences at the University of Ottawa, who is cross appointed to the School of EECS. Members chose to supervise projects for various reasons. Some projects explore a topic related to but not central to current research, some projects explore a preliminary research idea, others focus on implementation of research and yet others are part of a larger team effort.

### Benefits of the Project-Based MCS Program

The project-based program clearly fills a need as evidenced by the large number of applications. It attracts applications by international students but also by a considerable number of local applicants. It attracts applicants that are focused on a career in industry or government but even students interested in research sometimes chose this route to enter their graduate studies. Some project-based students transition into the thesis-based program after 1 or 2 semesters. The students also provide a benefit to industry in the Ottawa area as can be seen by the considerable number of Co-Op terms offered to project-based Master's student by local industry and government. The program is also beneficial for OCICS as a whole. Project-based student are required to take 8 courses and as such they increase enrolment and allow OCICS to offer more and a wider variety of courses to all graduate students. Furthermore, the international students often come from first class universities around the world bringing a different focus and outlook to the courses in OCICS and enriching the experience for all students. Finally, faculty members benefit by supervising projects but also by having a potential pool of students that they may attract to their own research.