

**UNIVERSITY OF WINDSOR**  
**UNIVERSITY PROGRAM REVIEW (UPR)**  
**REPORT ON: COMPUTER SCIENCE**  
**GRADUATE PROGRAMS (MSc and PhD)**  
May 2016

## **EXECUTIVE SUMMARY**

This review covers the thesis-based graduate programs offered by the School of Computer Sciences. However, to provide context, some information on the area's course-based Master's program and undergraduate programs has also been included.

### **Review Preparation**

In preparing this document, the Program Development Committee reviewed the following: Computer Science's Self-Study (SS) (2015), the report of the external reviewers (ER) (May 2015), the response from the Head (HR) (September 2015), and the response from the Dean (DR) (February 2016) to the above material. The external reviewers were: Dr. Amir Asif, Dean, Faculty of Engineering and Computer Science, Concordia University, Dr. Patricia Evans, Faculty of Computer Science, University of New Brunswick, and Dr. Narayan Kar, Faculty of Engineering, University of Windsor.

### **Graduate and Undergraduate Programs**

The School offers the following thesis-based graduate programs: Master of Science in Computer Science (with/without Co-op) and a PhD in Computer Science. The School also offers a Master of Applied Computing which was not under review because it had just been launched in Fall 2014.

At the undergraduate level, the School offers a Bachelor of Computer Science (General), a Bachelor of Computer Science (Honours) (with/without Co-op), a Bachelor of Computer Science (Honours) in Applied Computing (with/without Co-op), a Bachelor of Science in Computer Science (Honours) in Computer Information Systems (with/without Co-op), and a Bachelor of Science (Honours) in Computer Science with Software Engineering Specialization. Students also have the option of combining their Honours Computer Science major with a major from another discipline.

The School provides prospective students with a number of pathways to its degree programs including:

#### Degree Completion Programs

- Bachelor of Computer Science (General) for University Graduates
- Bachelor of Computer Science (Honours Applied Computing) for University Graduates
- Bachelor of Computer Science (General) (for Qualifying Ontario and Other College Diploma Holders)
- Bachelor of Computer Science (Honours Applied Computing) (with and without Co-op) (for Qualifying Ontario and Other College Diploma Holders)

#### Articulation Agreements:

- Bachelor of Computer Science (General) for Qualifying Ontario CAAT (or equivalent) Students with 2 Years of Study at CAAT (or equivalent) diploma program
- Bachelor of Computer Science (Honours Applied Computing) (Co-op) for Qualifying Ontario CAAT (or equivalent) Students with 2 Years of Study at CAAT (or equivalent) diploma program

Admission to the concurrent Bachelor of Computer Science (Honours)/Bachelor of Education has been suspended since Fall 2014.

The School also offers a Minor in Computer Science, a Minor in Applied Information Technology, a Certificate in Applied Information Technology, as well as Major and Minor Concentrations for the Bachelor of Interdisciplinary Arts and Science.

## Enrolments

### Undergraduate

	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
Full-Time	229.5	258.5	276.5	337	332
Part-Time	90.5	92.5	94	99	108.5

### Graduate

	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
MAC Full-Time	---	---	---	21	33
MAC Part-Time	---	---	---	0	0
MSc Full-Time	51	39	51	65	54
MSc Part-Time	4	1	0	1	2
PhD Full-Time	26	24	19	14	16
PhD Part-Time	4	2	0	1	1

## Human Resources

### Faculty/Instructors

Tenured/tenure-track faculty	19 (including Head)
Limited-term appointments	2
Faculty members involved in graduate program delivery	32 (19 tenured/tenure-track + 1 limited-term appointment + 9 adjunct professors + 2 cross appointments + 1 professor emeritus)

### Full/Part-time Staff

Applied Information Technology Program Secretary V	.7
Coordinator 12	1
Decision Support Specialist	1
Graduate Secretary	1
Server and Network Technician VII	1
Secretary to the Head	1
Technician V	1

## FINAL ASSESSMENT REPORT (with Implementation Plan)

### Significant Strengths of the Programs

Faculty members in the School are active in research, with most holding NSERC Discovery grants and other government grants. They are committed to their graduate students and provide financial support, as possible, through their grants; understanding that graduate students are critical to the success of their own research programs. (ER, p.8) During this reporting period, over one-half of graduate students published at least one paper. (ER, p.7)

The School has established a strong administrative structure with strong leadership, under which the MSc in Computer Science and PhD in Computer Science operate, providing graduate students with clear direction and support. (ER, pp.7,9)

### Opportunities for Program Improvement/Enhancements

The School is undertaking a number of initiatives to further strengthen the graduate programs and attract more students, including providing more undergraduate research opportunities in order to encourage more 4<sup>th</sup> year

undergraduate students (particularly domestic students) to enrol in the MSc program, encouraging students to apply for internal and external research grants, and reviewing its graduate course offerings. (ER, p. 10)

With the departure of three faculty members over the last few years, and given that the discipline is “constantly evolving and adapting to the needs of society”, the School should consider re-evaluating its research strengths, perhaps focusing on 2-3 research clusters, review its graduate fields, and pursue interdisciplinary research and programming opportunities. (SS, p.71, ER, pp. 1,9-10) The School should also focus on the issues of course content and relevance, course overlap, and course availability, as appropriate. (ER, p.10) A refocussing and streamlining of research fields and courses might go a long way to addressing course-related issues raised by the external reviewers.

Further opportunities for program improvements are captured in the recommendations listed below.

## **IMPLEMENTATION PLAN**

### **Recommendations (in priority order)**

*(Final recommendations arrived at by the Program Development Committee, following a review and assessment of the External Reviewers report, the Head’s response and the Dean’s response.)*

#### **Recommendation 1: Learning Outcomes**

- (a) That the School submit learning outcomes for each of its MSc in Computer Science, its MSc in Computer Science with Co-op and its PhD in Computer Science that clearly correspond to the University's stated "Characteristics of a University of Windsor Graduate".
- (b) That faculty members further develop learning outcomes and assessment methods for each of the graduate courses, in support of the program outcomes, and determine what level of mastery of the material is appropriate for student outcomes and for each grade range in graduate level courses. *[PDC understands that Computer Science has developed learning outcomes, which have been approved by Council, for 22 of its 41 MSc/PhD graduate courses (Self Study, Appendix C) and looks forward to receiving these and the remaining 19 in due course.]*
- (c) That faculty members in the School apply and assess the course learning outcomes and program outcomes through research and teaching activities.
- (d) That the School submit a plan for making graduate students aware of the learning outcomes as part of their orientation.

**Agents:** Department Council, Head, CTL, Vice-Provost, Teaching and Learning

**Completion by:** Winter 2017 (in time for the area’s next self-study)

**Recommendation 2:** That Computer Science develop a strategic plan for its research and graduate programming, with a view to:

- identifying areas of research strength and growth, and developing cohesive and cross-disciplinary research programs
- introducing new in-demand fields in computer science
- creating accelerated pathways for outstanding undergraduate students into its thesis-based graduate programs, and
- securing increased research funding through external grants to improve its graduate student enrolment in its thesis-based graduate degrees.
- Strengthening connections to industry for learning and research opportunities.

**Agents:** Department Head, Dean of Science, Department Council

**Completion by:** Winter 2017 (plan to be submitted in time for the area’s next self-study)

**Recommendation 3:** That graduate courses, including their content and level of material, be adjusted to provide high-level knowledge appropriate to both specialists in the course areas and students specializing in other aspects of Computer Science. Courses in the same general area need to be coordinated to provide an overall foundation.

**Agents:** Department Council, Head

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 4:** To address concerns of course availability,

- That the School implement and biennially assess its two-year plan for offering courses which will enable it to maintain the diversity of courses within resource constraints. The planned courses offerings should be selected with respect to their value for the two areas of focus and the program as a whole.
- That with an increase in the graduate enrolment, more courses at the graduate level, especially those targeted toward PhD students be offered.
- That thesis-based graduate students (especially those enrolled in the MSc program) be permitted to take one MAC course that is carefully selected by their thesis supervisor in an area of research of the graduate student.

**Agents:** Department Head, Departmental Council

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 5:** That regulations be loosened so that students can start working on their research and thesis proposal before finishing all of their courses. Degree completion times should be extended for co-op students to account for their work terms.

**Agents:** Department Head, Dean of Graduate Studies

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 6:** That the more active research faculty members take on a leadership role in mentoring junior or less research productive graduate faculty members. They should also lead larger team-based research applications, including NSERC CRD and Strategic grant, as well as the provincial ORF and involve the less successful researchers in these proposals as much as possible.

**Agents:** Department Head, faculty members

**Completion by:** Winter 2017

**Recommendation 7:** Where possible, that the School allocate some of its revenue from the Master of Applied Computing program to support scholarships for research-based graduate students.

**Agents:** Department Head

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 8:** That more financial and infrastructure support for graduate students be provided to enable hiring of top-notch students. Financial offer letters during admission should, as much as possible, include both RA and GA commitments. *[PDC recognizes that the number of GA positions is tied to demonstrable undergraduate teaching needs, while RA positions are at the discretion of the School and its faculty members.]*

**Agents:** Department Head, faculty members

**Completion by:** Annual Review

**Recommendation 9:** That the School continue efforts to refurbish the office space for the graduate students, especially in Dillon Hall, to provide a productive working environment for research.

**Agents:** Department Head

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 10:** That the School make a case to the Dean of Science for additional resources in the form of:

- new faculty hires in the areas of focus to restore the School's ability to provide sufficient breadth and depth of graduate courses, keeping in mind undergraduate and MAC teaching needs as well.
- course releases to faculty with thriving research groups, to better enable them to continue their high-quality supervision and take on additional students.

**Agents:** Department Head

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 11:** That the School review the criteria for appointing and renewing adjunct and cross-appointed faculty and develop an outline of expectations for adjunct and cross-appointed faculty, including level of expected research activity in the School for continued membership in its graduate programs.

**Agents:** Department Head, Departmental Council

**Completion by:** Winter 2017 (in time for the area's next self-study)

**Recommendation 12:** That the Head ensure that faculty, staff, graduate and undergraduate students in the School are informed on the process and long term vision of the Faculty of Science, Faculty of Graduate Studies, and University of Windsor.

**Agents:** Department Head

**Completion by:** Annual Review