

**UNIVERSITY OF WINDSOR**  
**UNIVERSITY PROGRAM REVIEW (UPR)**  
**REPORT ON: PHYSICS**  
 GRADUATE PROGRAMS (MSc and PhD)  
 January 2017

**EXECUTIVE SUMMARY**

This review covers the graduate programs offered by the Department of Physics. However, to provide context, some information on the area's undergraduate programs has also been included.

**Review Preparation**

In preparing this document, the Program Development Committee reviewed the following: Physics' Self-Study (SS) (2012/13), the report of the external reviewers (ER) (October 2015), the response from the Head (HR) (January 2016), and the response from the Dean (DR) (May 2016) to the above material. The external reviewers were: Dr. J. Carl Kumaradas, Department of Physics, Ryerson University, Dr. Robert I. Thompson, Department of Physics and Astronomy, University of Calgary, and Dr. Maria Cioppa, Department of Earth and Environmental Sciences, University of Windsor.

**Graduate and Undergraduate Programs**

The Department offers the following graduate programs: Master of Science in Physics, with thesis, major paper or course-based, and a PhD in Physics. Fields for the research-based graduate programs are: atomic, molecular and optical (AMO) physics, material science, and theoretical physics. (SS, p.4)

At the undergraduate level, the School offers a Bachelor of Science (Honours) in Physics (with/without Co-op), a Bachelor of Science (Honours) in Physics with thesis (with/without Co-op), a Bachelor of Science (Honours) in Physics (Physics and High Technology) (with/without Co-op), a Bachelor of Science (Honours) in Physics (Physics and High Technology) with thesis (with/without Co-op), a Bachelor of Science (Honours) in Physics (Medical Physics) (with/without Co-op), and a Bachelor of Science (Honours) in Physics (Medical Physics) with thesis (with/without Co-op). Students also have the option of combining their Honours Physics major with a major from another discipline.

The School also offers a Minor in Physics, as well as Major and Minor Concentrations for the Bachelor of Interdisciplinary Arts and Science.

**Enrolments**

**Undergraduate**

|                  | Fall 2012 | Fall 2013 | Fall 2014 | Fall 2015 | Fall 2016 |
|------------------|-----------|-----------|-----------|-----------|-----------|
| <b>Full-Time</b> | 66.5      | 57.5      | 68        | 63        | 60        |
| <b>Part-Time</b> | 13        | 16.5      | 6.5       | 14        | 9.5       |

**Graduate**

|                      | Fall 2012 | Fall 2013 | Fall 2014 | Fall 2015 | Fall 2016 |
|----------------------|-----------|-----------|-----------|-----------|-----------|
| <b>MSc Full-Time</b> | 8         | 7         | 8         | 9         | 14        |
| <b>MSc Part-Time</b> | 0         | 0         | 0         | 0         | 0         |
| <b>PhD Full-Time</b> | 6         | 5         | 2         | 5         | 4         |
| <b>PhD Part-Time</b> | 0         | 0         | 0         | 0         | 0         |

## Human Resources

### Faculty/Instructors

|   |   |
|---|---|
| Tenured/tenure-track faculty                          | 7 (including Head)  |
| Faculty members involved in graduate program delivery | 15 (7 tenured/tenure-track + 3 cross appointments + 2 professor emeriti + 3 adjunct appointments) |

### Full/Part-time Staff

|  |     |
|--|-----|
| Physics Laboratory Coordinator VII         | 1   |
| Electronics and Computer Technologist VIII | .75 |
| Secretary                                  | 1   |

## FINAL ASSESSMENT REPORT (with Implementation Plan)

### Significant Strengths of the Programs

The external reviewers noted that “[i]n general terms, the faculty in the Department of Physics carry with them a set of high standard of qualifications for their roles in teaching, research, and service, bringing with them an excellent research and scholarly record and a strong commitment to graduate education. They bring a broader background in terms or research areas and education than that found in many physics departments, which is a strength of this unit.” (ER, p.13) The “diversity and quality of the faculty research programs” and “the broad range of external collaborations, both in pure research and, in particular, through the industrial partnerships of some of the faculty” are the linchpins of the graduate programs; enabling the Department to deliver on an exceptional student experience by providing a strong foundation for graduate student research. (ER, p.16)

### Opportunities for Program Improvement/Enhancements

The Department has undertaken a number of initiatives to further strengthen its graduate program, including “improved oversight by the program leadership to monitor program admissions and time-to-degree progress to enable student success; the creation of topical mini courses at the advanced level; the inclusion of experts from external to the Department in its seminar course as part of a restructuring of this portion of the program; an initiative to take on a just-in-time teaching strategy on one graduate course [...]; and an initiative by the Department to introduce annual progress reports by students in the graduate program.” (ER, p.16)

While the external reviewers were emphatic in asserting that the “traditional teaching approaches that the faculty currently employ are highly effective for, and further, highly popular with the students”, they did note that “[s]maller class sizes offer a significant advantage in the area of application/development of innovative and effective teaching approaches and pedagogies” and encourage the faculty “to engage as a group to spend some time considering what opportunities there might be for more innovative approaches to instruction in the graduate classroom”. (ER, pp. 9,10)

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:** That the Department undertake a curriculum review of its PhD program to determine if students might be better served with more research focus and fewer course requirements in the doctoral program,

consistent with most other Physics doctoral programs in Canada. Further, the offering of 5 courses in quantum physics and quantum field theory is a heavy weighting in this area for a Canadian Physics program, and the Department might consider diversifying the course offerings by the occasional replacement of a quantum-related course with some other topic.

**Agents:** Department Head, Departmental Council

**Completion by:** Fall 2020

**Recommendation 2:** That the Department submit learning outcomes and assessment methods for each of its graduate courses that clearly correspond to the University's stated "Characteristics of a University of Windsor Graduate"; that the Department review and define its course assessment methods taking into consideration the feedback provided by the external reviewers on pp10-11 of their report; and that the Department provide a curriculum map, mapping its course learning outcomes to the program-level learning outcomes for each of its graduate programs.

*[PDC notes that program-level learning outcomes for each of its graduate programs have been developed and submitted as part of the Self-Study.]*

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

**Completion by:** Fall 2018

**Recommendation 3:** Given the productivity of the current limited faculty numbers and potential for alignment with University of Windsor's strategic plan, that the Department make a case to the Dean of Science for expansion of the current faculty complement, including but not limited to cross-appointments.

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

**Completion by:** Fall 2018

**Recommendation 4:** That the Department of Physics undertake a thorough and self-critical assessment of its current space allocation and usage, with an eye to (a) identifying and prioritizing its space needs, (b) locating opportunities to address such needs through effect use and/or repurposing of its existing space, including clear budgeting requirements for the latter, and (c) identification of the remaining space shortfall, if any, in order to have a complete and compelling case for future requests for additional space for the Department.

**Agents:** Department Head

**Completion by:** Fall 2018

**Recommendation 4:** That the Department continue its investigation into the feasibility of launching a professional Master's degree in the area of Medical Physics, including range of interest and resource implications, and that it report on its findings.

**Agents:** Department Head, Physics faculty members, Dean of Science

**Completion by:** Fall 2018

**Recommendation 5:** That the practice of requiring annual progress reports from its graduate students be continued, and that it be supplemented by the early creation of graduate student supervisory committees, ideally within the first year of studies, and annual meetings of the students with their committees.

**Agents:** Department Head, Department Council

**Completion by:** Fall 2018

**Recommendation 6:** That the Department of Physics report on its program to review and assess lab safety within the Department.

**Agents:** Department Head, Dean of Science, Department of Health and Safety

**Completion by:** Fall 2018

**Recommendation 7:** That the Department of Physics institute and report on a program to examine a currently under-tapped opportunity for interdisciplinary collaboration within the University of Windsor. These collaborations could relate to research, research support, teaching, and administrative opportunities.

**Agents:** Department Head, Physics faculty members

**Completion by:** Fall 2018

**Recommendation 8:** That the Department of Physics launch a strategic exercise to bring together the above recommendations and present itself, its qualities, and its opportunities to the Faculty and the University in a positive, pro-active, and collaborative light in order to justify its current high level of activity and potential new value to the University, its Strategic Plan, and the need for the University of Windsor to maintain and expand its leadership in basic science. One way to gain information to represent itself and gage program effectiveness could be through the use of student exit interviews and the Department is encouraged to consider and report on the viability of launching a program of exit interviews of graduating students in the future.

**Agents:** Department Head, Dean of Science, VP Research and Innovation

**Completion by:** Fall 2018

**Recommendation 9:** That the Department report on the operations and maintenance of the student machine shop.

**Agents:** Department Head

**Completion by:** Fall 2018