

UNIVERSITY OF WINDSOR
UNIVERSITY PROGRAM REVIEW (UPR)
REPORT ON: Physics
 UNDERGRADUATE AND GRADUATE PROGRAMS
 January 2021

EXECUTIVE SUMMARY

Review Preparation

In preparing this document, the Program Development Committee reviewed the following: Physics' Self-Study (SS) (2017/2018), the report of the external reviewers (ER) (March 2020), the response from the Department Head (HR) (June 2020), and the response from the Dean (DR) (June 2020) to the above material. The external reviewers were: John de Bruyn, Department of Physics and Astronomy, University of Western Ontario; Adam Sarty, Department of Astronomy and Physics, and AVP Research and Dean of Graduate Studies and Research, Saint Mary's University; Iain Samson, School of the Environment, University of Windsor.

Undergraduate and Graduate Programs

At the undergraduate level, the Department offers an Honours Physics (with/without Co-op and with/without Thesis), Honours Physics (Physics and High Technology) (with/without Co-op and with/without Thesis), Honours Physics (Medical Physics) (with/without Co-op and with/without Thesis). Students also have the option of Combining their Honours Physics with a major from another discipline.

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

At the graduate level, the Department offers a Master of Science (MSc) in Physics, with a thesis option, major paper option, and course-based option, and a Doctor of Philosophy (PhD) in Physics.

Enrolments

Undergraduate

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Full-Time	60	62	58	59	63.5
Part-Time	9.5	3.5	3.5	6	8.5

Graduate

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Full-Time	18	13	12	8	9
Part-Time	0	0	0	0	0

Human Resources

Faculty/Instructors

Tenure/tenure-track faculty	8 (including the Head)
Faculty members involved in graduate program delivery	8

Full/Part-Time Staff

Physics Laboratory Coordinator	1
Secretary	1

FINAL ASSESSMENT REPORT (with Implementation Plan)

Significant Strengths of the Programs

The External Reviewers commended the Department on the revisions to its undergraduate and graduate programs since the last review, most notably a new first year-course, "From Symmetry to Chaos in the Universe," which provides an "innovative way of introducing mathematical and computational methods and some advances physical concepts very early in the undergraduate curriculum", as well as the "initiative to share the teaching of core graduate courses with a consortium of other universities, using real-time tele-delivery" ensuring more course options to graduate students. (ER, pp.2-4, p.9, p.10)

The Department is comprised of highly qualified and dedicated faculty members, with strong research records. (ER, p.7) Its smaller student:faculty ratio enables stronger student-faculty engagement and the provision of a greater number of research opportunities for undergraduate and graduate students. (ER, pp.7-8, p.11; SS, p.135) As noted by the External Reviewers, "[a]ll faculty in the department have ongoing research programs that involve graduate and undergrad students. The department emphasizes the importance of research opportunities in its undergraduate programs. This contributes to the intellectual quality of the student experience." (ER, p.9)

Opportunities for Program Improvement/Enhancements

While the External Reviewers commended the Department on recent revisions and ongoing efforts to improve its undergraduate and graduate curriculum, including modernization of lab content and delivery. (HR, p.3) Associated with this is the need to address under-utilized research labs, IDIR office space, and machine shop space. (ER, pp.4-5; HR, p.5) Further, the Department in its Self-Study that it will now turn its attention to increasing "the number of high-impact experiential opportunities in research laboratory settings and improvements in teaching and learning engagement in the classroom", thereby further improving the student learning experience and engagement. (SS, p.135)

The External Reviewers commended the Department on its strong undergraduate enrolment numbers, compared to other Canadian Physics departments (ER, p.7), and offered the following suggestions for continued enrolment growth: 1) that there be greater promotion of the co-op option to students and employers, noting that not all physics work needs to be research work and that "a physics co-op student has much the same skill set and capabilities as a typical engineering student" (ER, p.6, p.11); 2) that the Department lessen its emphasis on "research-readiness" outcome of its programs, in favour of a shared focus with "industry readiness" (ER, p.10); and 3) that the Department consider innovations to its graduate program, such as partnering with Michigan universities on colloquia talks, research visits, or collaborative teaching and research. (ER, pp.10-11)

These and other 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 response from the Department Head, and the Dean's response.)

Recommendation 1:

That the Department:

- a. submit program learning outcomes which the thesis and co-op options of its undergraduate programs.
[Program LOs have been submitted for undergraduate and graduate programs but do not differentiate between thesis, co-op, and regular options at the undergraduate level.]
- b. submit learning outcomes and assessment methods for each of its undergraduate and graduate courses that clearly correspond to the University's stated "Characteristics of a University of Windsor Graduate", through the required university internal approval process.

[Course level learning outcomes were submitted in the Self-Study for all undergraduate courses with the exception of PHYS-2980, PHYS-3980, PHYS-4980, PHYS-4200, PHYS-4600, PHYS-4679 and PHYS-4900, and are included in the February 2021 Senate package. Course-level learning outcomes for graduate courses are still outstanding with the exception of PHYS-8000, PHSY8160 and PHYS-9000.]

c. as part of its curriculum review under recommendation 5, complete and submit revised curriculum maps for each of its undergraduate and graduate programs through the university internal approval process.

[Physics is commended for developing curriculum maps for its current programs which it undertook prior to the launching of the CUMA database. As part of its next curriculum review, Physics is asked to use the CUMA database for curriculum mapping. PDC notes that all approved program and course learning outcomes are uploaded in this database making the mapping exercise more seamless.]

d. ensure that course syllabi make explicit reference to the primary learning outcomes associated with the course.

Agents: Departmental Council, Head, CTL

Completion by: Fall 2022

Recommendation 2: That the Department report on its efforts to assign the teaching of first-year classes to regular, full-time faculty.

Agents: Head

Completion by: Fall 2022

Recommendation 3: That the Department continue to encourage and report on the use of interactive-engagement tools and pedagogies, such as classroom response systems, in large first-year classes to enhance both peer-to-peer engagement and professor-student engagement during classes.

Agents: Head, faculty members, CTL

Completion by: Fall 2022

Recommendation 4: That the Department report on its efforts to reduce the number of undergraduate low-enrolment sections by restructuring courses and modifying course sequencing and prerequisites.

Agents: Department Council, Head

Completion by: Fall 2022

Recommendation 5: That the Department report on its review and revision of the purpose, content, and delivery of the Graduate Seminar course; continuation of the status quo for the Graduate Seminar course is not advised.

Agents: Department Council, Head

Completion by: Fall 2022

Recommendation 6: As the Department moves forward with its planned revisions to its MSc program, that it investigate and report on the feasibility of offering alternative formats for the MSc program, particularly formats involving industrial internships and collaborations.

Agents: Department Council, Head

Completion by: Fall 2022

Recommendation 7: That the Department develop and report on its plan to ensure that progress of all graduate students is monitored, and that supervisors, students, and supervisory committees work collectively to ensure timely completion of graduate degrees.

Agents: Head, faculty members

Completion by: Fall 2022

Recommendation 8: That the Department ensure that supervisory committees, with membership drawn from all Departmental faculty, be assigned for each graduate student early in their program, and that they meet with the student at least annually.

Agents: Head

Completion by: Fall 2022

Recommendation 9: That the Department report on its efforts to renovate and modernize space including:

- a. moving forward with the disposal or sale of the unused machinery in the former department machine shop with proceeds possibly to be directed towards cleaning up other space in the department.
- b. the development of a student machine shop.
- c. upgrading of the space allocated to undergraduate teaching labs.

Agents: Head

Completion by: Fall 2024

Recommendation 10: That the Department make a case to the Dean of Science and the VP, Research and Innovation for:

- a. a review of the use of the contract research space in Essex Hall that is currently assigned to IDIR, and with the possibility of a negotiated reassignment of the space to the Department of Physics investigated.
- b. a plan to meaningfully compensate the Physics Department for the loss of teaching capacity related to relief provided to faculty members associated with their work in the IDIR, as well as for other costs/impacts it bears as a result of IDIR research contracts.
- c. an investigation into the provision of technical support to the Department by IDIR, ideally leading to a formal agreement/MOU to ensure sustainability of the support.

Agents: Head, Dean of Science, VPRI

Completion by: Fall 2024

Recommendation 11: That the Department make a case to the Dean of Science for an additional administrative assistant position, possibly shared with other departments within the Faculty of Science.

Agents: Head, Dean of Science

Completion by: Fall 2024

Recommendation 12: That the Department report on its efforts to encourage and facilitate the diversification of research funding sources (*eg*, involvement in the Faculty of Science Extension Science program that supports the development of partnerships with industry, involvement in the new WE-SPARK Institute and opportunities for medical funding, *etc.*)

Agents: Head

Completion by: Fall 2022