



Final Assessment Report and Implementation Plan

Cyclical Program Review

Master of Science in Physics

August 2014

Graduate Cyclical Program Review: Department of Physics Final Assessment Report and Implementation Plan August 2014

Master of Science in Physics

Review Team

Dr. Jeff Hutter
Associate Professor (Department of Physics and Astronomy) and Associate Dean
Faculty of Science, Western University

Dr. Bill Whelan,
Professor of Physics
University of Prince Edward Island

Dr. Todd Randall
Associate Professor and Chair (Geography)
Lakehead University

Background

In accordance with the Lakehead University Institutional Quality Assurance Process (IQAP), a final assessment report has been prepared to provide a synthesis of the external evaluation and internal response and assessments of the Master of Science in Physics program delivered by the Department of Physics. This report identifies the significant strengths of the program, the opportunities for program improvement and enhancement, and sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the Final Assessment Report; who will be responsible for providing any resources made necessary by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations; who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

Review Summary

The Department of Physics submitted a Self-Study (Fall 2012). Volume 1 presented the program descriptions and outcomes, an analytical assessment of their programs, and program information including a student survey along with institutional information and statistical data. Volumes 2 and 3, respectively, provided a collection of the program course outlines and the CVs for each full-time member in the Department.

Two external reviewers and one internal reviewer, selected by the Senate Academic Quality Assurance Sub-Committee (SAC-QA) from a set of proposed reviewers, examined the materials and completed a two-day visit (June 19-20, 2013). The visit included meetings with the Provost and Vice-President (Academic), Acting Vice-President (Research, Economic Development and Innovation), Deputy Provost, Dean of the Faculty of Science and Environmental Studies, Dean and Manager of Faculty of Graduate Studies, University Librarian, core and adjunct faculty, Department Chair and Graduate Coordinator, technical and support staff, and current students. The Review Team toured University and off-campus resources including facilities at the Thunder Bay Regional Research Institute (TBRRI) and the Thunder Bay Regional Health Sciences Centre (TBRHSC).

In their report (August 2013), the Review Team provided feedback that describes how the Master of Science in Physics program meets the Quality Assurance Framework evaluation criteria and is consistent with the University's current mission, Academic and Strategic Plan priorities. The admission standards, curriculum structure and delivery, and teaching and assessment methods are appropriate, reflect the current state of the discipline, and are effective in preparing graduates to meet defined outcomes and the University's graduate degree level expectations.

The Department makes effective use of available resources. The faculty members are active in research and have secured external funding that is used extensively to support students in the physics program. The Review Team was impressed by the positive attitude and strong program endorsement displayed by the group of students who were interviewed. The Review Team provided recommendations with supporting rationale for future consideration.

Program Strengths and Opportunities for Improvement

Strengths

- Students appreciate the access to supervisors, high quality research equipment (both in individual and shared laboratories, e.g. LU Instrumentation Lab), computing and library facilities and excellent training opportunities.
- Students experience the transfer and assessment of research findings through both oral (minimum two presentations) and written (co-authoring peer-reviewed publications is common) formats and exposure to an external (to the University) thesis examiner.
- Faculty members publish in high quality journals and secure highly competitive funding.
- Quality indicators such as student time to completion (2 years), zero attrition rate, and experienced, tenured faculty teaching courses lead to students placing a high level of confidence in department leadership.

- Pilot project for funding international students (cost sharing and revenue return) along with strong faculty funding has begun to address this recruitment challenge.

Opportunities for Improvement

- Enhanced recruitment, especially of international students, will benefit from additional funding initiatives and ensure program viability; a departmental commitment to a minimum level of funding for each student (e.g. \$20K per annum) may be helpful.
- Ensure course outlines accurately reflect student assessment plan, membership and organization of student advisory committees (e.g. frequency of meetings).
- Consider engaging adjuncts more often in teaching of existing courses and/or creation of new courses.
- Encourage faculty to investigate non-traditional funding sources.
- Consider the development of a Medical Physics program in terms of resources (e.g. library holdings, accreditation) and potential benefits.
- Explore additional ways (e.g. video-conference) to include external thesis examiners in the actual defense as well as interact with the department and students (e.g. guest lectures).

The Graduate Coordinator for the Department of Physics submitted a response to the Reviewers' Report (December 2013). Specific recommendations were discussed, and clarifications and corrections presented.

Key Recommendations and Department Responses

1 Enrolment – The reviewers noted that higher enrolment would be desirable, both to increase the research intensity of the Department and to provide more opportunities for peer interactions within the student cohort. The Review Team recommended increasing enrolment to 5-6 students per year, such that there is a total of 10-12 graduate students in the program's thesis stream at a given time.

The Department responded that an intake of 5-6 students per year is realistic. However, there are a number of challenges limiting the growth of the program, such as:

- a) The Physics program is historically highly dependent on international students. It is currently very difficult to make competitive offers to international students due to a number of institutional policies, as acknowledged by the reviewers. In the short term, there will remain untapped capacity unless these policies are changed.

- b) As the reviewers mention, due to changes in the Discovery Grant program, several faculty members have either lost their grant or received reduced funding. This does limit our ability to attract students, particularly international students. Faculty members are looking for alternate funding opportunities from NSERC and other foundations beyond the Discovery Grant program. Several faculty members currently hold research grants from other NSERC programs, i.e. CREATE and CRD which are partnered with industry.

2 Adjunct Faculty – The reviewers’ recommended that adjunct faculty become involved in all aspects of program delivery, including student supervision/co-supervision, student advisory committee membership and course instruction. Team teaching and guest lecturing opportunities should be explored within the course delivery to better engage adjunct faculty and to ensure their expertise is best utilized to enhance student training / experiences.

The Department responded that at present graduate students in the program are required to take two of three “core courses” (Solid State Physics, Quantum Mechanics and Statistical Mechanics). Other courses required for the degree (one FCE) are chosen based on recommendations of the student supervisory committee. As the reviewers’ suggest, it would be beneficial to expand our course offerings by involving adjuncts, however, the Department must be ensure this does not dilute enrolment in our current offerings. At this time, some adjunct faculty are offering special topic courses related to medical imaging and the Department is exploring the possibility of more.

3 Course Outlines – The reviewers’ recommended that course outlines accurately reflect the student assessment plan, specifically with respect to whether the assessment includes a final examination.

The Department responded that they are not aware of any inconsistencies in the course outlines. In response to the reviewers’ concerns, however, and to ensure this is not the case going forward, the Department will systematically request that course outlines for all graduate courses be supplied to the Graduate Coordinator and kept on file. Furthermore, most of the core courses have a final exam whereas some special topic courses may rely on different forms of assessment such as presentations, developing a computer program, etc. Regardless, course outlines must clearly identify the student assessment plan.

4 Student Advisory Committees – The reviewers recommended expanding the membership of student advisory committees to at least three faculty members (including the student’s supervisor) and reducing the frequency of meetings to a minimum of twice per year (i.e. every 6 months).

The Department responded that they will encourage advisory committees to meet at least twice per year. Also, contrary to the comments of the reviewers, the Advisory Committee currently consists of three faculty members, and in the case of co-supervision a fourth member is required.

5 External Examiners – The reviewers recommended providing financial support to facilitate the attendance of external examiners at thesis defenses, which would provide an opportunity to share research expertise and experiences with existing graduate students (e.g. give a research presentation) and could open up new opportunities for future collaborations.

The Department responded that their current policy of selecting a thesis examiner external to the University exceeds the requirements of the Faculty of Graduate Studies. The Department believes an external examiner is an important quality measure for the program and also serves to highlight the research accomplishments of our students and faculty members to the wider physics community. While not denying the advantages of bringing the external examiner in to attend the thesis defense, the costs likely make this prohibitive. Recently, some examiners have attended the defense via videoconference and the Department sees this practice expanding.

6 Student Recruitment – The reviewers recommended increasing and enhancing student recruitment activities, e.g., at graduate fairs such as at the Canadian Undergraduate Physics Conference (CUPC), outreach to community, etc. The CREATE Program, which employs undergraduate students at the TBRRI, exposes them to medical imaging projects and is a tremendous recruitment opportunity.

The Department is planning to send an undergraduate student to the Canadian Association of Physicists Undergraduate Physics conference. Also, we are recruiting students that are currently involved in the undergraduate medical imaging project to our graduate program. [Note: Call for applications for Summer School on Medical Imaging" will be posted in the Physics Website to improve student's awareness.]

7 Student Support – The reviewers recommended the Department's current goal of providing a minimum graduate student support of \$20,000 annually be implemented and advertised as a policy to aid in recruiting efforts.

The Department responded that all students have received at least \$20,000 per annum. While willing to advertise this to recruit students, the Department is hesitant to implement this as a strict policy. Such a policy would prevent students from working with faculty members in the program without the financial resources to provide this level of support.

8 International Student Support - Internationalization is a priority of Lakehead University, yet support to recruit and fund international students is limited. Such financial support will be critical in order to meet enrolment targets for the MSc program. Funding mechanisms such as returning tuition credits to faculties to offset international student tuition and innovative cost-sharing agreements between the University and researcher (such as that initiated by the Provost this past year) need to be expanded.

As stated in an earlier response, due to a number of institutional policies, it is extremely hard for the Department to recruit international students. The Department believes graduate assistantships should be awarded to the most qualified international and

domestic students. The Department firmly agrees with the reviewers that changes in these policies are critical to meet the enrollment targets for the program.

9 Medical Physics Stream – The reviewers recommended developing a medical physics stream. Success of this new stream would be dependent on the participation of adjunct faculty at BRR and TBRHSC in course development/delivery and student supervision. Without their direct involvement, such a program would not be viable as student access to clinical expertise infrastructure is a hallmark of most successful medical physics programs.

The Department noted that pursuing a degree in Medical Physics is not possible at this time however they are actively planning for a graduate degree with an emphasis on Medical Imaging. This is much more feasible (i.e. does not require external accreditation) and builds upon existing strengths among faculty and adjuncts in the Department.

Implementation Plan (Part A): Department of Physics Follow-up Responsibilities

Recommendation	Proposed Follow-up	Responsibility*	Timeline
Explore ways to increase enrolment, especially of international students	Develop a recruitment and enrolment plan that considers targets for numbers, funding and timelines and reviews policies affecting allocation of Graduate Assistantships	Physics Chair and Graduate Coordinator; Dean Faculty of Graduate Studies	Initial Actions 2014-2015; follow-up ongoing
Explore opportunities to augment course offerings and more fully engage adjunct faculty and external examiners	Continue to identify opportunities (esp. in Medical Imaging) and establish next steps	Physics Chair and Graduate Coordinator	Initial Actions 2014-2015; follow-up ongoing
Review course documentation and student advisory committees	As part of the ongoing curriculum review process, consider course outlines, committee structure and functioning	Physics Chair and Graduate Coordinator	August 2015; follow-up ongoing
Consider development of a new Medical Imaging program	Establish a task force to explore a new field/specialization in Medical Imaging including requirements (if any) for accreditation; identify next steps	Physics Chair and Graduate Coordinator; Dean Faculty of Graduate Studies	Initial Actions 2014-2015; follow-up ongoing

Implementation Plan (Part B): Decanal and Administration Follow-up Responsibilities

Recommendation	Proposed Follow-up	Responsibility*	Timeline
Explore additional funding options for research and student support	Develop a plan to review existing pilot projects, identify opportunities and establish next steps	Physics Chair and Graduate Coordinator, Dean Faculty of Graduate Studies, VP REDI	Initial Actions 2014-2015; follow-up ongoing

*The Dean of the Faculty, in consultation with the Department Chair, shall be responsible for monitoring the Implementation Plan. The details of progress made will be presented in the Dean's Annual Reports and filed in the Office of the Provost and Vice-President (Academic).