Annual Academic Assessment Report Cover Sheet

Program Information:

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<td>Department Chair</td>
<td>Steen Madsen</td>
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<td>Assessment Coordinator</td>
<td>Gary Cerefice, Graduate Program Coordinator</td>
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Please attach a narrative (not to exceed 4 pages, excluding appendices) addressing the following:

- What are the student learning outcomes? Please provide a numbered list.
- Which learning outcomes were assessed?
- How were they assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What was learned from the assessment results?
- How did the program respond to what was learned?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
**Student Learning Objectives**

The goal of the Master of Science in Health Physics Program is to provide a high-quality graduate education experience for students in the fields of medical and health physics. The program consists of two sub-plans targeting the primary paths to employment: Environmental Health Physics (EHP) and Medical Physics (MP). The EHP sub-plan is accredited by the Accreditation Board of Engineering and Technology (ABET, 2015) and the MP sub-plan is accredited by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP, 2014).

The academic program consists of a common core coursework shared by both sub-plans, augmented by discipline-specific coursework and thesis research. The student learning objectives are developed at the program level, and are addressed primarily through the common core courses. Sub-plan specific courses supplement the core courses on the SLO’s and serve to deliver additional content to ensure students meet the requirements of the accrediting bodies.

**Student Learning Objectives (SLO)**

1. Graduates able to demonstrate knowledge of theoretical fundamentals of health physics
2. Graduates competent in advanced disciplines related to health physics
3. Graduates capable of assessing and solving problems related to health physics
4. Graduates will have had “hands-on” experience with experimental equipment and techniques and abilities to analyze data and develop reports
5. Graduates able to gain practical experience with state-of-the-art equipment and software
6. Graduates able to write technical documents
7. Graduates able to communicate with technical & non-technical audiences
8. Graduates able to function within a team
9. Graduates able to participate in the research process and disseminate results
10. Graduates cognizant of the need for life-long learning and professional responsibility
11. Graduates exposed to professional practice
12. Graduates able to interact with professionals in a less formal setting
13. Graduates exposed to health physics and medical ethics
14. Graduates cognizant of the need to understand socio-cultural, political, and environmental issues related to health physics

**Assessment Activities – 2015**

Our accrediting bodies require an annual self-evaluation of the program, program objectives, student learning objectives and performance. This self-evaluation is performed as part of the end of the academic year program faculty meeting. The annual self-evaluation is focused on the performance of the students and feedback on courses from the previous year (FA and SP terms), performance on the oral examinations, and thesis defenses with the intent of addressing any immediate concerns or issues with the program content and direction. As part of the self-assessment process, the faculty will also review the alumni and employer feedback on alumni performance and capabilities to identify any concerns or deficiencies. The program faculty will also meet with our external review committees (for EHP and MP) to discuss and evaluate the program outcomes, student learning outcomes, and the feedback gathered over the course of the academic year. This year’s assessment process was performed with additional emphasis regarding SLO’s 1 to 5 (students acquiring key competencies for their career paths). These SLO’s
tie directly into the graduate program level requirement: “the development of extensive knowledge in the field under study”.

Performance of the academic program with regards to the SLO’s was evaluated directly by the faculty involved in teaching the courses by comparing student performance on assignments, quizzes, exams, reports, and presentations against the course and program expectations as well as against previous year’s student performance. Student evaluations of the course provided feedback to the instructor as well as the department chair on the content relative to program objectives. The performance of students in the comprehensive oral examination also provided feedback on areas that need improvement in the program.

In addition to the data and observations from classroom performance, the program was also assessed through exit interviews with graduating students (2 this cycle). The preparation of students for the workforce was assessed by surveying alumni’s employers (3 responses this cycle). We also had two students take their national board exams during the past year.

We also held two external advisory committee meetings: the Environmental HP external advisory board May 19, 2015 and the Medical Physics external advisory board Dec. 8, 2015. As part of these meetings the department faculty and external advisors reviewed the program SLO’s and accreditation program goals, curriculum, student performance, and program performance.

**Assessment Results / Lessons Learned**

Based on student performance in the coursework and on the cumulative oral examination it became apparent that additional training/practice in problem solving techniques, particularly for “real world or word problems”. Students also had problems applying professional judgment in interpreting data and making reasonable assumptions to address open-ended problems. From student feedback and a review of the program curriculum, a problem was identified with the content of the radiation transport class: content on shipping radioactive materials was added to the course instead of numerical techniques for solving particle transport/shielding problems.

From the student exit interviews, students in the MP track requested that more clinical opportunities be made available during the MS program. Employer surveys indicated no concerns with recent graduates (in fact, all indicated that the alumni were all well prepared). However, all of the employer surveys were for alumni from the EHP track, so it is unclear if the concern about clinical preparation raised by the students is echoed by employers. In reviewing student performance, the mean time to graduate and complete the thesis work seems to be slipping towards 2.5 to 3 years.

Five students took the department comprehensive oral exam, with 4 passing on the first try (the fifth passed the second time). During the oral exam, students all demonstrated a good fundamental understanding of the principles of health physics. Students did show some concerns in a reluctance to interpret data or make reasonable assumptions for problem solving. Two students took the ABR part 1 exam, with one student passing the clinical portion and the other passing the physics portion. Performance on the oral exam and the ABR are typical of past graduates from the program, although a student passing the clinical portion of the ABR and not the physics was unusual (program students usually pass the ABR physics portion and struggle with the clinical).
Program Responses (“Closing the Loop”)

HPS 703 (Radiation Transport) has been updated to remove the section on the shipping of radioactive materials. This section will be replaced with additional problem solving for radiation shielding and external dose assessment using numerical techniques. All of the first year courses (701, 730, 602/603, and 703) will be revised for their next offerings to incorporate more problem solving and interpretation of results to provide students more opportunities to practice these skills.

Based on previous feedback, as well as guidance from our accrediting bodies during the site visits, the department seminar course has changed to incorporate at least one group project every semester. HPS 616 (advanced health physics) will be redesigned for SP16 to end with a group design project in health physics. These changes are intended to address the program requirement and SLO promoting working in teams (SLO 8).

To address the low pass rate for the ABR part I clinical portion, the second year courses for the MP track (740, 742, 742L) will be revised to spend additional time preparing students for a clinical environment. The addition of HPS 790 (oncology clinical training) in collaboration with Varian should also help provide more clinical opportunities for students.

The primary concern observed in this last assessment round was the time to degree completion slipping towards 2.5 to 3 years. The primary factor appears to be students delaying their thesis work until the completion or near completion of their coursework. To address this issue, we will be changing the program requirements to require students to select their thesis advisor within their first semester in the program. This will hopefully pair students with mentors earlier in their program and provide the support and encouragement to begin work on their thesis earlier. Another factor in this slippage is the lack of graduate assistantships over the summer, resulting in students leaving the program for the summer months. While faculty are attempting to resolve this gap with external research funding, additional state support for state GA’s over the summer could also be useful in supporting students performing thesis work over the summer.