Annual Academic Assessment Report Cover Sheet

Program Information:

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<th>Program Assessed</th>
<th>M.Sc. of Physics</th>
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<td>Department</td>
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<td>Department Chair</td>
<td>Stephen Lepp</td>
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<td>Assessment Coordinator</td>
<td>Michael Pravica</td>
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<td>Date Submitted</td>
<td>01/05/17</td>
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Contact Person for This Report

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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.

1. Graduates of the program are expected to be successful in pursuing careers in the direct practice of physics or further education in more advanced programs in physics or related fields.

2. Graduates of the program are ready to be team contributors or leaders, capable of collaboration and thinking independently.

3. Graduates of the program are trained to be effective communicators (both orally and in the written word) professionally and socially.

4. Graduates of the program are prepared through coursework and cutting-edge research to be professional problem solvers and analytical thinkers.

5. Graduates are expected to possess the ability to work in the laboratory, understand how to take and analyze experimental data and/or generate
Which learning outcomes were assessed?  **All outcomes were assessed (1-5).**

How were they assessed?  (Programs must use at least one direct assessment of student learning.)  **Our primary tools of assessment lie in the thesis requirement. The masters candidate presents his/her thesis work in written form (the thesis) and in oral form (the defense). Outcomes 1-5 are assessed during this time. We also conduct an exit interview with all of our students to partially-assess outcome 1 and via subsequent contact with the students after graduation.**

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.  **Not applicable as this is a graduate degree.**

Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:

6. student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
7. activities requiring originality, critical analysis and expertise.
8. the development of extensive knowledge in the field under study.

For the masters of science in physics degree, we assess outcome 6 in particular and, to a lesser extent, outcomes 7 and 8.

Though students are not required to publish peer-reviewed papers for their thesis, we strongly encourage it. With few exceptions that I am aware of, most of our students do publish at least some of their work in scientifically-based peer-reviewed journals. They are also strongly encouraged to present their research at various UNLV, local, regional, national and international conferences. For example, one of Prof. Pravica’s students, Daniel Sneed, who graduated from UNLV with B.Sc. and masters degrees in physics is currently a Ph.D.-seeking student within our graduate program. He won the “Outstanding Poster” award from the US Department of Energy/Stockpile Stewardship meeting on matter subjected to extreme conditions three times when he was a masters-seeking student. Every year, at least five of our graduate students attend this meeting. Another masters-seeking student of Prof. Pravica’s (David Goldberger) shared the “Audience Choice” award in this Fall’s (2017) “Rebel Slam” competition organized by the UNLV graduate college.

A number of our graduate students also participated in various summer schools/workshops as well as were awarded research internships at Los Alamos and Lawrence Livermore National Laboratories (LANL and LLNL). These experiences are intended to aid the students in developing their thesis projects, improving their research skills, and exposing them to US Department of Energy facilities and research challenges that are tackled by these facilities.

During the masters-seeking student’s career, he/she are expected to hold yearly meetings with their thesis committee and discuss progress (both course-related and thesis-related) by giving a presentation discussing their progress. The student’s progress is judged during these meetings by private conversations amongst the committee members.

Finally, our department has also instituted a policy to have the Assessment Coordinator interview all graduating undergraduates one-by-one. Questions from a standard template are asked and recorded. There is a problem that many graduating students have not seen Prof. Pravica and it is difficult for him, with all of his duties as the Physics and Astronomy’s Assessment coordinator, College of Sciences representative of
What was learned from the assessment results?

The faculty have made great strides in improving the quality and expectations of the masters thesis. We have found that the requirement of graduate students to meet with their thesis committee at least yearly has been very instrumental in identifying potential problems early and help them develop their thesis project and focus on the research problem sooner. As a result, we have observed a reduced average time for our students to complete and defend their masters thesis on average.

From the exit interview data gathered, students have complained about the lack of offerings of important graduate courses that they need to graduate. This is in part due to a paucity of physics professors as a number have either retired (e.g. John Farley and Jim Selser) or have passed away (e.g. Prof. Lon Spight). There was also some criticism of the varying level of teaching and supervisory quality with some professors (allegedly) leaving class early (e.g.). As result, some students didn't feel that they learned as much as they should have for some classes. Some students explained that they like professors who teach via the blackboard/whiteboard rather than powerpoint and use clickers which do not teach students the nuts and bolts of problem solving but rather bullet points/concepts. Some courses used math which some of students explained that they had not formally studied yet. Various textbooks were criticized as being too outdated. There were some issues pertaining to high drop out rate in certain courses taught by certain professors. In these courses, there can be (according to the students) arbitrary and spontaneous rules set by the professor in question beyond what was stated in the syllabus to such an extent that they were totally unaware of their current grade (e.g. before the drop date) leading to great stress, confusion, uncertainty, and eventually many dropping the class in question. Some of them asked for other professors (including myself) to teach the required upper-division courses in question. Prof. Pravica spoke with the Chair (Stephen Lepp) about the students's concerns and from his (Lepp's) point of view, maintaining standards for our department was of critical importance and for the courses in question, he felt that the instructors were well suited to maintain those standards. He nevertheless agreed that it would be helpful to rotate faculty in some of the upper division required courses from time to time.

On the positive side, students in general felt that by having significant research experience and exposure as an graduate student and writing a thesis, they were well prepared for pursuing further graduate studies (i.e. Ph.D. level) and lifelong learning. All students interviewed felt that their UNLV physics graduate education would help them succeed. In general, the students felt that their UNLV physics graduate education was excellent and were all largely satisfied. We also are developing a tremendous track record of having our students continue on to further their studies via graduate school (both here at UNLV and elsewhere) and/or other training.

The High Pressure Science and Engineering Center (HiPSEC) within our physics and astronomy department continues to receive feedback from the US Department of Energy (DOE)/NNSA on our efforts to train the next generation of America's weapons scientists based on regular site visits/reviews. The feedback has in general been very positive. Many of our students regularly travel to national and international laboratories such as the Advanced Photon Source (APS) and Canadian Light Source (CLS). Faculty members are explicitly encouraged to bring students with them to conduct experiments.

10/2014
Unfortunately, HiPSEC was informed last November (2017) that the funding will not be renewed. This is a great loss to the department. We as a department have had a meeting to discuss the anticipated difficulties and challenges associated with the loss of this major funding. Prof. Pravica has separate funding from HiPSEC until next September as do other members of HIPSEC (e.g. Prof. Salmat) and they are continuing to involve students in research both at UNLV and at international facilities such as the APS and CLS. They are also aggressively seeking alternative funding sources to continue student research in condensed matter physics at UNLV.

Finally, we have had a problem where some UNLV physics undergraduates have sought admission into the UNLV physics Masters-seeking graduate program but were repeatedly denied based on their undergraduate cumulative grade point average. They have taken courses as non-admitted students in the UNLV physics and astronomy department but, despite passing their graduate-level courses with a “B” or better, were still denied admission. I feel that this is problematic and will harm our graduate program. Students need to be given better guidance and more guarantees of admission via a better-articulated and departmentally-agreed on roadmap to admission. Prof. Pravica is engaged in discussions with Prof. Lepp on how to streamline the admissions process.

☐ How did the program respond to what was learned?

The Assessment coordinator has met with the Chair to discuss results of the exit interviews. We have also hired a tenure-track experimental condensed matter physicist (Ashkan Salmat), two tenure-track astrophysicists (Jason Steffen and Rebecca Martin) and a tenure-track condensed matter theorist (Quiang Zhu). These hires were instituted to replace retired or deceased faculty and help ease the burden for teaching graduate-level courses.

Due to the suggestions made by the NNSA reviewers, we have made more efforts to encourage our students to apply for research-based internships (e.g. at Los Alamos or Lawrence Livermore National Labs) as well as summer school workshops for our graduate students. We feel that the efforts will aid the students in making positive contacts with scientists at these DOE-run facilities which may aid them when later seeking employment.

The department continues to debate the best means to formally train graduate students on public speaking and the process of researching, reading and digesting peer-reviewed papers. The late Prof. Lon Spight taught a one credit graduate-level seminar in the past but has since passed away. Prof. Ashkan Salmat organizes a “Condensed Coffee” for students (mostly from his research group) where the latest state-of-the-art research papers are presented by one of the students (including graduate students) once a week and discussed. HIPSEC also organizes a seminar every week where, barring an invited speaker, one student talks about a paper or topic. The problem with these efforts is that they are voluntary and often students don’t participate. We are actively discussing means to encourage student participation in these types of educational events which may include making a new seminar course for credit. We strongly encourage applying students to take the GRE Physics exam but for a variety of reasons, we have in the past accepted students into the program who had not taken the GRE. With Prof. Victor Kwong (Graduate physics coordinator), we are working to ameliorate this issue. The topic is also frequently discussed among our faculty.

Finally, discussions are ongoing on how to aid students to forgo the Masters program if they successfully pass the qualifying exam and directly enter the Ph.D. program which will enable them to save time in not having to write a masters thesis and concentrate instead on the doctoral thesis. We have also learned that generally the best prepared students to pass the qualifying exam are the students who were undergraduate physics majors at UNLV.