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.

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 Physics 413 (Intermediate Laboratory) and Physics 493 (Senior Thesis) courses. Performance in Physics 413 is used to assess learning outcomes 2-5. Performance in Physics 493 is used to assess learning outcomes 1-5. 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.

For the introductory laboratory course (Phys 180-182), we use a laboratory practicum exam which is 50 percent of their grade. The instructors specifically determine the students’ proficiency of practical laboratory skills (e.g. setting up/connecting to a circuit and reading values from an oscilloscope). A small committee consisting of the Chair, laboratory coordinator Tom Hurst, and assorted faculty examine the relevance of the chosen tasks that the students are asked to perform to judge their laboratory skills (learning outcome 5).

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. We assess the following three UULO’s: 1. Intellectual Breadth and Lifelong Learning, 2. Inquiry and Critical Thinking, and 3. Communication.

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.

Not applicable as this is an undergraduate degree.

What was learned from the assessment results?

The faculty have made great strides in improving the quality and expectations of Physics 493. Professors who supervise students are expected to attend the oral presentations (all of them) and ask questions of the students afterward. The presentations are held consecutively and members of the public are invited to attend. Questions from the audience are encouraged. After the presentations are completed, the professors present remain to discuss grading in private. It is during these conversations (which of late have been more lengthy) that the faculty assess what each student learned in performing their research project, how well how well they communicated (both orally and in written form as their written reports are made available for the faculty on the prior evening). Grades are assigned during this time by mutual agreement of the faculty present which include the Chair of the Physics and Astronomy department. As the assessment coordinator, I have also attended these sessions as I had students who completed their senior thesis with me and I was also duty-bound to attend the presentations anyway. During the faculty discussions, I have sought to expand our discussions to include the learning outcomes with the faculty as part of the effort to make the faculty better-aware of them as we seek to improve the educational experience and quality of instruction for our students. In the opinion of
the faculty, we have been consistently improving the quality of the project of Physics 493 and that our students are improving in their ability to communicate their results (in part due to encouraging them to give practice talks beforehand) and, with better supervision, generate interesting results which inspire them to learn more.

Our department has also instituted a policy (agreed upon formally by the Department last Fall) to have the Assessment Coordinator interview all graduating undergraduates one-by-one. Questions from a standard template are asked and recorded.

From the exit interview data gathered, students have complained about the lack of offerings of important upper-level courses that they need to graduate. This is in part due to a paucity of professors as a number have either retired or passed away. 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 rather than powerpoint. Some courses used math which some of students explained that they had not formally had yet. Various textbooks were criticized as being too outdated.

On the positive side, students in general felt that by having significant research experience and exposure as an undergraduate, they were well prepared for pursuing graduate studies and lifelong learning. All students interviewed felt that their UNLV physics education would help them succeed. In general, the students felt that their UNLV physics undergraduate 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 has also received feedback from the US Department of Energy/NNSA on our efforts to train the next generation of America's weapons scientists and the feedback has in general been very positive. The NNSA reviewers suggested that we expand our efforts to expose students to national facilities and NNSA problems of interest by encouraging them to seek internships and fellowships outside of UNLV.

How did the program respond to what was learned?

The Assessment coordinator plans to have a meeting with the Chair to discuss results of the exit interviews and discuss them at an upcoming meeting sometime this Spring of 2016. We have also hired a tenure-track experimental condensed matter physicist (Ashkan Salamat) who will aid in shouldering some of the burden for Physics 413 (Intermediate lab I). A tenure-track astrophysicist has also been hired and there is a search underway for another astrophysicist. The first two hires were instituted to replace retired or deceased faculty.

Due to the suggestions made by the NNSA reviewers, we have made more efforts 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. One of Professor Pravica's students (Melanie White) attended a summer workshop at Los Alamos National Laboratory last summer (e.g.).

I note here in passing that the B.Sc. in applied physics has very similar learning outcomes to the B.Sc. in physics with the exception that the second semester of
Intermediate laboratory (Physics 414) is not required. Also, students have more flexibility to take more applied physics-related courses instead.

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.