1. Assessment information collected

This year we have completely redone our SLOA plan and rubric. Therefore a number of new instruments for evaluation of our program are being implemented. Because these have just been approved, a number do not yet have any data and therefore this SLOA report will have gaps in the data that will be filled in over the coming years as all of the instruments are exercised. A list of the major data collection tools follows:

1) A national physics concepts exam, the FCI, will be given at the beginning & end of phy 211x, introductory physics, at the end of phy 213x and just before graduation.

2) Student presentations evaluated with a presentation form.

3) Exit interview evaluated with a written form that can be supplemented with an oral interview.

4) Enumeration of number of students pursuing Education at next level ... or ...

Employment of graduating students into appropriate careers enumerated.

5) Enumeration of the number of students involved in faculty research.

6) An annual survey of student perception of their learning in the program.

7) Enumeration of presentations and publications.

8) A survey of alumni both for their status and their perception of the success of the program evaluated using an alumni survey form - after 1 and 5 years.

9) Outreach presentations (enumerated and or described) and science fair participation (enumerated and or described).

In addition, direct input from the students on what works and does not work is always taken.
2. Conclusions drawn from the information summarized above

Because the instruments to be used were only finalized and agreed to this semester, the conclusions will be more qualitative and anecdotal then quantitative this year but will be better quantified in subsequent years.

1) The graduating seniors this year scored very well on the FCI, their scores (averaging 28.25/30) "showed mastery" of the material. This is higher than the average scores for our incoming graduate students which speaks highly of our students and perhaps program. Unfortunately we do not have earlier scores for them as we just started this measurement.

2) The new student presentation metric will be started next fall; however for this years Phys381 presentations the student scores (from a very limited number of scores) ranged from 1-5, covering the entire range. The average for most of the questions was about 3/5 with the exception of presentation skills for which the average was 3.6/5.

3) For this metric we only have this years exit interviews to use. From those we can extract some information: 100% of the graduates are going on to graduate school, almost all of the other responses were one of the most positive two ratings for the questions. The two questions for which there was one neutral response were learning public speaking skill, and learning technical writing skills.

4) Over the last 2 years ~80% of our graduates have gone on to graduate school, approximately half in physics and half in other STEM fields (Comp. Sci., Atmospheric Sci. etc).

5) We currently have ~5 students (~30% of upper level students) involved in research with faculty members. Over that last 2 years, between 50 and 60% of our students have gained some research experience. While this is not an insubstantial number, it is still a number that should be increased and is addressed in the next section.

6) For this years annual survey of student perception of learning in their program, the average was ~3.65/5.

7) In the past year, students have presented or participated in at least 4 posters.

8) Since we only started using the Alumni Survey in the last few weeks, we have only the first 8 responses. There was a fair amount of useful information in the responses that we will process. Of those, some of the most useful responses were to questions that were in two parts. The first part asked "frequency of use for a skill" and the second part asks "preparation for that skill". Three of those questions showed a particular mismatch. Those were Public speaking, Technical writing and Research skills. There was also a comment about ease of discussing
things with the advisor (though the vast majority of responses were positive). These will be addressed in the next section.

9) We have not yet started enumerating this, however for the past few years many of the upper division physics students (mainly the Society of Physics Students, SPS) have been involved in outreach for the Science Potpourri and some for science fairs.

From this data, we have identified 3 issues we will attempt to deal with in this review cycle. They are:

1) Improving student preparation in technical writing,

2) Improving student preparation in public speaking (including to the general public), and

3) Improving student research experience.

3. Curricular changes resulting from conclusions drawn above

To address the issues raised, 3 changes will be implemented starting next year (fall 2016) in the undergraduate curriculum.

For the first two issues, we will institute a comprehensive communication program spanning the entire curriculum. Starting in the second year, all the students will get instruction and experience in writing, and presenting technical material and material aimed at a general audience. There will be a series of classes in which the writing, web projects and presentations are a significant part of the course. This will culminate with a final project that should incorporate all the aspects, technical writing, public technical speaking and the ability to present the material to a general audience.

For the third issue, we will be initiating a capstone project. In general this is expected to be a research project with a faculty member. The expectation will be that the student will spend at least a semester doing research. It will be a mentored research project on a physics topic or on a related topic that applies physical problem solving skills. The capstone project must be designed or chosen by the student in consultation with a faculty mentor. The goal is that this will be a “real” research project with the possibility of inclusion on a science presentation of even publication as opposed to a “make work” research project. The faculty mentor must approve the project before work begins. The project must include evaluation of data and communication of the study intent, methods, results, interpretation and conclusion in the context of existing literature and knowledge.
4. Identify the faculty members involved in reaching the conclusions drawn above and agreeing upon the curricular changes resulting

This was developed by the Physics Undergraduate SLOA committee:
Ataur Chowdhury - chair,
Chun-Sang Ng,
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David Newman
It was then discussed and agreed to by the entire physics faculty.