1. **Assessment information collected**

The graduate SLOA process in the Department of Physics has been revised in 2016. Therefore only a short record of data collection exists and this report still suffers from data gaps that we hope to fill by a more rigorously planned collection effort in the coming years. The metrics and tools used in this report are

1. Annual progress assessment form
2. Attachment to annual report
3. Thesis evaluation form
4. Teaching/communication evaluation form
5. Exit survey form
6. Alumni survey form

**Annual progress assessment.** This assessment is completed at every student’s annual committee meeting and any other event (e.g. defenses and oral comprehensive exams). The assessment categories range from general knowledge of the field to knowledge of the publication process.

**Attachment to annual report.** Information about student publications, presentations, awards, applications, proposals, and teaching activities is collected electronically.

The **thesis evaluation** is completed by all advisory committee members and the department chair. It is anonymous and not used to grade individual students. Evaluation categories cover all the major aspects of original scholarly activities from literature survey to quality of writing.

**Teaching/communications evaluation.** Most incoming graduate students undergo ~1 week of training followed by 2 semester-long teaching seminar classes of 1 credit each. The purpose of the training and seminar classes is: 1) Improve teaching skills (partially to turn students into good TAs but also good teachers), 2) introduce students to active
learning techniques, 3) Improve ability to communicate to all audiences (from Physics PhD to general public to professional groups). The students are all evaluated based on an evaluation rubric during that first week, in the middle of the first semester, in the middle of the second semester and at the end of the second semester. In addition direct input from the students on what works and does not work is taken at the end of each semester.

**Exit survey.** A survey of all graduating students, as well as those who leave the program without a degree. Data on the Exit Survey are sparse, because it was not consistently completed in the review period. This is partly due to administrative changes.

**Alumni survey.** An alumni survey has been developed based on the American Institute of Physics template. The survey is anonymous and questions range from alumni’s assessment of advisors to their preparedness for various professional activities.

2. **Conclusions drawn from the information summarized above**

**Annual progress assessment.** We evaluate students in the following categories:

1) General Knowledge of Field
2) Specific Knowledge of Literature
3) Ability to Critically Analyze Literature
4) Technical Abilities
5) Analytical Abilities
6) Oral Presentation Skills
7) Written Communication Skills
8) Knowledge of Peer-reviewed Publication Process
9) Ability to Act as Independent PhD Researcher

These assessments are done at each Annual Committee Meeting, Oral Comprehensive Exam, and PhD defense. We analyzed 36 responses that covered the full range from first year to graduating students. We find that a large proportion of students meet or exceed expectations in the various categories (ranging from 76% to 97%). The weakest category was ‘Specific Knowledge of Literature’. We note, however, that all graduating students scored well in this category. In general, all assessment categories scored at ‘Meets Expectation’ or above for PhD defenses.
**Attachment to annual report.** Each graduate student is asked to fill out an annual survey in which we collect information on papers published, conferences attended, honors/awards received, and grants applied to. Unfortunately, only 6 students filled out the survey. We have taken measures to ensure that this survey becomes part of the mandatory annual report, but some students were missed due to administrative changes at the college.

The 6 surveyed students have spent between 1 and 3 years in the program. Amongst them, they have 3 peer-reviewed publications and presented at a total of 8 professional conferences. These are very satisfactory numbers.

Two students have applied for jobs or grants; one of them for a total of 5 different fellowships (including an NSF graduate fellowship). No honors or awards were reported.

**Thesis evaluation.** Each PhD thesis is evaluated by committee members and the department chair with a score ranging from ‘Fair’ to ‘Excellent’ in the following categories:

1) Introduction
2) Literature Survey
3) Motivation for the Study
4) Methodology
5) Description of Experiment
6) Results of Publishable Quality?
7) Discussion of Results
8) Conclusions Supported by Results
9) Format
10) Quality of Diagrams
11) Quality of Writing

For the Physics PhD we only have two responses to evaluate. The responses range from ‘Good’ (2) to ‘Very Good’ (9) to ‘Excellent’ (10). Generally, respondents rate the quality of the theses highly. The weakest points were ‘Literature Survey’ and ‘Motivation for Study’. It is difficult to make recommendations based on such low numbers of responses, but these are two categories to pay attention to in future surveys.
**Teaching/communications evaluation.** All TA’s are evaluated at the beginning, in the middle, and at the end of the academic year according to an evaluation rubric that covers presentation skills, preparedness, content, and answering questions. While scores at the beginning of the semester vary greatly, we consistently observe improved in all students during the year. We therefore judge our TA training as successful and effective.

**Exit survey.** We only managed to conduct two exit interviews for this survey. Both respondents took a job as a post-doc. The average of the two responses (on a 1-5 scale with 5 indicating strongest agreement) were:

1) I can recommend UAF to another student (3.5)
2) UAF as a whole provides a stimulating atmosphere (3.5)
3) I can recommend my graduate physics degree program to another student (4)
4) I am pleased with the curriculum within my degree program (4.5)
5) The quality of instruction in the physics department is high (5)
6) Faculty members in the Physics department provide a stimulating atmosphere (4.5)
7) Faculty members in the Physics department are accessible and helpful (5)
8) The quality of research work in the Physics department and/or GI is high (5)
9) I am pleased with the research experience in my degree program (4.5)
10) My graduate advisor was constructively involved in my degree program (4.5)
11) My graduate advisory committee contributed to my research experience (3.5)
12) I had access to modern equipment in my research program (5)
13) My research was adequately funded (5)
14) My experience as a TA was rewarding (4)
15) Fellow Students were intellectually stimulating (3.5)
16) The Graduate Program Office was accessible and helpful (3.5)
17) I am prepared for the next step in my professional career (5)

Students were also given a chance to provide specific or general comments about their time at UAF and the program. They included:
“In general, I found courses very instructive. They were appropriately challenging and professors were almost always easily accessible if I needed help with homework or understanding the material. I felt core courses prepared me very well for the comprehensive exams. Elective or special topics classes were a little more hit and miss. Sometimes they were very helpful for my research. Other times the professor put a lot of focus on the particular area that they did research in, which could be interesting, but was not as helpful because it could be difficult to draw the parallels between two different fields.”

“The overall experience was excellent. The quality of instruction, Physics classes, accessibility of faculties, and research were excellent. However, an aspect of student support is still somewhat lacking. This might be due to the limited to both the number of faculties as well as graduate students where peer support is often constrained. Each year, graduate students need to rediscover knowledge about the University and the department. Memory through the historical developments of the Physics department might help graduate students navigate through their studies and enjoy living in Fairbanks. Although unofficially provided, career development such as writing proposals and building a CV can be beneficial to Physics students. Also, community involvement is also an important aspect that gives better visibility of the Physics department.”

Specifically on the TA experience:

“I enjoyed the TA program, but found parts of it frustrating. In particular, it was challenging when the lecture fell behind the lab and I as a lab TA had to introduce new concepts to the students for the first time, especially if I didn't know I would have to ahead of time and hadn't prepared appropriately. I often felt unqualified to deal with these situations, and I believe the students in lab found it similarly aggravating.”

Alumni survey. We surveyed 3 Alumni who had spent between 4.5 and 7 years at UAF. All of them indicated that “if they had to do it again” they would again choose the physics program at UAF. All respondents were employed after a maximum of 6 months. Two are currently employed in Government jobs, while one is employed in private industry. They responded to the following questions on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree):

- My advisor encouraged me in my academic goals (4.3)
- My advisor encouraged me in my career goals (4)
- My advisor encouraged me to excel in research (4.7)
- My advisor was accessible (4)
- My advisor was easy to discuss ideas with (5)
My coursework was challenging and engaging (4.7)

The breadth of my coursework was adequate (4.3)

My coursework prepared me for research (4)

My coursework was vital for my professional and/or post-graduate activities (4)

Was your graduate degree appropriate for the position (4.7)

This generally indicates a high satisfaction with the degree program and shows that students are well-prepared for their future jobs. One respondent offered some specific advice with the perspective of ‘big data’ private industry, which is a large employer of Physics graduates:

“What I see in industry, especially in computation-based, data science, machine learning fields and the tech start-up world … is that solid probability and statistics is a must. Try to underscore the need for this to students and future graduates. The code and calculus (simple optimization problems) are very much within reach of MS/PhD graduates. But industry now highly values the ability to work with and understand a Bayesian perspective as a complement to frequentist skills … I think Statistical Mechanics should be required coursework.”

“Also, in the same context, the open source scientific computation stack is taking over. R and Matlab are definitely still relevant but Python-based modeling/statistical/computational/machine learning tools are being pushed by the big players like Google and its wannabes. “

3. Curricular changes resulting from conclusions drawn above

At this stage we are not proposing any curricular changes. Generally, the program appears to be doing well in all assessment categories. This assessment does suffer from low number statistics, however. These responses should therefore also be evaluated in the longer term, now that assessment plans and strategies for data collection are in place.

4. Identify the faculty members involved in reaching the conclusions drawn above and agreeing upon the curricular changes resulting

The department continues to consider all aspects of the SLOA process, up to and including the proposal and implementation of curricular changes, as a body of the whole. Discussions on curricular assessment are taken up via regular agenda item at the beginning of each fall, subsequent to the receipt and compilation of student surveys.
and evaluations.
The graduate SLOA committee consists of Martin Truffer (chair), David Newman, and Peter Delamere.

5. Has your SLOA plan been updated to include assessment of the program's Communication Plan, as required by Faculty Senate motion? (required for baccalaureate programs only)

N/A