

Student Learning Outcomes Assessment Summary

Space Physics, Ph.D.

College of Natural Science and Mathematics

AY 2016-2018

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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 as follows:

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.

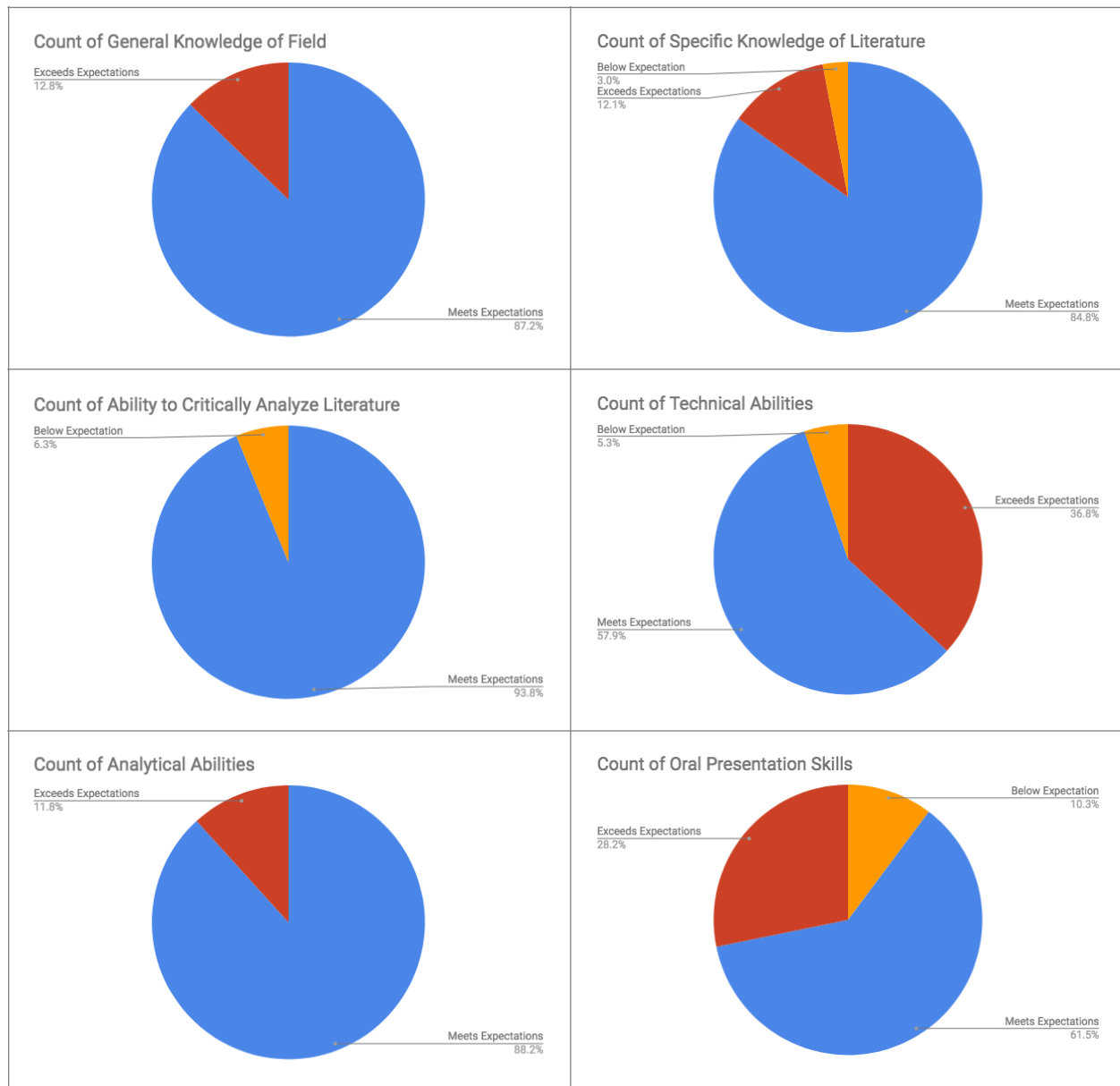
2. Conclusions drawn from the information summarized above

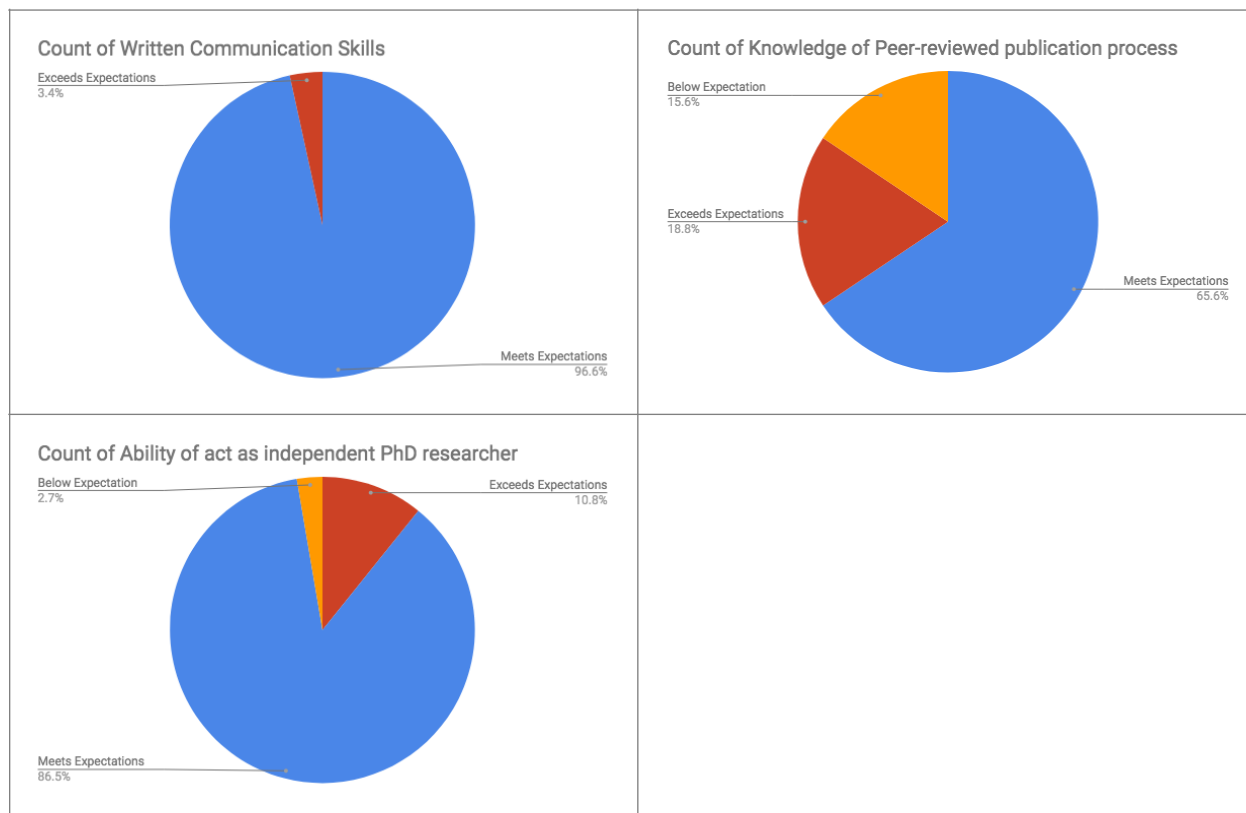
Three students graduated with a Ph.D. in Space Physics. The students worked at the Geophysical Institute on Space Physics related research. Two students are currently employed in post-doctoral research positions. Two students responded to our exit interview, commenting that all necessary courses were offered, the department was friendly, and recommended our program to other students.

Following each committee meeting (annual meeting, defense, oral comprehensive exam) we evaluate the progress of the student (below expectation=1, meeting expectation=2, exceeding expectation=3). We have 39 assessments for several Ph.D. student's based on a combination of 1) annual committee meetings, Ph.D. oral comprehensives, 3) Ph.D. defenses. The feedback is essentially unanimous that the students are meeting expectation with regard to: 1) general knowledge of the field, 2) specific knowledge of the literature, 3) ability to critically analyze literature, 4) technical abilities, 5) analytic abilities, 6) oral presentation skills, 7) written communication skills, 8) knowledge of peer-reviewed scientific publication process, 9) ability to act as an independent researcher. In addition, we have sorted data for students spanning 1 through 7 years in the degree program (we have no data from 6th year students). In general, students were "meeting expectations" for all years in degree program. We did see a slight improvement from year 1 (2.0) to year 3 (2.15). The best result was for the 7th-year students (2.17). The lowest score was for 5th-year students (1.94). However, the slight differences are not statistically significant. The results for all years in the degree program are summarized below with students "meeting expectations" in all categories:

- General knowledge of the field: 2.1
- Specific knowledge of literature: 2.0
- Ability to critically analyze literature: 1.9
- Technical abilities: 2.2
- Analytic abilities: 2.1
- Oral presentation skills: 2.1
- Written communication skills: 2.0
- Knowledge of peer-reviewed scientific publication process: 2.0
- Ability to act as an independent researcher: 2.0

The figure below summarizes the results for all categories, showing the distribution of scores from 39 surveys. The highest count of “below expectation” (orange) was found in the “knowledge of peer-reviewed publication process”. Other areas for improvement include: “technical abilities”, “specific knowledge of literature”, “ability to act as an independent PhD researcher”. On the other hand, deficiencies in “oral presentations skills” were offset with nearly 30% receiving “exceeds expectation” (red). Otherwise, as noted above, the average was consistent with “meeting expectations” (blue).

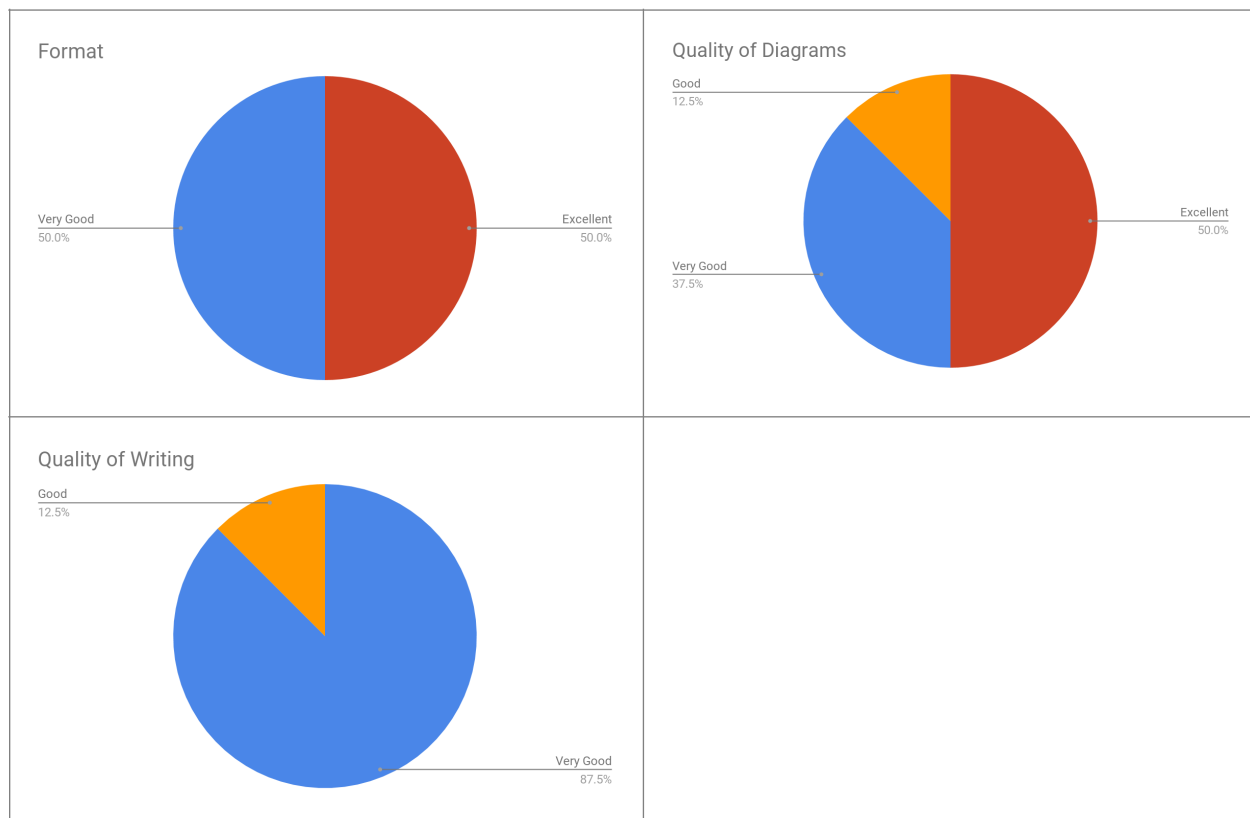




Annual Report: We received two responses from Ph.D. Space Physics students. A total of 3 publications were reported. Both students have graduated.

Thesis Evaluation. The department has implemented a new thesis evaluation where we evaluate the student in the following categories: 1) Introduction, 2) literature survey, 3) motivation for study, 4) methodology, 5) description of experiment, 6) results of publishable quality, 7) discussion of results, 8) conclusions supported by results, and 9) format. The scale is defined as poor = 1, fair = 2, good = 3/orange, very good = 4/blue, excellent = 5/red. Data from two students was obtained and across all categories the dissertations were rated as “very good” (blue). No significant weaknesses were noted. The figure below shows the results from 8 faculty evaluations. Overall the faculty favorably reviewed the dissertations. We note room for improvement in “discussion of results” (50% good) and “results of publishable quality” (62.5% good). We anticipate improving our statistics for future thesis evaluations.





Alumni Survey. We have adopted a new alumni survey to assess the long-term outcome of Space Physics Ph.D. graduates along with their impressions of our graduate program. The average full-time equivalent years to graduation was 5.2 years and 100% of the respondents concurred that “if they had to do it all over again”, they would still get a graduate degree from the UAF physics department, indicating that the UAF physics department is, overall, viewed quite favorably.

The alumni survey evaluated the graduate experience in terms of the effectiveness of the advisor and the relevance and effectiveness of coursework. We summarize the results as follows (where 1=strongly disagree and 5 = strongly agree):

- My advisor encouraged me in my academic goals: 5.0
- My advisor encouraged me in my career goals: 5.0
- My advisor encouraged me to excel in research: 5.0
- My advisor was accessible: 4.8
- My advisor was easy to discuss ideas with: 5.0
- My coursework was challenging and engaging: 4.6
- The breadth of my coursework was adequate: 5.0
- My coursework prepared me for research: 4.8
- My coursework was vital for my professional and/or post-graduate activities: 4.8

With regard to advisor and coursework effectiveness, the survey results were strongly

positive (i.e., 4.6-5.0).

Our surveyed graduates are all employed. The number of months spent actively seeking employment was roughly 9 months. Employment sectors include educational institutions (60%), government (20%), private/industry (20%). The surveyed alumni agree that their graduate degree was appropriate for their current employment (4.0/5).

The department will continue to refine our alumni survey and make every effort possible to address deficiencies. While the survey results were largely positive, the department might strive to mitigate the average 5-month seeking employment time. Two of our recent Ph.D. graduates left UAF with employment.

Exit Interview. We conducted two exit interviews of our graduating Ph.D. Space Physics students. One respondent is working as a post-doc, and the other is taking a job related to their specialization.

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. The quality of instruction in the physics department is high (2.5)
6. Faculty members in the Physics department provide a stimulating atmosphere (4.5)
7. Faculty members in the Physics department are accessible and helpful (4)
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 (5)
10. My graduate advisor was constructively involved in my degree program (5)
11. My graduate advisory committee contributed to my research experience (5)
12. I had access to modern equipment in my research program (3.5)
13. My research was adequately funded (5)
14. My experience as a TA was rewarding (4)
15. Fellow Students were intellectually stimulating (5)
16. The Graduate Program Office was accessible and helpful (5)
17. I am prepared for the next step in my professional career (4.5)

The responses were generally positive. One respondent had the following suggestion, "Everything at UAF is fantastic besides the class. I think it will be a little bit better if the school can hire an instructor for the graduate students." This response may be due to the shortage of faculty relative our historic average. For example, in the past 5 years, the department has seen the retirement of 2 FTEs, while only 0.5 FTE was hired in replacement. The relatively lower scores for items 1 (3.5) and 2 (3.5) may be due, in part to the low score on item 5 (2.5). As a department, we will strive to improve the quality of instruction in our graduate courses.

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 improvement in all students during the year. We therefore judge our TA training as successful and effective.

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.

We are concerned with the quality of our Space Physics graduate instruction following a critical comment from the exit interview. The physics department, due to recent retirements (2 FTE), is short-handed. Department members are cognizant of potential deficiencies in delivering a robust and complete curriculum in Space Physics. A new faculty hire has been completed and the addition of 0.5 FTE in space physics should help to alleviate the problem. However, the faculty and students are working closely together to identify the most pressing curricular needs, adjusting our course offerings as required.

Research funding is also essential for a sustainable graduate program. Research-prepared students propagate funding successes. The department is fully aware of the challenges that lie ahead in an increasingly competitive funding environment, compounded by a short-handed faculty. Nevertheless, we encourage students to be active in summer research, hoping to leverage research experience to write graduate fellowship proposals. Teaching Assistantship opportunities are also declining due to course cancellations (e.g., PHYS102- Energy and Society), which also compounds the burden on research dollars to support students. At some point, the idea of 12-month support on an RA may not be sustainable.

It is our intention to restore the missing pieces of the graduate curriculum with future faculty hires. In the meanwhile, faculty and students will actively work together to ensure a quality outcome for our graduate program. As more data becomes available through our revised assessment metrics, we will address curricular changes as necessary.

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