

Physics – Bachelor of Science

Current Compliance Year: 2023-2024

Mid-Cycle Review

Recent Recommendations

Feedback will include recommendations from the last Expedited Review or from your most recent review by your school or college. You may not see any feedback or recommendations until you have completed your first full or mid-cycle review.

Response to Previous Recommendations (if any):

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Student Learning Outcomes

The previous Student Learning Outcomes Assessment has been submitted as its own report. Going forward you will use the following prompts to discuss the success of your most recent SLOA plan and address your assessment activities since your last SLOA report (typically the past two years or since your last program review).

Learning outcomes feedback from last review:

Feedback will be provided once you have completed a full or mid-cycle review.

Discuss your SLOA findings, changes you are making and what you hope to see as a result:

Based on the limited information available, the program appears to be strong but new faculty hires would greatly benefit the department. This would aid in finding solutions to some of the issues presented in the undergraduate surveys, such as allowing the department to offer additional classes and restructuring the way courses are offered. This would help keep students on track for graduating should their circumstances require it.

An area the department needs to improve on are the data collection practices. A best practices document will be implemented and reviewed with all department faculty and staff.

Discuss the curricular changes made based on assessing your SLO. If you haven't made any curricular changes, please explain why not and address what you did notice in the review, including strengths of your curriculum through the assessment of your outcomes:

We believe that the BS program in Physics is strong with strength in most of the areas we deem important. However, based on limited data from surveys, interviews and comments there are some areas that should be strengthened:

- More diverse options in physics.
- Core course offerings with more frequencies.
- Incorporation of computation techniques into introductory physics.

For the first area of improvement in terms of “increased diversity options”, we will continue to push for the PhysTec program aimed at graduating students with a career path as high school teachers in Physics and STEM. There exists a high demand for this work force in Alaska and elsewhere. Additionally, we will explore adding other applied physics concentrations that are in high demand nationally, namely bio-physics and engineering physics. For the second area of improvement, we will explore options to bring flexibility in our course offerings. Given the structured course sequence and limited option for electives, it is going to be a daunting task with limited faculty. It will be worth to explore relaxing

prerequisites to allow students more flexibility. For the final area of improvement, we will work to introduce computational techniques into our introductory physics courses. We routinely use computational techniques in our upper division courses, but to extend this to lower division courses will not be easy. To implement this, students should have some basic computational skills, which most of the students taking introductory courses likely do not possess. All of the aforementioned initiatives would be better facilitated by a more robust faculty size.

Are communication outcomes embedded in the SLOA Plan?

As of 2017 all Baccalaureate programs were required to embed the communication outcomes within their SLOA Plans, this is optional for non-Baccalaureate programs.

Not Embedded

Student Success

To access the Student Success Dashboard please sign into a UA computer with VPN connection (if not on campus). You will need your UA credentials and it is best accessed with the most updated version of Chrome, Edge, Firefox or Safari browsers; Internet Explorer is not supported. You will need to filter the data to see your programs. If you need assistance in finding the data for your programs, please contact your data liaison or Julia Manfredini in the PAIR office.

Data Liaisons

Each school or college has a team of Data Liaisons to help you analyze the data provided in the portal and may be able to help you see your data in multiple contexts. You can find a list of data liaisons on the resources page for Program Review.

The college or school level committee will also have access to this data with the goal that by providing these visualizations data availability will be increased.

Data supplied within the dashboard linked below is intended for Academic Program Review and not for any other purpose.

Student Success Data Dashboard

Previous Feedback

Feedback will be provided once you have completed a full or mid-cycle review.

Student Success Data Trends: (please indicate the trends that apply to your program)

Increase in persistence, Increase in degrees awarded, Decline in majors, Decline in SCH, Decrease in pass rates

If equity gaps were found in any of your disaggregated student success data, please explain how you plan to address those gaps. Please contact your data liaison or make an appointment with Julia Manfredini to learn more about analyzing your data.

No equity gaps were noted upon review.

Optional Data Explanation

Feel free to share more of your thoughts on the data provided.

High Impact Practices

According to the AAC&U, High-Impact Educational Practices “have been widely tested and have been shown to be beneficial to college students from many backgrounds.” UAF is particularly interested in Undergraduate Research and/or Scholarly Activity because it is one of our mission fulfillment indicators, but all of these researched High-Impact Educational Practices should be reflected in your program’s student learning outcomes and curriculum.

Previous Feedback

Feedback will be provided once you have completed a full or mid-cycle review.

High-Impact Practices Used in this Program

Please use the following fields to discuss how your program is using the high-impact practices, successes and known issues and solutions, or ways you are considering incorporating them in the future. If you are not using any of the high-impact practices listed, please use the “Other or None of These,” field to share what your program is doing to help students be successful.

High Impact Practices that currently apply to your program:

Capstone Courses and Projects, Undergraduate Research, Collaborative Assignments and Projects, Writing-Intensive Courses

Collaborative Assignments & Projects

1. AGU 2021, "UAF Space Weather UnderGround Program: A Student-Built Magnetometer Array in Alaska for Space Science Research"
2. AGU 2021: "Machine Learning Models as an Alternative to Standard Interpolation Techniques for Estimating OMNI Data Gaps"
3. AGU 2022, "The University of Alaska Space Weather Underground Program: Student-built magnetometer array using unique construction and deployment techniques"
4. AGU 2022, "The University of Alaska Space Weather UnderGround Educator Development Program"
5. ML-Helio 2022: "Machine Learning Models as an Alternative to Standard Interpolation Techniques for Estimating Gaps in OMNI Data" (most viewed poster)
6. TESS 2022, "Space Weather Underground activities at the University of Alaska"
7. AGU 2023 Poster titled: "A MacGyvered Approach to Cost-Effective Magnetometers in Alaska"
8. AGU 2023 Talk titled: "Advancing Space Weather Research in Alaska Through Collaborations with High Schools: The Space Weather UnderGround Program"

Undergraduate Research

From 2021-2023 there have been a minimum of six undergraduate students involved in research at the Geophysical Institute. One of these six students is an international student doing a semester abroad study program at UAF.

From 2021-2023, there have been at minimum 12 presentations/publications authored/co-authored by undergraduate students. These include papers published in scientific journals, AGU/TESS/ML-Helio presentations, and UAF Office of Intellectual Property Submissions.

Diversity/Global Learning

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ePortfolios

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First-Year Seminars & Experiences

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Writing-Intensive Courses

Both, Phys 381 and Phys 382 are writing intensive courses.
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Service-Learning and/or Community-based Learning

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Internships

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Capstone Courses & Projects

All undergraduate students are required to defend a Capstone Project in their senior year. The project consists of an oral presentation and a written paper as part of the requirements. These presentations are evaluated by all attending physics faculty with a presentation form. Data from 2021-2023 depicts an average presentation score of 4.52 for students presenting Phys 381 reports and capstone oral reports. There were no notable areas of weakness.
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Other or None of these (explain)

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Submission**Submitter & Collaborator Names**

Martin Truffer Ataur Chowdhury

Submitter Email

mtruffer2@alaska.edu

College or School Review Committee

The college or school committees set the tone for helping each program feel seen during this process. We have provided you with strength-based feedback tags to attach to this program review. Please select as many as applicable.

Overall Recommendations

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Explanation of Recommendations

The review panel acknowledges the time and effort that went into submitting the mid-cycle program review for the Physics BS program. We understand that the department has been affected by faculty turnover and appreciate the program's submission of the Student Learning Outcomes Summary. We have noted that the department would benefit from new faculty hires which would allow for additional courses to be offered. The review panel appreciates that the program provided a thorough overview of student success data and narrative for the HIPs (high-impact practices).

Learning Outcomes Feedback

Requires Minor Revision

Student Learning Outcomes Assessment Feedback (tags)

Missing a direct measure

Student Learning Outcomes Assessment Feedback (narrative)

The program provided 4 SLOs for the Physics BS SLOA plan. The review panel offers the following recommendations to improve upon the program's SLOAs: - SLO #s1-2 are appropriate as measures of student learning. - SLO # 3 is a program outcome and not tied to student learning. - With regard to SLO #3, the program is encouraged to retain this measure of outcome assessment for their own internal tracking purposes (just not use it as part of program review). Post-graduation activities, such as graduate school/job placement are not considered an assessment of student learning and are instead program outcomes. - With regard to SLO #4, the recommendation from the review panel is to re-frame this as a communications SLO. - Per guidance from the NWCCU for accreditation purposes, they recommend that degree programs have between 3-5 SLOs per program. The review panel notes that some of the assessment criteria needs to be revised. For example, maintaining a strong international reputation is not an assessment. The review panel appreciates the program's discussion of the SLOAs. For the full program review, which occurs in two years, we look forward to the program's revisit of SLOA best practices as well as providing artifacts used for data collection, as this would strengthen the program review. With respect to curricular changes, we understand that having additional faculty would be helpful in achieving the program's curricular objectives. For the full program review, we look forward to seeing if any of the desired curricular changes were implemented and if they improved student engagement and success. Following NWCCU guidance, SLOA plans must emphasize "closing the loop" and continuous improvement, ensuring each SLO within the plan is assessed individually to verify alignment with program objectives. If a SLO fails to produce the expected assessment outcome, adjustments to SLO language, substantial changes to the SLO, or revisions to data collection rubrics are necessary to ensure alignment and facilitate program improvement.

Student Success & Equity Feedback

The program noted an increase in persistence and degrees awarded. The review panel agrees that there has been an increase in persistence, but saw a decline in degrees awarded. Additionally, the program noted a decline in majors, SCH, and pass rates.

The program did not identify any equity gaps. Program numbers are small, which does make it difficult to identify trends, but the program could have reflected on things like an increase in [REDACTED] enrolling in the program, as well as an increase in [REDACTED] students.

It would be helpful to see some discussion of the tags that were chosen, and to discuss how the program will address declines in majors, SCH, and pass rates. Additionally, what are some ways the program can support students to reach degree completion?

High-Impact Practices Feedback

The program identified writing-intensive courses, capstone courses/projects, collaborative assignments/projects, and UG research as HIPs. A narrative was provided for each HIP, but it was not clear where these HIPs fit into the program or if all students are required to complete them to meet graduation requirements.

The review panel recommends including examples to demonstrate/highlight each HIP, similar to what was provided for collaborative assignments/projects (this was a great example).

What percentage of students participate in each HIP for those that are optional?

The review panel recognizes that the HIPs employed by the Physics program are all positive and meaningful in preparing students to enter the workforce.

UNIVERSITY OF ALASKA FAIRBANKS

Student Learning Outcomes Assessment for Physics BS program

Department of Physics

Adopted 12 May 2016

Expanded Statement of Institutional Purpose	Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
MISSION STATEMENT: The Physics Undergraduate Program will provide scientists and professionals broad problem solving skills and the training and insight to understand and explore the physical world, from elementary particles to the structure and origin of the universe. GOAL STATEMENT: We will maintain a program of high quality, international reputation and produce scientists and professionals capable of solving current problems and anticipating future challenges in Physics as well as other disciplines.	Basic understanding of fundamental laws of physics and ability to apply to them to real world problems	Physics will maintain a strong International reputation for producing well-trained graduates.	1. FCI (At beginning & end of phys 211x, at the end of phys 213x and just before graduation) 2. Capstone course (presentation form) 3. Student presentation (presentation form) 4. Exit interview (written and/or oral form)
	Ability to engage in analytical thinking, problem solving and demonstrate subject expertise	Students will demonstrate their abilities and progress through presentations, and written reports.	1. Research experience: Capstone project (mentor rubric/presentation form) 2. National competition presentation evaluation (presentation form)
	Appropriate preparation for Higher education and/or Professional career	80% will be employed or admitted to a graduate program one year after graduation. Additionally they will have been exposed to research and appropriate communications techniques through the capstone course and communications sequence.	1. Capstone courses (research) (mentor rubric/presentation form) 2. Communications (phys 213, 381, 462, capstone) (presentation forms) 3. Number of students pursuing Education at next level (enumerate)... or ... 4. Employment of graduating students into appropriate careers (enumerate) 5. Number of students involved in faculty research (enumerate) 6. Honors, awards, and other forms of Recognition (enumerate) 7. Presentations and publications (enumerate) 8. Survey of student perception of their own learning (annual survey form) 9. Survey of alumni perception of their own learning (alumni survey form - after 1 and 5 years)
	Preparation for: Lifelong learning, Outreach, and Community development	Students will demonstrate their abilities through presentations and outreach activities.	1. Capstone course (presentation form) 2. 213 general audience presentation (presentation form) 3. Outreach activity involvement: - Outreach presentations (enumerate) - Targeted seminars (enumerate) - Science fair participation (enumerate)