

**Institutional Effectiveness  
2018-2019**

**Program:** Physics BS

**College and Department:** College of Arts & Science – Department of Physics

**Contact:** Stephen Robinson

**Mission:**



*Student Learning Outcome 5 - Students graduating in physics will have received an introduction to a range of common technological tools appropriate to physics and related disciplines.*

- All graduating physics majors and alumni report being adequately prepared to use technological tools appropriate to physics and related disciplines in their employment or graduate studies.

*Student Learning Outcome 6 - The TTU physics program will give students sufficient preparation in content and skills/techniques to continue to graduate school or obtain suitable employment.*

- All graduating seniors and alumni will report being well prepared to continue on to graduate school in physics (or a closely related discipline) or to enter immediate employment, whichever is relevant to their particular situation.

*Student Learning Outcome 7 - Students graduating in physics will demonstrate the skills and techniques needed to engage in planning and carrying out basic or applied research.*

- Students will demonstrate competency by completing a research project in PHYS 4730 (Research Planning) and PHYS 4740 (Research) courses taken as seniors. Students will meet or exceed the minimum standards of the research course (PHYS 4730 or PHYS 47140). The targeted outcome is that at least 75% of students should meet or exceed the minimum standards.

A departmentally developed curriculum map can be found in Appendix 1 that shows the connections between courses and student learning outcomes.

**Assessment Methods:**

*PG 1:*

at other institutions. (Note: since almost all such experiences must necessarily take place during the summer it is impossible to ensure that all students will take advantage of such

*SLO 3: Students graduating in physics will demonstrate the skills and techniques necessary to engage in authentic experimental investigation.*

*PHYS 4710/4711 Capstone Course:* All physics majors take a senior lab course, either PHYS 4710 (4 cr) or PHYS 4711 (2 cr). To be successful in this course students must synthesize many skills learned in their academic careers to date. They must engage in scientific investigation by planning and carrying out experiments, and they must use their physics i2.3 .6 (u)-nowledgi5 (e)-6 ( t)5 (o)-9.7 ( g

have a fresher recollection of their TTU experiences and so can provide valuable feedback on some elements of the program. The department chair already conducts a confidential exit interview with each graduating physics major. These interviews explicitly address how well prepared each student feels for their next career step, including their preparation in the use of technological tools and development of research skills.

*Alumni Surveys:* Because of the low number of physics graduates, the alumni surveys are







A breakdown of MFT results suggests students are weaker in the areas of Optics/Waves and Thermodynamics. Over the coming year, the department will discuss a course of action to address this weakness.

*Student Learning Outcome 3 - Students graduating in physics will demonstrate the skills and techniques necessary to engage in authentic experimental investigation.*

- *Students will demonstrate their ability to engage in experimental investigations by meeting or exceeding the minimum standards of the capstone Advanced Experimental Physics course (PHYS 4710 or PHYS 4711). The targeted outcome is that at least 75% of students should meet or exceed the minimum standards.*

Three physics majors took either the PHYS 4710 or 4711 course this year, only two of who met the minimal expectations.

*Student Learning Outcome 4 - Students graduating in physics will demonstrate the ability to communicate their understanding orally in a presentation format.*

- *Students will demonstrate their ability to effectively communicate their capstone Advanced Experimental Physics project (PHYS 4710 or PHYS 4711). The targeted outcome is that at least 75% of students should meet or exceed the minimum communication standards on the project rubric.*

Three physics majors took either the PHYS 4710 or 4711 course this year, all three were judged by the

*Student Learning Outcome 5 - Students graduating in physics will have received an introduction to a range of common technological tools appropriate to physics and related disciplines.*



these classes compared to the on-ground counterparts, for others it is because of the convenience in scheduling that such a class offers. Unfortunately, these online classes do not prepare students well, particularly in the area of needed laboratory skills. The TTU physics department has therefore resolved to develop its own online versions of these courses, focusing on maintaining high quality while employing current best practices in online delivery in general and physics content in particular. The working group formed last year has developed what we deem as an acceptable format, and the first version of online PHYS 2110 will be offered in the fall of 2019.

The department will use the established FCI diagnostic test to assess student learning in this new online course compared to current on-ground versions.

### *Program Goal 3*

In the past, reviewing video of classes being taught has given valuable feedback to faculty on their teaching (Program Goal 3). However, with the adoption of more student-centered strategies the focus of classroom activity has moved from the instructor to several groups of students working together in



## Appendix 2: Alumni Survey Report

### *Report on Physics Department Alumni Survey - 2018*

#### Introduction

During the fall of 2018, TTU physics alumni were contacted and asked to complete the same online survey we have used in the past (hosted by Qualtrics). From this, and previous requests, we now have responses from sixty-eight alumni, with graduation years from 1947 to 2017. In order to extract feedback relevant to the current program we

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## Specific Topics

The next question asked for feedback on the level of preparation in specific content areas. The average rating for each cohort is shown below.

Again, this shows that alumni continue to rate their preparation in Electricity and Magnetism and Quantum Mechanics as good to excellent. Statistical and Classical Mechanics have consistently had the lowest perceived levels of preparation with Classical Mechanics dropping to 'Adequate' and Statistical Mechanics dropping below 'Adequate' and approaching 'Poor'. However, these indications should be tempered by the low number of responses from the most recent cohort.

### Comments:

~~None provided~~

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Comments accompanying these ratings were all positive.

**Comments:**

