

Program Review: Department of Physics
Dean's Response
June 2019

Submitted by: Dr. Andrea L. Easter-Pilcher
College of Science

I would like to thank the program evaluation team (Dr. Kirk Hagen, Dr. Timothy Herzog and Dr. Eric Toberer) for their critical assessment of the College of Science (COS) physics program at Weber State University. I would also like to acknowledge Dr. Colin Inglefield (Department Chair) and the faculty members in the Department of Physics for their excellent self-study and their innovative and proactive response to the review team's report.

I have thoroughly reviewed the departmental self-study, the program review team's report and the Department of Physics's response to the review team's report. The review team highlighted the many outstanding attributes of the physics program and also delineated a few areas of concern. The dean's response provides commentary on observations made by the program evaluation team as well as the physics faculty response. The dean's response follows the organizational structure used by the program evaluation team in their program review report.

Standard A. Mission Statement

The review team recognizes that the Department of Physics is "clearly meeting its mission of high quality instruction at the undergraduate level." The team notes that the program enjoys exceptionally strong relationships between the students and the faculty, features individualized instruction for majors in the upper level courses, is deeply committed to teaching excellence, and is a model program that has achieved fantastic community outreach. The dean heartily concurs with these assessments and would add that an additional strength of this department is the camaraderie and collegiality that occurs among the faculty members themselves.

Standard B. Curriculum:

The review team recognizes the physics curriculum as consistent with national physics programs and praises the program for their emphasis on improving assessment strategies. The team commends the department for the development of creative Signature Assignments and Big Questions in their general education courses, for recognizing gaps in the curriculum and developing courses that have effectively filled those gaps, and for providing robust research experiences for their students. I agree with this positive review of departmental efforts in these areas and will address the issue of support for undergraduate research later in this report. The team did suggest that the department continue their efforts "to understand the curricular needs of physics students as they graduate" and to "evolve the curriculum accordingly." I concur with this recommendation and recommend that the department continue to work closely with their Advisory Board to accomplish this.

The physics students who were interviewed by the review team stated that most of their courses were lecture based. Faculty members, who noted that most of the faculty in the department use lecture as the primary content delivery strategy, confirmed this. The review team and the dean recognize that there are innovative teaching practices occurring in the department and that faculty members in the department are passionate about undergraduate education. The review team contends however, that active teaching and learning strategies are not being implemented across the curriculum and that student-centered teaching does not appear to be an "overarching culture" within the department. The

review team recommends that the department consider revising their lower and upper level courses to support a more engaging, student-centered pedagogical focus with the intention of attracting and retaining majors.

The department generally agrees with the review team's assessment and delineates strategies that they are implementing and resources that they need to move forward with these pedagogical revisions. The department has incorporated "field trips" (visits to the physics research labs in Tracy Hall Science Center) into their general education and introductory majors courses, and the faculty members have engaged in literature review and conversation within the department focused on improving content delivery strategies. The department will implement experimental revisions of the popular Physics 1010, *Elementary Physics* in an effort to improve student experiences in that "feeder" course.

I commend the experimental revision efforts in Physics 1010 and encourage the department to continue with these strategies, bringing them to the majority of physics courses within the next couple of years. The review team did note, "While faculty expressed a desire to undertake curriculum reform to embrace evidence-based teaching practices, the reality is they do not presently have the bandwidth to undertake substantive reform." I support the desire of many faculty members within the Department of Physics and across the COS to undertake curriculum reform and recognize that workload issues impede this progress. The academic leadership team will focus on COS faculty workload issues during the fall term.

Standard C. Student Learning Outcomes and Assessments:

The review team recognizes that the department put significant effort into evolving their assessment strategies and that student learning outcomes are well thought out and do not need any major revisions. The department is planning to reconsider one aspect of their course assessment procedures. They intend to rewrite the charges to the department assessment committee to support a focus on identifying and documenting engaged teaching and learning practices that are already occurring across the physics curriculum. They will then share those practices within the department and across the COS. I am especially interested in this strategy and support sharing successful, and innovative student-focused teaching and learning practices across the college. I would like Dr. Inglefield to raise this idea with the academic leadership team in the fall.

Standard D. Academic Advising:

The department chair handles academic advising for this department almost exclusively and successfully. The review team recognized that a significant amount of additional advising (career and personal) occurs from the faculty in their many interactions with the students. Students confirmed this, stating that they "had incredible access to faculty, had built strong relationships with the faculty, and viewed the faculty as their mentors." The dean agrees with the review team that advising and mentoring is a clear strength of the department.

Standard E. Faculty:

The review team compliments the Department of Physics faculty members for their many accomplishments including numerous teaching and research awards at the University and state level, serving as authors in peer-reviewed, international journals, as editors of internationally important textbooks, and as leaders at the university, community, state and national level. The review team was impressed with the faculty gender diversity, which is unheard of for most physics departments across the nation. The team also commented that the faculty members were a "model for active maintenance of professional relationships within a department."

The review team did have some significant concerns in this area. They noted that the faculty universally complained about workload and the decrease in faculty numbers (two open faculty lines resulting from retirements were given to other COS departments by previous deans) over the last 10 years. Coupled with this concern, was the their concern regarding the relative lack of junior faculty members in the pipeline, which could create an “experience gap” in the future. According to the department chair, the department needs a 1.5 FTE faculty line increase to cover the current workload. The chair and the review team are clear that given faculty research with students, extensive community outreach and increasing demand from EAST (engineering students needing additional sections of physics courses), the need for additional faculty is urgent. I agree that there is a valid and strong argument for an additional faculty member in this department. I have requested (dean’s summary of the SPRs) a new faculty line in the Department of Physics (as one of two top priority faculty lines for the COS) from the Provost and await her response. Discussions between the department chair and the dean regarding laboratory support staff are ongoing.

Standard F. Program Support:

The team commends the faculty for actively mentoring their undergraduate students in cutting edge research and representing WSU nationally at the Council for Undergraduate Research. These efforts are supported by prestigious grants that have been awarded to the faculty. However, the review team reiterates the issue of overloaded faculty and suggests that their research efforts with students are not supported in the faculty workload model. The team also recognizes the amount of time it takes faculty to manage grants given that the WSU infrastructure to support faculty grants is very limited. Faculty members who have brought in high-level grants (NSF) manage the majority of the financial, material and personnel challenges of these grants themselves. I recognize the excessive additional burden that this places on faculty who are motivated to provide exceptional undergraduate research experiences for their students. Adequate support for research efforts is an issue that extends across the entire COS (and university) and will be discussed as we assess our faculty workload model in the fall.

The department recognizes that highlighting the accomplishments of faculty and students would help them compete with other physics programs across the state. I agree and encourage the department to work with Ali Miller to accomplish this marketing strategy.

Standard G. Relationships with External Communities:

The review team and the dean (and the university) recognize the outstanding efforts of this department in terms of community outreach noting the several very popular physics community outreach events (Science in the Parks, shows at the Ott Planetarium and Physics Open House etc.). The review team and the dean also recognize the questionable sustainability of these programs given the immense amount of time and effort required to pull off these events. Faculty workload discussions taken up by the COS academic leadership team this fall will include consideration of valuable departmental outreach efforts.

The review team suggests that the department might explore cross-disciplinary programs in materials science and/or engineering physics. The department is moving ahead with these suggestions and, in fact, was already considering these possibilities, given the workforce trends at Hill Air Force Base and feedback from their departmental advisory group. Dr. Inglefield has prepared and attached an appendix (to his response to the review team’s report) which details two options for an ABET certified Engineering Physics degree. I find this new degree possibility very compelling and would support the department’s desire to bring in someone from ABET to help clarify some of the questions that remain regarding developing a program such as this one in our Department of Physics. I would also like the department to continue consideration of a Materials Science cross-disciplinary program.