

USU Physics Department R411 Review March 2024

Review Team:

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Introduction

The Evaluation Committee conducted interviews with groups of students, staff, and faculty from the Department over a two day period (March 21-22, 2024). In addition, the Committee was provided with the Department self-study, the majors sheet, and a list of all courses offered. The Committee provided initial feedback to the Department Head and Dean of the College of Science at the end of the second day.

Department Overview

USU is the land-grant university in the state of Utah with missions in teaching, research, and extension. USU serves ~25,000 students, with training across the full spectrum of topics. Further, USU is a research intensive, Carnegie R1, university, and thus supports research at the highest level. The Physics Department at USU serves as the centerpiece of physics education and research for the entire university. As such, the service level classes taught by the Physics Department are integral to the education of all science and engineering student majors. For this reason, the Physics Department teaches many large, introductory level physics classes. As part of its research mission, the Department operates world-class research laboratories that serve to educate undergraduate and graduate students, and to conduct research supported by grants and contracts. To support these missions, the Physics Department at USU occupies excellent space on several floors of the Science Engineering Research building on the USU campus. The Department employs faculty in the tenure track and term ranks, staff scientists, administrative staff, graduate and undergraduate students. It currently has 86 majors and 27 graduate students.

Things the Department is doing well

- The Department appears to be very collegial; the faculty, staff and students all seem to like and respect one another. The members of the departmental staff in particular are willing to take on tasks outside their normal duties to help to keep the Department running smoothly.
- Credit hour production per faculty member is very high. The Department is doing a great job providing service classes to students campus wide.

- Many undergraduates are engaged in research. Experiential learning is a strength of the Department.
- The number of undergraduate physics majors is impressive. Also impressive is the number of majors receiving Goldwater Scholarships.
- The undergraduate teaching laboratories are well equipped and supervised by excellent scientists.
- The Department is doing an excellent job of public outreach. The yearly Physics Day at Lagoon, the annual Demo Show, and the monthly public observatory night are well attended and serve to educate and inspire the next generation of physicists.
- The Graduate Tracking Committee is doing a good job monitoring graduate students' progress. The graduate handbook is well written and informative.

Challenges the Department is facing

- Graduate student numbers are low. This makes it difficult to populate the graduate courses and keep the graduate student population at a healthy and sustainable level. Research groups may not be able to recruit students even though they have funding for GRAs.
- The majority of graduate students have no summer support. The Department should work to provide 12 months of support for all graduate students using a combination of GTA and GRA funds.
- Graduate stipends are not competitive at the national level. The current living wage for a single person in Cache Valley is \$31k/y.
- The core graduate courses are only offered every other year.
- The amount of money available for start-up packages for new faculty members is far from being competitive at the national level. Recent hires at comparable institutions are in the \$1 to \$1.5M range for experimentalists. Raising the startup at USU is constrained by the funding distribution requiring at least 25% to come from the Department F&A return.
- Many members of the faculty are nearing retirement. There are currently no tenure-track assistant professors in the Department. It will likely be necessary to hire a substantial number of tenure-track faculty members in the near future, and the available start-up funds appear to be far from adequate.
- The research group in solid state and surface physics is in danger of disappearing due to retirements. If this is allowed to happen, it would be much more difficult to rebuild the group in the future.

Recommendations to consider

- The faculty should develop an actionable strategic plan for the Department. All tenured and tenure track members of the Department should be engaged in such strategic planning, not just the junior members nor just the senior members. Both the energy of the junior members and the broad vision of the senior members are needed.
- Future tenure-track hiring should be made at the assistant professor level.
- The committee recommends that at least one tenure-track faculty member in experimental condensed matter physics be hired in the near future. This is not only to prevent the catastrophic scenario of the disappearance of the group, but because condensed matter is an area of physics where future growth potential and needs lie both in terms of graduate education and research funding. An added benefit of condensed matter physicists is their ability to collaborate with others STEM faculty on campus to build interdisciplinary programs. This area should be strengthened and should be one of the focus areas of future growth.
- Faculty searches should be run as expeditiously as possible to ensure the best possible candidate pools.
- The Department Head should work with the Administration to raise the startup for new hires. The model that at least 25% comes from the Department F&A return will not meet the minimum requirements for the current market.
- Year-round stipends are needed for all graduate students who are making adequate progress toward their degrees.
- When it is possible to do so, funds for GRAs should be included in grant proposals rather than for postdocs or new research scientists. This would help to reinvigorate the graduate program. In principle, it would also help to improve the success rate of proposals.
- When it is possible to do so, teaching assistantships should be given to graduate students rather than undergraduate students. To support this change, we recommend that the central administration increase the budget for teaching assistantships. Before last year, this budget was unchanged for a decade. This had a very negative effect on the Department.
- Stipends for teaching assistants should be increased to a living wage of \$31k/y.
- Academic credit or pay should be given for all semesters that undergraduate students are engaged in research.
- The course offerings at the freshman undergraduate level could be streamlined. The Department could stop offering some non-essential courses and combine others. The teaching capacity that would be freed up in this way could be used to offer elective courses for upper division undergraduate physics majors and/or graduate students.
- One member of the teaching faculty does not have an appropriate position and the number of courses he teaches each semester is unreasonably high. We recommend the

Department consider appointing him as a Lecturer, or hiring someone into such a position.

- There is a need for a new Staff Assistant I in the Departmental Main Office. This person is needed to man the desk at the entrance to the office.

Summary

Overall, the Committee found a department with many excellent qualities, including a collegial team, excellent facilities, and experienced leadership. The training of undergraduate students is aligned with similar programs at other universities. The requirement for all majors to do 2 semesters of research is commendable. Students doing research should be either paid or provided with course credit for all semesters they are working. The teaching and research laboratories have excellent equipment and there are excellent staff and researchers. The faculty have a wealth of experience and many have significant funding from grants and contracts. The graduate program has a small number of students and the current guaranteed funding of only 9 months per year is not competitive with comparable programs at other universities. The Department will want to develop a plan to offer all graduate students 12 months of support by using a combination of GTA, GRA, and scholarship support. The possible retirement of up to 7 faculty members over the next five years poses a significant challenge and opportunity for the Department. An important part of meeting this challenge will be to offer competitive start up packages. For experimentalists, start up packages in the \$1-1.5 M range should be expected. Given the limited FA return funds in the Department, a creative plan will need to be developed. These plans might include use of existing equipment and increased central funding. The salary discussed is competitive, and so this should not be an issue. The Department will want to work collectively to develop a strategic hiring plan that is creative and considers research areas that are expected to generate considerable funding in the future.