

# Responses to 2018 EPEAB Recommendations

## Career Preparation

***Issue:** EP students have expressed a vested interest in participating in career prep opportunities. The Physics Department had provided this resource in a previous year as a course requiring enrollment, and that model was unsuccessful.*

***Recommendation:** A suggestion is to provide the career prep skills as an extracurricular workshop that can include writing resumes, interview practice and job search strategies. Guest speakers (e.g. EP alumni, EPEAB members) could be invited to the workshop to give the students career advice.*

### **Response:**

In 2017, Dr. Zollner did offer a one-credit course in resume building, GRE preparation, and job search strategies, but attendance was very low and we do not expect this course to have enough attendance to run again. Students have requested a GRE preparation course and it may be possible to run this as a mini-semester course lasting half a semester. Unfortunately, students have very tight schedules and it is difficult for many of them to increase their course loads.

We have had some guest speakers talk:

- Joe Peterson (NMSU alumnus), March 15, 2018, Colloquium "Seismic Imaging: A Private Sector Option for Physics Graduates"
- Adrian Losko \*NMSU alumnus", October 4, 2018, Colloquium "Non-Destructive Isotope Specific Tomography Using Energy-Resolved Neutron Imaging"; discussed also job opportunities at LANL
- Mike DeAntonio, Colloquium "Get a Job!" on February 7<sup>th</sup>; attended by about 15 students
- Laura Pineda, 2<sup>nd</sup> Lieutenant with US Air Force and EP-ChME alumnus, talked about job and internship opportunities with the Airforce Research Laboratory and shared her own experiences with the Starfire Optical Range on February 6<sup>th</sup>. The department provided Pizza, but attendance was low (7 students).

We look forward to having more such events in the future.

All students are encouraged to attend NMSU's "Career Connections Fair" held each semester in Corbett Center. At this, recruiters from companies, national laboratories, and other government organizations fill the main auditorium in Corbett. In addition, the Career Services staff run a Resume AggieMania event prior to the Career Fair. NMSU Career Services provide many services to prepare students for future careers.

## EP Student Research Opportunities

***Issue:** The Advisory Board and EP students have identified a need for greater accessibility to internship and undergraduate research opportunities. The current system consists of a folder with printouts and brochures located in the Physics Department office. Professors and the Department Head may email the students with opportunities as they arise as well. Students have expressed a desire for a more accessible (modernized/central) portal for these positions such as a Department website. The folder was found to be out of date or not well organized and the wide-distribution emails were lost in inbox clutter.*

*EP students often find themselves passed over for large, traditional internship and research positions due to a lack of understanding on the part of the employer of the value of their degree. Engineering positions may see EP students as physicists and research positions may see the opposite.*

***Recommendation:*** *It is the opinion of the EPEAB that more personal, one-on-one recommendations and connections will ensure these students are highly valued in summer placements. Even through the traditional application routes such as the Science Undergraduate Laboratory Internship (SULI), a personal contact through a professor provides invaluable assistance in competitive positions.*

*The EPEAB agrees with the students' sentiments and would encourage the Physics Department to provide information on internships, The National Science Foundation's Research Experiences for Undergraduates (REU) program, and other summer opportunities to the students in a more modern and easily accessible way. The same system would lend itself to career opportunities. As discussed below in this report, an updated and maintained program website (another task for a Program Coordinator) would be an excellent place to provide a career/internship portal. Such a platform could also provide a feedback mechanism for tracking student internship and research placements, which the Physics Department could use as a non-course metric for tracking program objectives. Given the extensive alumni tracking done by the Department, folding in internship and summer work would extend the picture of student success within their time at NMSU and allow time for correcting trajectories.*

**Response:**

The Department of Physics Advising Form was modified and contains a new section for recording, REU participation as well as career advisement.

In total 13 completed EP Advising Forms for the Spring 2019 semester were analyzed: 31% (4) of the students participated in REU's in Summer 2018, at Universities, National Laboratories, or in the private sector. 23% (3) of the students are planning on applying to REU's for Summer 2019. 15% (2) of the students are currently participating in on-campus undergraduate research. 8% (1) of the students received career advisement.

We will use these numbers as a baseline and analyze the Advising Forms each semester, for feedback and identifying of strategies how to increase internship participation and RP program visibility. Furthermore, Elena Fernandez was hired for 2 hours per week for updating the program website, thus promoting program visibility, see more detail below.

**Increasing Program Participation and Visibility**

***Issue:*** *Engineering Physics is a unique and vibrant program with an impressive record of educational accomplishment. The EP Program appears very competitive in preparing students for careers in multidisciplinary science and technology fields. The Program is, however, relatively small and recent enrollment trends are down. EP students are (or at least appear to be) ineligible for scholarships in their Engineering discipline. The Engineering Physics "current use" scholarship alluded to above has not as of yet been well funded; this is likely due to the fact that the Program is still quite young, and few if any EP alumni are far enough along in their career to afford to make large donations.*

***Recommendation:*** *A concerted effort is recommended to increase EP Program enrollment and visibility. Here, visibility is viewed with respect to peer University programs as well as external (to the University) peer institutions. This effort would entail: 1) increasing various opportunities afforded to EP students, such as research*

*internship opportunities, career preparation, scholarships, and alumni and foundation support; 2) enhanced recruitment for the EP Program.*

*The Advisory Board believes that increased Departmental support by NMSU is key to meeting this and other recommendations. This support should include:*

- Hiring a Program Coordinator who can take on a range of important support functions, many of which are suggested in this document. A Program Coordinator can also help Physics Faculty ensure that the EP Program has good recognition across NMSU and that opportunities for Program growth are fully exploited*
- New investments in Laboratory equipment and infrastructure – (Physics faculty should maintain and update a prioritized list of desired equipment)*
- Hiring additional faculty consistent with meeting course and Program demands*

*Regarding recruitment, it is recommended that University-level, College-level, and Departmental-level marketing efforts to high schools (particularly to guidance counselors) and community colleges emphasize the EP Program. This includes a recommendation that the Physics Department coordinate with all NMSU recruiters to provide them with an up-to-date EP Program flyer. These efforts can demonstrate the breadth of the EP degree by highlighting the career successes of EP alumni. It is further recommended that these efforts utilize social media (e.g. Facebook and YouTube) to the largest extent possible. Finally, both the College of Engineering Outreach Office and the Engineering Development Office are advised to work more closely with the Physics Department in promoting the EP Program. (Physics Department faculty report that these two entities have not been particularly responsive to them.)*

*Regarding scholarships, it is recommended that: 1) University-level and College-level administrators work to provide additional scholarship opportunities for EP students (e.g. by establishing or redirecting President's Scholarships, Provost's Scholarships, Dean's Scholarships, and existing scholarships in the various Engineering Departments); 2) the Physics Department revisit efforts to fund the Engineering Physics "current use" scholarship, perhaps by creating a "Give Now" button on the EP website (yet another task for an EP Program Coordinator).*

**Response:**

In the past two years, enrollment in our EP Program has decreased significantly; the Spring 2019 enrollment is just above 50% compared to Spring 2017. Currently, our EP Program continues to struggle with program visibility, targeted recruitment opportunities and/or community acceptance, despite excellent job placement of our alumni and program satisfaction of our students. It seems clear that the program requires a much more aggressive recruitment and retention strategies, and the EP Program Committee maintains that such tasks could be performed by a dedicated EP Program Coordinator. However, decreasing EP enrollment and budgetary constraints are insurmountable obstacles for creating such a position in the near future. Similar considerations apply for justifying future faculty line requests that are aligned better with the program needs.

Despite this, recruiting and retention efforts are being stepped up in the department with several faculty taking active roles in recruiting for both Physics and EP. A new recruiting calendar is being developed and the Physics Olympics is being revived. There were departmentally-sponsored trips to El Paso and Albuquerque to supplement the regional recruiting. Plans are underway for trips to Alamogordo, Santa Fe and Los Alamos as well

as several smaller cities around the state. Both SEPh and SPS are stepping up recruiting efforts and several of the faculty are working with undergraduates on research. We are working on a way to make this effort more transparent so that we can fill our website and social media with success stories that will attract more students.

While budget concerns make this difficult, several faculty members are working very hard to promote the program both locally and nationally. Working with the American Society for Engineering Education (ASEE) Engineering Physics/Physics division has produced more interest nationally for Engineering Physics among employers. Dr. DeAntonio is starting a concerted effort to bring brand recognition nationally and locally for Engineering Physics in the high schools and will bring some tasks before the division at ASEE at the next meeting in June. He also visited with many recruiters during the NMSU Career Fair to explain the advantages of hiring EP students.

While budget for staff and faculty lines remained stagnant, the 'new' administration (Provost's Office) has increased each college's budgets for infrastructure, facilities and laboratory equipment. The Department of Physics was able to secure roughly \$20k through the College of Engineering's Lab Student Fee Allocations and an additional \$24k through the College of Arts & Science's ERR & SEMF program for maintenance, upgrades and purchasing of instructional laboratory equipment. The money was (or will be) used for replacement of computers in the computer and instructional laboratories, new laboratory experiments, necessary repairs/replacements of existing lab facilities and partial payment of equipment maintenance contracts.

As for donations and scholarships, the EP website has now a 'Giving' link. We will also contact alumni in physics and EP to give directly to Engineering Physics Current Use Scholarship. Several have already donated.

### **Engineering-wide interdisciplinary capstone course**

***Issue 1:** Because of the current course load of EP students and prerequisites imposed by the various Engineering departments, it is at times difficult for students to complete the required capstone course in their identified Engineering discipline. This problem has existed for many years, without any comprehensive solution to this point in time. An interdisciplinary capstone option would alleviate this problem.*

***Issue 2:** Engineering Physics is intended to train students to bridge the gap between disciplines. This necessary skill is often lacking in the workplace, whereby team members from different technical backgrounds are unable to effectively communicate. This common problem hinders the development of new technologies. A capstone that highlights the interdisciplinary strengths of senior EP students is desirable as they go on to apply for positions after graduation.*

***Recommendation:** We continue to support the choice of an engineering-wide interdisciplinary capstone course or option. This is an opportunity to strengthen the EP program that will also facilitate the growth of interdisciplinary skills in the engineering college as a whole. This can all be accomplished while maintaining the current goals of the capstone system such as lifelong learning, management, and design skills. This initiative was backed by the EPEAB previously and continues to have our full support.*

#### **Response:**

The NMSU College of Engineering has recently introduced two new college-wide interdisciplinary capstone courses: ENGR 401 "Engineering Capstone I" and ENGR 402 "Engineering Capstone II". Starting from the 2019-2020 academic year, we will

incorporate these interdisciplinary capstone courses into the curriculum of our Engineering Physics program. The new sequence of engineering-wide capstone courses will allow students enrolled in the Engineering Physics program to bridge the gap between disciplines and gain experience in solving real-world multidisciplinary problems selected from a broad spectrum of interest areas, including mechanical, aerospace, electrical, and chemical engineering. Furthermore, the addition of interdisciplinary capstone courses to the Engineering Physics curriculum will make it easier for Engineering Physics students to complete the required sequence of capstone courses by eliminating the need to meet the department-specific prerequisite requirements imposed by various engineering departments.

### **Web Presence Improvements**

***Issue:** Prospective students and engineering programs are increasingly turning to the internet for information, marketing and recruiting. This is the present-day battlefield where competition for students plays out. While the information on the NMSU EP website is adequate, it would benefit from some enhancements.*

***Recommendation:** We recommend the following updates to the EP website:*

- *Include descriptions of the type of work EP graduates actually performs in the course of their career (vs. the US Dept. of Labor description); here the Physics Department is advised to contact EP alumni for testimonials to demonstrate the diversity of opportunities available to EP graduates.*
- *The program flowcharts currently displayed are useful, but the tables recently created for the Program's ABET Self Study Report (possibly with links to current course catalog descriptions) may be more useful to the prospective student deciding on a course of study.*
- *Include examples of support available to students vis-à-vis scholarships, internships, and research opportunities.*
- *Publicly advertising open research or scholarship opportunities is not necessary; however, examples of recently completed activities demonstrates program success. Links to EP events (pictures/videos) will convey the support students provide to each other and the exciting projects and outreach activities in which they participate.*
- *Include a link to SEPh and other student or professional societies in which EP students are active (e.g. APS and various Engineering societies).*

*It should be noted once more that the above are key tasks for a Program Coordinator.*

### **Response:**

The website of the EP Program required many updates and changes to conform with ABET's minimum requirements for a program website, such as graduation rates, updated curriculum flow charts, current student lists and similar. Prior to the ABET visit, the Department of Physics hired Elena Fernandez, who had been the web developer of the original EP website but is currently employed with Amigos Bravos in Taos, for about 10 hours a week to ensure that the EP website conforms with the ABET requirements, which was the main priority in 2018. Specifically, the following changes have been made or will be made in near future:

- The website includes a new link on 'EP Careers' with up-to-date information for career choices and job titles of our EP Alumni. We also inquired with alumni

about feedback about the program, and we intend to provide this as a ‘rolling news-feed’ at the bottom of the EP homepage.

- Updated curriculum tables and links to course descriptions (ABET-style syllabi) are now provided for all EP concentrations.
- We have approached our students to volunteer a short write-up about their internship or undergraduate research experiences and hope to share some of those on our website.
- We added a new webpage about scholarship opportunities for EP and physics undergraduate students and how to apply for those.
- The Society of Engineering Physics (SEPh) students has been discussing of contributing pictures, stories and/or videos about recent outreach and recruitment activities to the website. SEPh is also involved in the design of new fliers, brochures and similar.

### **Centralized Advising and EP Challenges**

***Issue 1:** EP students have expressed concerns about course availability, pre-requisite requirements, and course phasing. These concerns should be on the radar of the administration. Specifically, the availability of core courses and associated pre-requisites directly affects the time required to complete the EP degree. In most EP concentrations, there is virtually no way to accommodate a semester slip of a “critical path course” (e.g. for an internship opportunity), without delaying the degree by one year. Add to this the fact that many engineering departments are continuously reformulating their curricula and course offerings (sometimes to accommodate reduced credit hour requirements), and some “replacement” courses entail a different set of pre-requisites than the “original” course. This can result in instances where students who were prepared to take one course in a given semester must now take one or two extra courses as pre-requisites for the replacement course. The EP Program Committee reports that it is sometimes possible to negotiate an “equivalent” course when a major conflict exists in an EP student’s course schedule, although this requires careful attention on the part of the academic advisor.*

***Issue 2:** A transition to centralized advising is underway at NMSU, whereby all students will receive their academic advising from a staff of professional advisors as opposed to faculty in their respective departments. While there are identified benefits of this centralization, the EBEAB is concerned that centralized advisors may not be best suited to navigate the complex EP curricula, specifically regarding the issues discussed above, including course scheduling and de-conflicting, satisfying pre-requisites, and negotiating equivalent courses. Student feedback on this proposed change indicates strong apprehension that general advisors won’t understand what individual EP students need in terms of course requirements, as well as preparation to pursue their interests within their technical focus areas.*

***Recommendation:** While the EPEAB is not generally opposed to centralized academic advising for EP students, we strongly recommend that all EP students be required to see an academic advisor in the Physics Department each semester. This requirement could take the form of either an “academic advisement” or “mentoring” hold on students’ registration—even if this entails a hold in addition to a centralized advising hold. It is our opinion that the Physics faculty are best suited to navigating the curricula for each of the EP concentrations, as well as reacting to changes on the part of the various*

*Engineering course offerings. Furthermore, the Physics faculty have important perspectives for EP students, with regard to course scheduling as well as career-building opportunities. Another key difference is a faculty advisor's insight into the preparation of a specific student to choose the best pathway given the advisor's familiarity with the student's past performance. While the College Deans do understand the importance of expert counseling in complex programs like EP, continued program and departmental communication with the Deans on this issue remains important as the roll-out of centralized advising proceeds.*

**Response:**

Centralized Advising (CAASS) is probably here to stay, so we are working out the kinks in the program during this second year of its implementation. We have learned to search through COGNOS reports of enrolled majors before the beginning of classes, to find out the names of students who have not been advised, since they were probably advised by CAASS, and then check that they have been advised correctly. In the second year we have generally seen fewer problems with these students. In fact, we have seen an increase in the number of cases where CAASS calls us to get a recommendation on what a particular student should do; this is a very good development. In other cases, we have found that CAASS has additional information that we are not aware of (unofficial transfer transcripts, for example), which were the basis of CAASS action. In general, all EP students have a dedicated assigned departmental advisor. We do continue to place advising holds on all our majors, even if they are also being advised by CAASS.