

Criterion B.5 Faculty

The Engineering Physics program in the NMSU College of Engineering is offered jointly by the Department of Physics in the College of Arts and Sciences, and the Departments of Electrical and Computer Engineering (EE) and Mechanical Engineering (ME) in the College of Engineering. Specialty courses in Electrical Engineering and in Mechanical Engineering are taught by the respective ABET-accredited departments in the College of Engineering. The Department of Physics provides a strong fundamental physics education in support of these disciplines and overall program management. The combination of Physics and Engineering faculty is well qualified to cover all the curricular areas of the Engineering Physics (EP) program.

B.5.1 Faculty Competencies

The Department of Physics instructional faculty and staff is summarized in Table 5.1. The faculty consists of the following:

- Sixteen tenured or tenure-track faculty members (14.5 full time equivalent lines).
- Two college professor with teaching responsibilities.
- One emeritus professor with teaching responsibilities.
- One professional staff with responsibility for instructional support and involvement in instructional laboratory development.

Table 5.1: Physics faculty and staff information and specialty areas.

| Name, Title, Highest Degree, Institution | Graduate Faculty Member | Federal or Industry Sponsors | Specialty |
|---|--|---|--|
| Robert Armstrong, Professor Ph.D. Johns Hopkins | yes | DOD, NSF, LASYS Corp. | Experimental optics, Optical materials |
| Donald Birx, Professor Ph.D. U. of Dayton | yes | PSL | Predictive Science |
| Matthias Burkardt, Professor Ph.D. U. of Erlangen-Nürnberg | yes | DoE | Theoretical Nuclear and Particle Physics |
| Michaela Burkardt College Assistant Professor Ph.D. U. of Erlangen-Nürnberg | no | | Physics Teaching |
| Seamus Curran, Assistant Professor Ph.D. Trinity College (Dublin) | yes | DoD, NSF | Materials Science, Nanophysics |
| Michael DeAntonio, College Assistant Professor Ph.D. NMSU | no | | Physics Teaching |
| Michael Engelhardt, Assistant Professor Ph.D. Erlangen-Nürnberg | yes | DoE | Theoretical/Computational Nuclear and Particle Physics |

Table 5.1: (cont.) Physics faculty and staff information and specialty areas.

| Name, Title, Highest Degree, Institution | Graduate Faculty Member | Federal or Industry Sponsors | Specialty |
|--|--|---|--|
| William Gibbs Professor Ph.D. Rice | yes | NSF | Theoretical/Computational Nuclear and Particle Physics |
| Thomas Hearn Associate Professor Ph.D. CalTech | yes | NSF | Geophysics, Computational Physics |
| Stephen Kanim Associate Professor Ph.D. U. of Washington | yes | NSF | Physics Learning & Education Methods |
| Boris Kiefer Assistant Professor Ph.D. U. of Michigan | yes | | Computational Geophysics; Materials Science |
| Gary Kyle Professor Ph.D. U. of Minnesota | yes | DoE | Experimental High Energy Nuclear Physics |
| Kanani K.M. Lee Assistant Professor Ph.D. UC Berkeley | yes | | Experimental Geophysics; Materials Science |
| Heinrich Nakotte Associate Professor Ph.D. U. of Amsterdam | yes | NSF, LANL | Experimental Materials Science; Neutron Scattering |
| James Ni Professor Ph.D. Cornell | yes | NSF, LANL | Experimental Geophysics; Seismology |
| Vassili Papavassiliou Associate Professor Ph.D. Yale | yes | DoE | Experimental High Energy Nuclear Physics |
| Stephen Pate Professor Ph.D. U. of Pennsylvania | yes | DoE | Experimental High Energy Nuclear Physics |
| Christine Pennise Professional Staff M.S. Johns Hopkins | no | | Instructional Support & Laboratory Development |
| Thor Stromberg Emeritus Associate Professor Ph.D. Iowa State | no | | Physics Teaching |
| Jacob Urquidi Assistant Professor Ph.D. Texas Tech | yes | LANL | Exp. & Comp. Materials Science; X-ray & Neutron Scattering |
| Igor Vasiliev Assistant Professor Ph.D. U. of Minnesota | yes | NSF | Theoretical and Computational Materials Science |

All faculty, who teach EP courses, have Doctorate degrees in Physics or Engineering. The professional support staff member has an M.S. degree in Electrical Engineering. Resumes of each faculty member are provided in Appendix I.B. The faculty and staff are well qualified to teach the required curriculum.

Faculty workloads are presented in Table I-3. The teaching loads in the Department of Physics are relatively low. The nominal teaching load for tenured and tenure-track faculty is three formal courses (9 credit hours) per year, which is considered to be a 37.5% teaching load. In addition, regular faculty members are expected to carry out active externally funded research programs, support and supervise undergraduate and graduate student research, and perform service. The entire regular (tenured or tenure-track) faculty, and one emeritus faculty member, have active research programs, most of them externally supported by government or industrial agencies. Many faculty further reduce their teaching load by using grant funds to “buy out” academic year teaching and spend more time on research. Two of the faculty (Engelhardt, Urquidi) hold joint appointments with outside research institutions, and one (Gibbs) has a 50% position. The strong funded research component allows the department to offer well supported undergraduate and graduate research opportunities.

Faculty members are evaluated annually for their performance in the areas of teaching, research, and service as specified by the College of Arts & Sciences. The evaluation is performed by a committee consisting of two tenured faculty members elected by the faculty and the Department Head on the basis of a point system devised by the faculty. This evaluation is used as the primary basis for awarding merit-based salary increases, and it is considered in the promotion and tenure process. Criteria for teaching may include student and peer evaluations, direct measures of learning, mentoring of graduate students, and extra effort preparing course or instructional laboratory materials. Research is evaluated on the basis of number and quality of publications, conference presentations, proposals submitted and funded, and support of students. Service can include professional service, such as refereeing publications or proposals, organization of conferences, service on university committees, and community service. Major prizes won in any of these areas also influence the rating. In addition to the annual evaluations faculty are also evaluated every 3 to 5 years by the Graduate School for membership on the graduate faculty. The primary criteria are a) creative activity; b) continual study in their field; and c) successful teaching.

B.5.2 Faculty Interaction with Students, Advising, Professional Development, Government and Industry

Levels of Student-Faculty Interactions

Student-faculty interaction begins in the classroom. Faculty are generally assigned the courses they request, but student evaluations of teaching, information gleaned in exit interviews of graduating students, and peer evaluation are also important considerations. In exit interviews, students often comment on the accessibility of our faculty both within and outside the classroom. Class sizes in our department tend to be small – typically fewer than a dozen students – which creates an atmosphere conducive for individual attention and free discussion.

Student-faculty interaction is also fostered by our twice-a-week *Coffee and Conversation sessions* for all members of the department – where students and faculty can interact in an informal setting. The Department also has picnics in the Fall and Spring semesters, which are well attended by students and alumni.

The department has an active chapter of the Society of Physics Students (SPS), the national student organization sponsored by the American Institute of Physics. SPS conduct a wide range of student activities throughout the year, including regular meetings, field trips, speakers from local laboratories, research projects, and attending professional meetings. The student research projects are often directed toward the development of physics demonstration equipment which is used for classes and for outreach.

Each year, as part of the department's Outcomes Assessment process, the Department Head meets with the students in a setting where they can discuss departmental issues freely. This has directly led to changes in curriculum and department policies.

Students also have the opportunity to meet with the Engineering Physics External Advisory Board each spring. The Advisory Board consists of external reviewers, representatives of the program constituents, drawn from national laboratories and industry, and includes alumni.

Advising

The Department's undergraduate program is under the overall supervision of a faculty member, who is designated to be the Undergraduate Program Director. Under this supervision, the department has two designated undergraduate advisors, one for the BA and BS Physics students, and one for the BS Engineering Physics students. This number of advisors is sufficient for our relatively small program, and concentrating the advising function in a few persons ensures that the advisors are well-trained and conscientious. The Engineering Physics advisor consults directly with corresponding advisors in the Electrical and Mechanical Engineering Departments. All students are required to be advised, enforced by a hold placed on their registration. In exit interviews students are generally very satisfied with the quality of advising they received.

Professional Development

Faculty professional development activities include: attendance at seminars and colloquia, participation in teaching improvement activities, participation at professional meetings, reviewing publications and proposals, and conducting original research. All of these activities are expected of regular faculty and are part of the annual evaluation process.

The formal opportunities for teaching improvement available at NMSU include monthly workshops organized by the university Teaching Academy, annual workshops organized by the College of Engineering and the NM Space Grant Consortium, and the GRASP mentoring program sponsored by the NM Space Grant Consortium. The NMSU Teaching Academy sponsors monthly workshops on teaching techniques. They are well attended by our faculty, some of whom (Kanim and DeAntonio) have given presentations. The annual workshops are primarily forums for faculty presentations on teaching. Faculty can request participation in the GRASP program, which sends an observer to the class several times during the semester, who then meets regularly with the

instructor to discuss strategies to improve teaching. Several of our faculty members have participated in this program.

Dr. Stephen Kanim (Physics) has a national reputation in Physics Education research. All of our faculty benefit from the seminars he gives at NMSU, and the informal interaction they have with him.

All tenured faculty members in physics have established internationally recognized, competitively funded research programs, and most of our untenured faculty achieve this after a few years. In 2004, the faculty had 62 refereed papers published or accepted for publication and 28 more submitted. They presented 30 talks at international or national conferences and 41 seminars at universities and national laboratories. Our faculty refereed more than 150 papers and proposals. The department had about \$2M in externally funded research expenditures, which supported 10 undergraduate and 20 graduate students.

Interaction with Practitioners and Employers

The primary career markets for Engineering Physics students in New Mexico are High-Tech companies, national laboratories, and graduate schools. We have endeavored to make our program known at campus career fairs. We find that many employers are not aware of Engineering Physics as a discipline, although they regularly employ both mechanical and electrical engineers. Many government organizations have security limitations that limit their pool of potential employees, and they are happy to see the pool enlarged with high-tech students. Employers have been very receptive of the program, and eager to interview our students. The faculty has regular interaction with national labs and high-tech companies through their research programs. The national labs, in particular, have long-standing relationships with NMSU physics. Los Alamos National Laboratory has supported the department over the last eight years with the LANCE professorship position in which a faculty member spends half their time at Los Alamos National Lab. Physics also interacts with the community through the Engineering Physics External Advisory Board and the Physics External Advisory board. These boards meet in the Spring and Fall semesters, respectively.