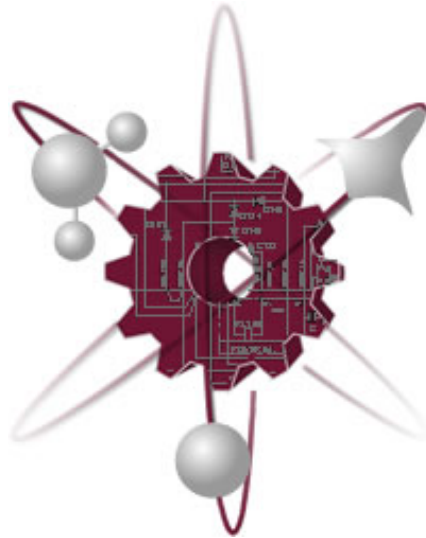


Criterion 8: Institutional Support

Engineering Physics

Bachelor of Science in Engineering Physics



Self-Study Report

New Mexico State University



June 2012

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

Describe the leadership of the program and discuss its adequacy to ensure the quality and continuity of the program and how the leadership is involved in decisions that affect the program.

The Bachelor of Science in Engineering Physics program is offered jointly by the Department of Physics in the College of Arts & Sciences and the Departments of Chemical Engineering, Electrical and Computer Engineering, and Mechanical & Aerospace Engineering in the College of Engineering. Degrees are awarded by the College of Engineering, but engineering physics students have their academic home in the Department of Physics. This organizational structure is similar to University of Colorado at Boulder, with the difference that the UC Boulder Engineering Physics program is not seeking ABET accreditation.

This highly interdisciplinary degree has been approved by the NMSU Board of Regents and is supported by the central administration. Provost Wilkins is very supportive of interdisciplinary programs. Both colleges support the program and provide leadership and advice, for example through interactions with the external Engineering Physics Advisory Board, with the Physics Department Head, and through the Engineering Physics Committee (described later).

At the departmental level, leadership of the BS in Engineering Physics program is shared between the Physics Department Head (Dr. Stefan Zollner), the Engineering Physics Program Head (Dr. Heinz Nakotte), and the Engineering Physics Program Committee (Dr. Nakotte, Dr. Hearn, Dr. Pate, Dr. DeAntonio, Dr. Vasiliev, Dr. Dawood, Dr. Andersen, Dr. Park, and Ms. Fernandez).

The Department Head attends all department head meetings (and similar events) in the College of Arts & Sciences and as many as possible in the College of Engineering. When he is absent from campus, he appoints an acting department head. In cases of scheduling conflicts between both colleges, he is represented by the Engineering Physics program head or a member of the Engineering Physics Committee. This arrangement allows complete tie-in of the Department of Physics and the Engineering Physics program in both colleges. The role of the academic department head is described in the NMSU Policy Manual, especially Section 5.45.20. The Physics Department Head serves at the discretion of the Dean of the College of Arts & Sciences, with the concurrence of the executive vice president and provost. The Physics Department Head is evaluated annually by the Dean of the College of Arts & Sciences, with a more detailed review every three to five years. Items most relevant to the leadership of the Engineering Physics program are described below.

Responsibilities of the Physics Department Head include the following: academic leadership in teaching, research, and outreach; departmental collegiality; managing the budget, meeting reporting requirements to the institution and both colleges; scheduling of courses to meet the requirements of students enrolled in undergraduate and graduate programs; performance management of all staff, faculty, and teaching assistants in the Department of Physics (including mentoring and retention), assessment of the physics undergraduate and graduate programs in the College of Arts & Sciences, external representation of the department (college- and

institution-wide, national societies, constituents, national laboratories, local industry, government agencies, alumni, prospective students and their parents), ruling on academic and personnel appeals and grievances, assisting and advising of students, staff, and faculty with NMSU policies and procedures. The Department Head also performs all exit interviews with engineering physics students and reports his findings to the Engineering Physics Program Committee. He also carries out alumni surveys.

Responsibilities of the Engineering Physics Program Head include the following: assessment and accreditation of the Engineering Physics program, coordination of Engineering Physics student advising, leadership for the engineering physics committee, representing the Physics Department Head when needed, recruiting and retention of Engineering Physics students, new student registration in the College of Engineering.

The Engineering Physics Committee is appointed by the Physics Department Head in consultation with the Engineering Physics Program Head, the department heads of the participating engineering departments, and the Associate Dean for Academics in the College of Engineering. This committee is chaired by the Engineering Physics Program Head. The Physics Department Head and the Associate Dean for Academics in the College of Engineering are *ex officio* members. The Engineering Physics Committee has responsibility for the definition of the engineering physics curricula and its concentrations. Its members assist with engineering physics student advising (including degree checks), assessment and accreditation (continuous improvement of educational programs, courses, laboratory and computational facilities), recruiting, and retention. They update the advising documents, the engineering physics degree pages in the catalog, the course descriptions, and the engineering physics web pages. They also provide advice to other faculty in physics and in the participating engineering departments on their deliverables to the program and act as role models for other faculty.

The Engineering Physics Program Committee works closely with other committees in the Department of Physics, especially the *Curriculum Committee* (chaired by Dr. Vasiliev), the *Undergraduate Recruiting and Retention Committee* (chaired by the Undergraduate Physics Program Head, Dr. Matthias Burkardt), the *Computer Committee* (chaired by Dr. Vasiliev), and the *Laboratory Committee* (chaired by Dr. Papavassiliou).

All departmental committees regularly update the entire physics faculty at departmental faculty meetings, which are held at least once a month. Special physics faculty meetings are held for important topics as needed, for example to review the Department's Promotion and Tenure and other governance documents, to discuss candidates interviewed for an open faculty position, to discuss continuous improvement of outcomes and objectives of educational programs, to plan the strategy of the department for future directions, to decide on committee assignments, or to review the progress of undergraduate and graduate students towards degree completion.

Important strategic decisions are made collegially by the physics faculty and reported to the College of Arts & Sciences (or Engineering) by the Physics Department Head. Tactical and operational details are decided by the Department Head following established university, college, and departmental procedures, usually after consulting the relevant committee chair.

To improve the governance of the Department of Physics, the faculty meet once a year without the department head (for example as part of a retreat before the semester) to discuss their satisfaction with departmental governance. The purpose of this meeting is to communicate to the Department Head, which decisions should be made by the Department Head, by faculty committees, or by the entire faculty. The faculty will provide feedback on decisions made over the past year and guidance for the following year. At this meeting, the faculty members also review which committees the department should form, what their duties should be, and they propose which faculty members should serve on various departmental, college, and university committees.

This leadership model is complicated, but also adequate for the needs of the program. Since Engineering Physics is highly interdisciplinary, our model ensures that members of all relevant disciplines contribute to the leadership of the program. On the other hand, there is also a clear chain of command: Issues related to courses are determined by the course department head and course dean. Issues related to engineering physics students and degrees are determined by the Physics Department Head (who acts as a department head in the College of Engineering for the purposes of the Engineering Physics program) and the Office of the Dean of Engineering. The Engineering Physics Program Head often acts for the Physics Department Head, in case the latter has conflicting responsibilities in both colleges.

B. Program Budget and Financial Support

1. Describe the process used to establish the program's budget and provide evidence of continuity of institutional support for the program. Include the sources of financial support including both permanent (recurring) and temporary (one-time) funds.

The recurring total budget of the NMSU Department of Physics for the 2011/12 fiscal year (July 1st to June 30th) has four components, as listed below. The Department of Physics has six degree options, including BS and BA in Physics, BS in Engineering Physics, MS in Physics, Ph.D. in Physics, and MS in Physics with a *concentration in Space Physics*. Expenditures towards these different degrees are not budgeted separately. The Department of Physics also teaches general education courses for about 1000 NMSU students each year.

The budget of the Department of Physics has been very stable (almost flat) for the past decade, indicating strong continuous institutional support. Students in the Engineering Physics program take core courses in physics and in one engineering discipline. Usually, these courses have low enrollment and therefore no additional instructional expenses are needed to offer the Engineering Physics program. The biggest budget item for Engineering Physics is the cost of administration as a separate degree program.

There is considerable synergy between the physics and engineering physics programs. Only in this combination can a sufficient number of students be reached to offer upper-division physics courses. (10 or more students are needed to offer an undergraduate course.) Engineering physics students also indicate a stronger affinity with physics than with engineering. Therefore, these two degree programs should be housed in the same academic department. Since NMSU is a small institution, the two programs would not be viable as separate programs.

Recurring budget items in the Department of Physics:

- The Instructional and General (I&G) budget, which consists of *State of New Mexico* funds, is currently at 1.56 M\$ per year (down from 1.70 M\$ in the 2008/09 fiscal year). The items in this budget contain the salaries of the Department Head and staff (229 k\$, down from 269 k\$), the faculty salaries (985 k\$, down from 1051 k\$), the graduate teaching assistant salary pools (262 k\$, down from 297 k\$), and departmental operational funds (80 k\$, flat since the 2008/09 fiscal year).
- Physics faculty members conduct research funded by external agencies (NSF, DoE, Army, Air Force, NASA, etc.) with annual expenditures of approximately 1.5 M\$. These research funds mostly support the research and graduate education mission of the Department. In addition, some of these grants also support undergraduate research, which provide extracurricular learning opportunities for physics and engineering physics undergraduate students. These undergraduate research funds are supplemented with small grants from the New Mexico Space Grant Consortium, the Louis Stokes Alliance for Minority Participation, the NMSU Vice President for Research, and the Colleges of Engineering and Arts & Sciences.
- A portion of the Facilities and Administration (F&A) costs charged to external research grants by the University is returned to the Department. After subtracting the departmental portion of startup commitments and cost share, the department receives about 15 to 20 k\$ annually. This portion of the budget is used to pay a graduate assistant to provide IT support for the department. It also pays for other minor indirect costs, such as automobile insurance or relocation expenses for new hires.
- Finally, the Department of Physics receives about 60 k\$ per year in earnings from NMSU Foundation endowed accounts (totaling about 1.5 M\$). These funds are used to pay undergraduate student scholarships (scholarships of USD 750 each for 20 students, totaling 15 k\$), hosting physics colloquium speakers, meal and entertainment expenses of candidates interviewing for faculty positions, banquets or picnics for students, faculty, and staff at the end of each semester, named research professorships (Gardiner Professorship), and summer research support for graduate students.

The Department of Physics I&G budget is established annually by the institution through the College of Arts & Sciences. Despite recent cuts in state support for the institution and changes in institutional priorities through reallocation of faculty and graduate teaching assistantship lines, the total I&G funds in the Department of Physics have only been reduced by about 8% since 2008/09. See TABLE 8.1 for details. Despite overall budget pressures, the institution has continually supported the Department of Physics, for example by renovating Gardiner Hall, which houses the Department of Physics and the Geological Sciences Department, by hiring a new Academic Department Head, replacing the retiring Fiscal Monitor, providing permanent funds for two College Associate Professors (teaching faculty), and by approving a new junior tenure-track faculty hire. Our undergraduate programs in physics and engineering physics compare favorably in quality, enrollment, and graduation rates with others in the Rio Grande Valley (University of Texas at Brownsville, University of Texas – Pan American, University of

Texas at El Paso, New Mexico Institute of Mining and Technology) or in rural West Texas (Texas Tech University, Texas A&M Kingsville, Angelo State University, West Texas A&M University, Abilene Christian University, McMurry University).

Table 8.1. Selected annual budget figures of the Department of Physics over the past decade. Estimates are indicated, where precise figures were not available.

| Category | FY 01/02 | FY 03/04 | FY 05/06 | FY 08/09 | FY 09/10 | FY 10/11 | FY 11/12 |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| <i>Operational Funds</i> | 76,270 | 76,270 | 76,270 | 80,379 | 80,379 | 80,649 | 80,649 |
| <i>Faculty Salaries</i> | 992,947 | 1,019,978 | 1,088,768 | 1,051,328 | 1,061,889 | 983,859 | 985,159 |
| <i>Staff Salaries</i> | ~250,000 | ~250,000 | ~250,000 | 268,566 | 209,523 | 233,345 | 229,067 |
| <i>Teaching Assistants</i> | 242,607 | 246,347 | 265,728 | 297,401 | 297,401 | 262,413 | 262,413 |
| <i>F&A Return</i> | 30,499 | 38,673 | 20,000 | ~15,000 | ~15,000 | ~15,000 | ~15,000 |
| <i>Endowments</i> | ~60,000 | ~60,000 | ~60,000 | ~60,000 | ~60,000 | ~60,000 | ~60,000 |

Research expenditures and F&A returned to the department vary with the success of physics faculty in obtaining external research support and with the portion collected by the Arts & Sciences Research Center for commitments (faculty start-up or mandatory cost-share). The share returned to the Department of Physics was reduced from 24.5% to 16% in the 2004/05 fiscal year. Earnings from Foundation accounts are based on the 1.5 M\$ principal and can vary with the annual return on investments distributed by the Foundation.

In addition to these recurring funds, one-time funds are distributed to the Department of Physics by the institution and by the College of Arts & Sciences.

- The College of Arts & Sciences and the central administration (through enrollment management) provide funds for temporary instructors (including graduate teaching assistants) during the fall and spring semester and over the summer. Salary savings from faculty on one-year sabbaticals, on leave, or from research course buy-outs are returned to the College of Arts & Sciences. In the 2011/12 fiscal year, the Department of Physics returned 65 k\$ to the College of Arts & Sciences as salary savings and received 141 k\$ for temporary instructors, resulting in additional one-time I&G funds of 76 k\$.
- Twice a year, the institution solicits requests for Equipment Renewal and Replacement from the Department. Also, in the fall semester, there is a call for requests to distribute Student Equipment Maintenance Fees. These funds can be used for equipment, software, maintenance, and supplies. Requests are routed from the Department of Physics through the College of Arts & Sciences to the central administration. Typical allocations to the Department of Physics have been around USD 10,000 per year recently.
- The physics faculty voted not to request approval for additional enrollment-based course fees for our physics laboratory from the central administration, to avoid additional financial burdens for our NMSU students.

Recurring and one-time funds in the College of Engineering are used to pay the salaries of faculty and staff to teach courses in electrical, chemical, mechanical, and aerospace engineering. Similarly, College of Engineering facilities and supplies are used for these courses. College of Engineering faculty members also have had the primary responsibility to teach capstone design courses. After the renovation of Gardiner Hall, capstone design courses in physics are expected to become more common. The College of Engineering also supports engineering physics ambassadors and recruiting and retention of engineering physics students as well as student travel and awards.

2. Describe how teaching is supported by the institution in terms of graders, teaching assistants, teaching workshops, etc.

The Department of Physics had I&G funds of about 262 k\$ for 15.4 half-time equivalent Graduate Teaching Assistants in the 2011/12 fiscal year (fall and spring). Most of these teaching assistants are assigned to teach general-education laboratory sections. Each semester, the Department of Physics teaches laboratory sections for about 650 students. Each teaching assistant also works in the physics tutoring center for about 2-3 hours per week to assist students with their general-education physics homework. All international students assigned as laboratory instructors have passed the International Teaching Assistant screening. (Students who fail the ITA screening must successfully complete a communication course before they can teach a lab section. To encourage quick academic progress, such students have to enroll in three physics courses and the communication course for a total of 12 credits. The Department of Physics pays 50% of the tuition for the communication course.) These graduate laboratory instructors are trained by the Department of Physics in an orientation session at the beginning of the semester. (The responsibility for hosting this session rests with the Graduate Physics Program Head, Dr. Papavassiliou). Day-to-day supervision for the lab TAs is provided by the Physics lab coordinator and instructor, Ms. Christine Pennise.

International teaching assistants who failed the International TA screening exam (and must be enrolled in the communication course) are usually assigned as graders. Each TA has responsibility to grade for three courses. In the spring of 2012, four half-time equivalent graders provided instructional grading support for a total of 12 courses. Since there are not enough graders for all undergraduate courses, some instructors are required to use an online homework system (usually Mastering Physics) in their large lower-division general-education courses.

The Department of Physics also hires undergraduate physics and engineering physics students as learning assistants. They staff our tutoring room and assist with supplemental instruction in the lower-division courses for our physics majors. Sometimes, they also assist with the modern physics laboratory (PHYS 315L) or help to setup laboratory experiments for Ms. Pennise.

In the summer, general-education courses (PHYS 211G, 212G, and 215G) are usually taught by experienced graduate teaching assistants as lecturers. About six first-year graduate students are also hired each summer as laboratory teaching assistants. One of the more demanding summer courses, PHYS 216G, has been taught by a faculty member (Dr. Urquidi) in recent years.

The institution supports good teaching and the enhancement of instructional skills through a number of on-campus programs, most importantly the Teaching Academy. Tenure-system faculty, College (teaching) faculty, and graduate assistants are all eligible to participate in Teaching Academy workshops free of charge to improve their instructional skills. Many physics faculty participate in Teaching Academy events each year. The College of Arts & Sciences and the College of Engineering encourage their faculty to participate in relevant Teaching Academy events. At least once or twice a year, the Department of Physics also invites established Physics Education Researchers as colloquium speakers to be informed about the latest trends in physics teaching.

3. To the extent not described above, describe how resources are provided to acquire, maintain, and upgrade the infrastructures, facilities and equipment used in the program.

The two-year renovation of Gardiner Hall (home of the Department of Physics and the Geological Sciences Department) was concluded in the summer of 2010. This renovation included new furniture for faculty offices, classrooms, and student lounges. All classrooms were equipped with a computer, a ceiling-mounted projector, blackboards or white boards, a document camera, a DVD and VCR combo player, and a stereo sound system (standard NMSU smart-room design). One classroom was designed for studio-style and peer-instruction learning based on the latest results from physics education research. This PER classroom is used for supplemental instruction in lower-division courses. Each faculty and staff member received a new computer and printer. Engineering physics students have access to the building during evening and weekend hours with proximity cards. They often meet to study or work on homework problems in the engineering physics student lounge (which is also used as our computational physics classroom a few times a week in the afternoon during the fall semesters). The renovation also provided high-quality space for research laboratories, but no laboratory equipment for instructional or research purposes.

The costs for infrastructure repairs (especially maintenance, supplies, and repairs for computer and audiovisual equipment, furniture, appliances, photocopier and printers) and minor facility improvements (such as new network drops, power outlets for laboratories, theft prevention devices, etc) are paid from the departmental operations budget.

4. Assess the adequacy of the resources described in this section with respect to the students in the program being able to attain the student outcomes.

The resources described above are sufficient to meet the meet the stated *Program Outcomes* and *Educational Objectives* of the Engineering Physics program. We have outstanding world-class physicists and engineers as instructors, who are passionate about undergraduate instruction. All physics courses required for graduation are scheduled at least once per year and are taught by a faculty member with a Ph.D. in physics. Occasionally, the College of Arts & Sciences will allow us to teach a course below the minimum enrollment threshold of ten students. (Since physics and engineering physics students are pooled into the same courses, this happens at most once per academic year.) Scheduling conflicts for students are resolved by individual meetings with students outside of the regular classroom hours or by setting up independent-study courses, which are taught by physics faculty as an overload without pay. Physics and engineering courses do not usually fill up. Students are advised as early as possible

to find room in required calculus courses during the preregistration period. Therefore, our students can graduate in eight semesters, provided they are ready for calculus in their first semester at NMSU.

While the departmental operating and equipment budgets are small, the resources are sufficient to provide adequate instructional laboratory and computational facilities for our students. Capstone and upper-division laboratory courses are sometimes linked to faculty research projects, which allow us to leverage our significant external research expenditures for engineering physics instruction. Our operational funds are sufficient to hire undergraduate students as learning assistants, to purchase materials and supplies for lower-division general-education laboratories, and for clerical expenses such as photocopies. We also provide a desk and a computer for every graduate and some undergraduate students.

In exit interviews, students generally express satisfaction with our institutional resources dedicated to engineering physics. Nevertheless, they mention two resource issues that might be improved.

- (1) More capstone design courses should be offered by physics faculty. This requires new faculty lines with significant start-up funds for experimental research in Gardiner Hall. These new faculty will also provide opportunities for undergraduate research by physics and engineering physics students. The College of Arts & Sciences understands this issue and has just approved a new faculty hire in experimental nuclear physics. Our request for another faculty line in experimental materials physics was forwarded to the Provost's office.
- (2) Students are not satisfied with the advanced physics laboratory course (PHYS 475), because it uses mostly obsolete equipment. This concern is known to the department and we are seeking to improve our advanced physics laboratory over time.

C. Staffing

Describe the adequacy of the staff (administrative, instructional, and technical) and institutional services provided to the program. Discuss methods used to retain and train staff.

The Department of Physics currently has 12.5 full-time equivalent tenured faculty members, including the Physics Department Head. At present, there are no tenure-track faculty members currently in the department. The Physics Department Head teaches one half of the average teaching load for the department, reducing the number of tenured faculty instructors to 12 FTE. There are also two half-time College-track (teaching) faculty members. When combined, these 13 FTE faculty instructors provide adequate teaching, advising, and assessment support for the engineering physics program. Required courses are offered at least once per year and our students can graduate in four years, provided they are ready for calculus in their first semester.

The Department of Physics also has three full-time staff members on campus. Loretta Gonzalez is the (non-exempt) Administrative Assistant. Her responsibilities include faculty and student hiring, student records, and student relations. Rosa Christensen is the (non-exempt) Fiscal Monitor. Most of her work is focused on administration of experimental research grants at the

departmental level. She also supervises spending of departmental I&G funds. Finally, Ms. Pennise is the (exempt) lab coordinator. Since the Department of Physics has lost several faculty lines in recent years, we no longer have a sufficient number of faculty members to have the lower-division laboratories taught by faculty. Ms. Pennise therefore also acts as the laboratory instructor of record for 650 students each semester. She does an outstanding job teaching these labs and supervising our laboratory graduate teaching assistants. On the other hand, she is less likely to make laboratory curriculum improvements than a tenure-system faculty member. Formally, Elena Fernandez (a member of the Engineering Physics Program Committee) is also staff member (Specialist III) with the Department of Physics. However, she is presently being paid through a subcontract with Los Alamos National Laboratory (LANL), based there and fulfills duties at LANL.

Research faculty and staff members hired entirely for research through external grants and contracts are not mentioned here, since their interaction with the engineering physics program has been minimal over the past five years. Potentially, such research staff might offer an engineering physics capstone design project.

NMSU exempt and non-exempt staff did not have a pay raise since the 2008/09 fiscal year. (The Administrative Assistant received a degree award supplement of \$1200 annually when completing her BA in Spanish degree in 2009.) The lack of raises has made staff morale a challenge. Nevertheless, we have outstanding staff in the Department of Physics. The Department Head supports the staff by promoting a collegial climate in the department. The exempt lab coordinator has been receiving a small supplement to her staff salary for acting as the lab instructor for lower-division laboratory courses (due to an insufficient number of physics faculty members available to teach all our courses). Effective July 1st, 2012, the staff members are expected to receive a 2% pay increase (except for the fiscal monitor, who did not work for the university during the entire preceding 12-month period). While staff pay is generally low (even for Southern New Mexico), NMSU benefits (medical, dental, retirement, etc) are excellent in comparison with the private sector.

Training for the non-exempt staff members (Administrative Assistant and Fiscal Monitor) on NMSU business procedures (hiring procedures, record retention, general employee safety, etc) is made available by the institution. The lab coordinator traveled to the American Physical Society March meeting in Boston in February 2012, paid by the Department of Physics operational budget. This allowed her to visit lab equipment vendors in the conference exhibit, attend sessions on physics education research, and general physics talks of interest. NMSU also waives tuition for regular employees to enroll in a limited number of courses with permission of the supervisor, which enables employees to continuously improve their skills.

D. Faculty Hiring and Retention

1. Describe the process for hiring of new faculty.

Faculty lines that become vacant through retirements or resignations are returned to the Office of the Executive Vice President and Provost. Once a year, early in the spring semester, the academic departments submit requests for faculty lines to their college. (The Department of Physics submits such requests to the College of Arts & Sciences.) The colleges collect all requests and submit some of them to the Provost's Office for approval. Departments are notified during the summer if their line requests have been approved. When the department request new faculty lines, they also request start-up funds. Typically, the start-up expenses for physics faculty (graduate student support, faculty summer salary, equipment, supplies, and travel) are shared by the Vice President for Research (50%), the College of Arts & Sciences (33%), and the Department of Physics (17%). The Department of Physics share of start-up expenses (17%) consumes most of the F&A (indirect costs) of external research returned to the Department.

Vacant faculty lines approved for rehire by the central administration are filled at the Assistant Professor level. The institution budgets new positions at the median of a salary study performed by the institution's Human Resources department. The *Mercer 2010 salary study* places the median salary for a new Assistant Professor of Physics at approximately 61 k\$. A salary of 60 k\$ was approved for our new hire in Experimental High-Energy Nuclear Physics for the 2012/13 academic year. There is concern in the Department of Physics that the budgeted salary will not be sufficient to attract a qualified candidate to this position, since nearby institutions have made recent assistant professor hires in physics at significantly higher salaries (70 k\$ at University of New Mexico, 68 k\$ at University of Texas at El Paso). A new NMSU salary study effective July 1, 2012, shows a median market salary of 64 k\$ at research-intensive peer institutions. A study performed in the fall of 2011 by the Physics Department at Florida State University including 62 Ph.D. granting physics department around the nation shows a median new Assistant Professor Salary of 70 k\$.

After the approval for a new faculty line has been received from the Office of the Executive Vice President and Provost through the College of Arts & Sciences, the Department of Physics submits a position request form to the Office of the Provost through the College of Arts & Sciences. Attached to this form are a copy of the proposed ad and a description of the position. The Physics Department Head and the proposed chair of the search committee also meet with the Vice President for Research and the Associate Dean for Research in the College of Arts & Sciences to sign a firm commitment for start-up for the new faculty member. For the most recent hire to start in August 2012, an agreement was reached for a start-up of 241 k\$. After the position request form has been fully approved, advertising can begin and a search committee is appointed by the Physics Department Head with concurrence of the Dean of Arts & Sciences. Typically, a search committee will have about 5 members, including one member from a different department and one member from a subfield of physics different from the new faculty member being sought.

The advertisement for the position, approved by Human Resources, is distributed as both a print ad (in *Physics Today*, typically) and as an online ad (in *Physics Today* online, and in a

variety of jobs databases and email list-servers relevant to the field in question). Applicants are asked to provide a full CV, a statement of research interests, a statement of teaching philosophy, and a list of at least three references. The search committee reviews the applications and selects the best 3-4 candidates for interview. This short list is presented to the Physics Faculty and the Dean for approval.

During the interviews, each candidate will meet with the Dean (or an Associate Dean), the Vice President for Research, and small groups of faculty; present a Colloquium to the whole Department of Physics; and present a “pizza seminar” to a group of graduate students – the graduate students make written comments about each candidate.

Subsequent to the interviews, the search committee will meet and formulate a set of conclusions about the candidates based on their own experiences in the interviews, informal discussions with other faculty members, and the written comments of the graduate students. These conclusions are presented to a meeting of the Department of Physics faculty, and based on the outcome of that meeting a memo is written to the Dean expressing the conclusions of the Department. The Department Head, the Search Committee Chair then meet with the Dean to discuss which candidate will receive an offer.

2. *Describe strategies used to retain current qualified faculty.*

The department head and college administration strive to sustain a challenging and rewarding professional work environment, so that faculty members remain enthusiastic about remaining with the department. Junior faculty members are provided with opportunities for formal and informal mentoring toward facilitating career success. They are also encouraged to develop areas within departmental academic programs that are of specific interest to them. Numerous professional development courses and workshops are offered on campus at no cost, through the Teaching Academy and the Advance Program, for instance. Faculty and their family members are eligible to take a limited number of NMSU courses free of charge (tuition benefits).

The College of Arts & Sciences also has a comprehensive awards program, including awards to stimulate research and reward outstanding teaching and service. Such awards are available to junior faculty, tenured faculty, and College Faculty. Details can be found at the NMSU Arts & Sciences web page under the “College Awards” menu item on the sidebar. Some awards are funds for research (which can include summer salary), course buy-outs, or funds for development such as travel. There are also awards in the Department of Physics (*Gardiner Professorship*, most recently awarded to Dr. James Ni and Dr. Heinz Nakotte) and from the institution as a whole (such as the *Distinguished Achievement Professorship* recently awarded to Dr. Matthias Burkardt and Dr. William Gibbs). Similarly, Dr. Heinz Nakotte received the institution’s advising award at the fall 2010 faculty convocation.

If a faculty member with a strong record of performance receives an offer from another institution, NMSU will make an effort to retain this faculty member. The faculty member presents a written offer from another institution to the Department Head, who will make a recommendation to the Dean about retaining the faculty member. Retention incentives can include an increase in base salary; retention commitment (similar to start-up commitment) for

students, summer salary, travel, equipment, supplies, etc; accommodation of a spouse or partner. The financial burden for such retention incentives is borne entirely by the College of Arts & Sciences. For increases in base salary, the College will typically leave a faculty line vacant and use the funds instead for salary increases to retain qualified faculty members. Retention commitments are paid out of the F&A portion from external research grants paid to the College of Arts & Sciences and the Department of Physics.

The NMSU Board of Regents recognizes that faculty salaries at NMSU are well below market (especially for full professors) and that there has been no salary raise for faculty for a number of years, due to reductions in state formula funding for the institution. There will be a 2% salary raise pool for raises taking effect on July 1st, 2012.

The institution believes in differential rewards based on performance for students, staff, and faculty. To evaluate faculty performance, the faculty elect two tenured faculty members to consult with the Department Head about performance ratings (exceeds, meets, or does not meet expectations) in the areas of teaching, research, service, and outreach (if applicable). The overall performance rating, once approved by the Dean of the College of Arts & Sciences, will be considered in determining raises and other reward system elements. For example, for the current salary increase cycle, all faculty members with satisfactory performance over the past three years will receive an across-the-board 1% pay increase. In addition, a 0.85% raise pool was made available to the Department for performance based raises. The faculty approved a simple formula on how to distribute the additional 0.85% at a faculty meeting. The raises were then implemented by the Department Head, pending approval by the Dean of the College of Arts & Sciences and the Executive Vice President and Provost.

E. Support of Faculty Professional Development

Describe the adequacy of support for faculty professional development and how such activities, such as sabbaticals, travel, workshops, seminars, etc., are planned and supported.

All tenured faculty members are eligible for sabbaticals as described in NMSU Policy Manual Section 7.20.70. "The purpose of a sabbatical leave is to promote professional growth." After at least 12 semesters of full-time service, faculty members apply for a sabbatical during the spring semester, requiring approval from the Department Head, the Dean of Arts & Sciences, and the Executive Vice President and Provost. Sabbatical leaves are for one semester at no reduction in salary or for a year at 60% of salary. (The other 40% of salary plus travel expenses are often covered, at least in part, by a host institution visited by the faculty member on sabbatical, such as Los Alamos National Laboratory, University of New Mexico, or Jefferson Laboratory in recent history).

The Department of Physics has a vibrant colloquium speaker series. Typically, about two thirds of colloquium speakers are external. In addition to giving a colloquium about their research, the colloquium speakers also meet individually with faculty and students throughout the day to exchange ideas about topics of common interest (teaching, research, service). Both the colloquium and the individual meetings contribute to faculty development.

Most tenured physics faculty members (all except one) have significant external research grants (in excess of typically 100 k\$ per year per faculty member). Their research grants typically

contain funds for travel to conferences or other institutions. While primarily for research (and to update faculty knowledge in their area of specialty), conferences such as the general or March meetings of the American Physical Society usually also have sessions contributing to professional development in physics education, which are attended by our faculty members.

The Department of Physics (from its operational I&G funds) and the College of Arts & Sciences provide travel support for College Faculty to attend a regional or national meeting on Physics Education (such as the annual meeting of the American Society of Engineering Education or the American Association of Physics Teachers). Sometimes, such attendance is also supported by the conference organizers. The Department Head and other departmental leaders attend physics leadership conferences, such as the biennial physics department chair conference (organized by APS and AAPT) and meetings intended to increase STEM education and enrollment or physics teacher education. The Department Head shares learning obtained at such conferences and workshops with relevant physics faculty members.

To facilitate informal sharing of information between faculty members, physics faculty members meet once a week for a brown-bag lunch in the physics conference room. There are also special faculty meetings dedicated to continuous improvement of our undergraduate physics programs. Some of these meetings involve faculty from the participating engineering departments. The Engineering Physics external advisory board and the Physics external advisory board also provide valuable information, advice, and recommendations to the physics faculty, both in their reports and also in meetings with individual faculty or with groups of faculty.

While NMSU is a minority-serving institution with very limited funds for professional development, there are nevertheless ample opportunities to achieve this aim. Typically, all physics faculty members travel at least once per year, many of them more often. Therefore, institutional support for faculty development appears adequate.