Overview
This report covers the activities of the physics department during the time period from the end of the Spring 2000 semester through the end of the Spring 2001 semester. It is organized into two general areas – Education and Outreach and Research. These areas are themselves organized by three crosscutting themes – Challenges, Accomplishments, and Direction.

In addition, there were personnel changes in the department. Dr. Dwight Russell left the department effective January 2001, and Dr. Paul Wang gave notice that he was leaving effective July 2000. Searches were made in the past year in the following areas: Materials Science, Biophysics, and Space Physics. In Materials Science and in Space we expect to recruit faculty before the end of the summer. As this report is being written, requests to make offers are being evaluated by upper administration.

Education and Outreach
Challenges
The biggest challenge to education in the physics department is the number of majors and graduate students. The number of physics majors nationally has appeared to stabilize, but at pre-Sputnik levels. This is mirrored at a national level by declining enrollments in science generally, and the issue is of growing concern at the highest levels. The challenge locally is to recruit more students as well as retain them at higher rates.

Declining enrollments have put pressure on the recruiting of graduate students. This challenge became very clear in our graduate program this fall semester when, out of an expected incoming class of 7 graduate students in July, we got only two. Of the five students we did not get, two students (including a graduating UTEP senior) accepted offers at other institutions, and one decided not to leave work. The other two students (Mexican nationals from Zacatecas) did show up on campus, but left the following day stating that UTEP was too expensive and that they did not have money for tuition. The students who took the other offers had their tuition paid by their respective institutions. We thus find ourselves with a clear competitive disadvantage competing for graduate students because of the inability to use state funds for tuition waivers.

Accomplishments
A major accomplishment in the past year has been the initial implementation of a restructured introductory calculus-based physics sequence (2 courses - introductory mechanics; introductory electromagnetism). The revised sequence relies on “active engagement” techniques and is consistent with the ABET 2000 guidelines (we have supplied the necessary paperwork to the College of Engineering). Active lecture, computer simulations, collaborative problem solving, and hands-on laboratory are all used. These courses are currently being evaluated and will be improved, based on the results of the evaluations and pre/post testing using widely benchmarks instruments. Preliminary results are:

1. The combined dropout/F/D rate for both courses combined has been reduced by 30%.
2. The mechanics course showed a drop in scores (compared to previous semesters) on the Force Concept Inventory conceptual exam. This negative result needs to be confirmed with the spring scores. In any case, we need to analyze and improve those sections of the course causing the most difficulty.

3. The electromagnetism course showed students entering with a much lower pretest average (21%) as compared to a national sampling (30%) on the Conceptual Survey of Electricity and Magnetism, but the posttest scores were almost the same (44% and 47%, respectively), indicating that our students caught up. Again, we need to determine if this result holds for the spring, and also look for specific areas where students still have difficulty.

4. An attitudinal survey of students this spring found a very strong support for the revised course format, including the team-teaching aspect of the course. This positive attitude towards the introductory sequence seems to be paying off in terms of numbers of majors. Two students in those courses have decided to switch their majors to physics, and three more are strongly considering it. No current physics majors taking the revised courses decided to leave physics, in contrast to previous years (according to Alan Dean).

To deal with the issue of financial stress on graduate students, two new policies were instituted after the loss of so many students in September. All new graduate students get an automatic $400 towards tuition from the Cook Professorship. Also, all new graduate students are advised to make use of the emergency loan that they can request so as to defer tuition payments. This means that they will not have a large tuition bill due directly on arrival. The department recruited three new students for the spring semester (two from Mexico and one from Bangladesh). These policies proved very helpful to the new students.

In the area of outreach, a major NASA grant was awarded to the College of Science with Dr. Ramon Lopez as the PI (Connecting Sun City with Sun-Earth Connections). This grant provides $672,000 over three years to recruit high school students into science (not just physics) through the lure of space science. The Physics Circus made a number of visits to area schools, as well as putting on shows for students visiting UTEP. The Physics Circus also accompanied Dr. Fitzgerald to a Science Career Expo held at the Insights science Museum. Finally, our Society of Physics students participated in judging the Ysleta science fair this spring.

**Direction**

We expect to continue to revise our physics courses, particularly the service courses. These revisions will be aimed at producing improved learning environments and increasing retention. We also plan to expand recruitment efforts and outreach to area schools. Finally, the department voted to phase in a staggered offering of the upper division courses until the number of majors increases to the point where it is feasible to offer the full suite of courses every year. We had intended to implement this in the coming year, but due to student requirements for courses if they are to graduate next year we will not be able to do so until the 2002-2003 academic year. In the fall semester, Drs. Lopez (Ramon) and Smith have agreed to take a voluntary overload to provide the required courses.

Another measure discussed in the department during a faculty meeting was the need to interview our graduates. At one point the department did have an exit questionnaire, as well as a follow-up one. This summer we plan to develop a new questionnaire based on the old ones and begin a regular monitoring of our graduates to see where we might be able to improve what we provide students.
Research

Challenges

The department participates in two Ph.D. programs: Materials Science and Engineering (MASE) and Environmental Science and Engineering (ESE). We have lost several faculty in Materials Science, leaving us with a very weak participation in the MASE program. The overwhelming need is to recruit additional materials scientists who can work effectively with existing programs while adding additional capabilities to the effort on campus. We also tried this year to recruit a Biophysicist who could support interdisciplinary biomedical programs. That search was not successful as the two individuals interviewed were not deemed suitable.

Accomplishments

Several faculty (Drs. R. Lopez, Smith, and Fitzgerald) were awarded new research grants this past year totaling over $700,000 over the next three years. Dr. Cole spent the spring at Jefferson Lab with his Master’s student preparing his experiment. When the data collection is completed, Dr. Cole will return with enough material for many Master’s theses and undergraduate projects. Dr. Smith had a notable success when a paper being presented by his student Omar Vargas was selected for a press release at the spring meeting of the American Astronomical Society.

One of the departments Ph.D. Students, Roderick Pearson (ESE student under the direction of Dr. Fitzgerald), was awarded a prestigious EPA Fellowship last summer. This fellowship provides financial support, tuition, and travel funds to scientific meetings.

A number of undergraduates participated in research projects this past year, and they presented their results at various meetings. Seven physics undergraduates presented their work at the MIE undergraduate student research expo on campus this spring. In October, eight students (both graduates and undergraduates) attended the annual meeting of Texas section of the American Physical Society in Houston to present their work. Three students (two graduate students and one undergraduate) are attending the national spring meeting of the American Geophysical Union (which is the major geo/space science society in the world) and one is attending the spring meeting of the American Astronomical Society (as mentioned above). Two other students (one undergraduate and one graduate) under the direction of Dr. Fitzgerald also attended national meetings, and one of these students, Karina Apodaca was selected to be among the students representing UTEP at a National MIE meeting in summer 2000.

Plans for a new computational science Ph.D. program were discussed within the College of Science, and Dr. Ravelo from Physics took a leading role as Co-Chair of the committee that drafted the white paper on the subject. This report was well received and the college is moving forward to develop a plan for such a degree.

Direction

The critical issue for next year involves rebuilding a materials science group in the department. We hope to have approval for an early search (advertise in July, hire for a January start date), and a request to that effect has been made to the Dean. To move more effectively to hire a biophysicist, Drs. R. Lopez, Gardea, and Rael will meet to plan a coordinated approach to the hires within all three departments who are intended to
support the biomedical initiative, and we will request to reopen the biophysics position in
the fall. In addition, the department is committed to supporting a future Ph.D. in
computational science, and will give preference to future individuals who can contribute
in that area. It is expected that Dr. Ravelo will play a significant role in the preparation
of plans and actual implementation of such a Ph.D. program.