Physics Department Strategic Plan 1996

I. Mission

The Physics Department faculty is committed to providing outstanding educational and research opportunities. Our highest priority is to help all students achieve their educational objectives. We serve the people of the State of North Carolina by:

* providing educational opportunities to undergraduate and graduate students in physics, through high-quality curricula and world-class research facilities

* developing research programs which advance scientific knowledge, and which contribute to the needs of the Nation and State, and which merit national and international recognition for their high quality

* providing high-quality physics instruction to all of the University community

* supporting outreach activity which fosters improved public awareness and understanding of science.

II. Vision

Our vision of the Department in the next 5-10 years reflects our commitment to people, and our commitment to excellence in teaching and research:

* One third of the faculty will be members of the NCSU Academy of Outstanding Teachers

* The Department will rank in the top 20% in the next National Academy ranking of graduate Physics research programs

* One half of the faculty will have been elected Fellows of professional societies (American Physical Society, Materials Research Society....)

* Three to five new faculty will have been hired from under represented groups (African-American, women)

* One to three faculty will be members of the National Academy

* Enrollment in MS and Ph.D. programs will double, to 30-40/year

* Graduating class of physics majors will double, to 30-40/year

* Service course enrollments will grow by 25%, to 3200 students/semester

* The fragmented and constrained facilities we now occupy will be consolidated in core basic science facilities on Centennial Campus

2/6/96

III. Strategic Issues

A. Evaluation Results

1. Assessment activities since Spring 1994

* Exit interviews with BS, MS, and Ph.D. students

* Records on employment of graduating BS, MS and Ph.D. students

* Major fields achievement test administered to physics seniors

* Records on student success in entry to graduate school

* Written and numerical instructor evaluations in all courses, including a 'yes/no' course-satisfaction question

2. Results of assessments since May 1994

* Our thirty-nine Physics BS graduates are much sought after for graduate school and for employment. Twenty-two are in graduate programs (56%) and nine have technical jobs (23%)

* Our thirty-one Physics MS and Ph.D. students are all employed, and in excellent positions in academia, industry, and government

* Our physics majors score highly in the major fields achievement test in Physics (88th percentile in 1994, 93rd percentile in 1995)

* Responding students (1537) in Fall 1995 100-200 level service physics courses answered 'yes' 70-80% of the time to the question "do you find this course to be generally satisfactory"

3. Changes in response to findings

* Working to reduce class size, to improve the lecture and laboratory learning environment, and to boost tutorial support services

* Increased use of learning technology (sample tests on the web) and a focus on cooperative learning in 200 level courses

* Emphasis on instrumentation in course work (upgrade of laboratory equipment and skills for students at all levels)

B n/a

C n/a

IV. Goals

*** Participate in new research and business partnerships which build on NCSU's strengths in basic sciences and engineering.**

* The electronics industry will be building major new electronic materials fabrication facilities in the US over the next decade. North Carolina can be a leader in capturing one or more of these facilities by creating an internationally recognized faculty at NCSU in the core disciplinary areas and materials science areas. Many of the best electronic materials researchers in the world are at industrial laboratories (AT&T, IBM) which are being downsized. We have a unique opportunity to attract these National Academy caliber scientists to NCSU, and use their expertise to build a new generation of industrial partnerships on Centennial Campus. Discussions between PAMS and COE are on going.

***Improved service course instruction in 205/208 and 211/212 - Physics for Scientists and Engineers, and General Physics:**

* use computer-graded problem assignments on a daily basis to emphasize basic understanding

* explore computer based collaborative learning environments

* reduce class size in core courses - no class over hundred students

* emphasize writing and analysis skills in the teaching laboratories

* teach in modern classroom space that permits faculty interaction with individual students, and allows integration of observation and experiment with the lecture materials

* boost tutorial services

***Improved service course instruction in 131 and 223 - Conceptual Physics, and Astronomy**

* develop an additional introductory astronomy course to accommodate high student interest

* relocate Schenk forest astronomy laboratory site (it will become unusable for night time observation as the area is developed)

* develop a light, lasers and optics course with take home laboratories to accommodate the demand for conceptual rather than mathematical science courses

***Develop BS Physics options that appeal to cross disciplinary interests**

* Materials Physics option, joint with Materials Science and Engineering, to appeal to students interested in working in the electronic materials industries

* Computational Physics option, to appeal to students interested in careers in visualization and the modeling of complex physical phenomena via super computers

* Marine Physics option with MEAS, and BS in Marine Sciences with concentration in physics

*** Develop new MS programs for students planning on careers outside of academia**

* MS in Instrumentation - a joint program with MEAS to exploit new opportunities for Government and military funding

* Five year BS/MS program to appeal to academically gifted students who have participated in research as undergraduates

* Host topical one day conferences which link up different NCSU departments. Examples are fluid dynamics, imaging and remote sensing, nanometrology, microscopy

Supplementary material

Out of a faculty of 34.5, eleven have been named to the Academy of Outstanding Teachers (Cobb, Doggett (emeritus) Fornes, Gould, Haase, Johnston, Lado, Patty, Reynolds, Schetzina, Seagondollar (emeritus), three have been named Alumni Distinguished Undergraduate Professor (Gould, Haase, Patty); and one has been named Alumni Distinguished Graduate Professor (Mitchell). Our faculty provides State and National leadership in science education: David Haase is Director of Science House, and Karen Johnston is immediate past President of the American Association of Physics Teachers.

We taught 2728 students in lectures in Fall 95 with evaluations of 4.2 out of 5.0 on the "overall effectiveness of the instructor" question. Responding students in 100-200 level service physics courses answered 'yes' 70-80% of the time to the question "do you find this course to be generally satisfactory". The satisfaction score for all courses was 82%. In Fall 1995 we taught 2097 students in laboratory sections of courses.

Our research funding for the year 1994-95 was $5.5M excluding State appropriations, and growing. In the recent NRC rankings we moved from 75 to 51 out of 144 in "quality of faculty". In citations per faculty we were 32 out of 144. We showed the tenth biggest jump of any school in the five year "perception of change" ranking. We had the highest percentage (25%) of women graduate students of any physics program in the top half of the rankings. Five of our faculty have received Alumni Research awards (Bernholc, Lucovsky, Nemanich, Sayers, Schetzina). Ten of the faculty active in the Department are Fellows of the American Physical Society (Aspnes, Bernholc, Chung, Gould, Lucovsky, Mitchell, Nemanich, Sayers, Schetzina, Risley). Aspnes recently was awarded the Isakson prize of the American Physical Society. Nemanich is Vice President elect of the Materials Research Society.

Contrary to recent trends and perceptions, our PhD's are in demand, and recently some have received multiple job offers at mid sixties salaries A full listing of recent MS/PhD employment is available.

Faculty and students offices and laboratories are located in eight different building on

the NCSU campus: Cox, Dabney, Bureau of Mines, Daniels, Withers, Nelson, Research II, Research III.

Fall 95 service course enrollments (lecture/laboratory):

PY131 158/167

PY223 242/184

PY205 584/485

PY208 707/678

PY211 506/507

PY212 234/232

1994 proposed initiatives

* increased TA and grading support for 100 and 200 level courses

* increased TA laboratory support for 100 and 200 level courses

* computer support services position within physics

* graduate secretary position IV

* line item position for Physics Tutorial Center manager

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