DEPARTMENT OF PHYSICS
CALIFORNIA STATE UNIVERSITY, FRESNO

MISSION STATEMENT
UNDERGRADUATE PHYSICS PROGRAM

INTRODUCTION:

The primary mission of the Physics Department at California State University, Fresno, is to provide undergraduate students with a rigorous and thorough understanding of the ideas and methodology of physics.

Non-majors are exposed to general physics principles and introduced to the problem-solving methods characteristic of physics in a variety of courses. We offer conceptual physics and astronomy courses for non-science majors and more rigorous general physics courses for students studying other science-based majors. Both calculus-based and non-calculus-based general physics sequences are available, as appropriate, for different majors.

Physics majors are given a comprehensive background in the fundamental areas of the discipline such as Classical Mechanics, Thermodynamics, Electricity and Magnetism, Modern Physics, Optics and Quantum Mechanics. Through other elective courses, our majors are encouraged to explore specialized areas such as atomic physics, geophysics, relativity, statistical mechanics, condensed matter, astronomy and astrophysics. Laboratory courses and independent study projects allow physics majors to apply their knowledge to new problems. The B.S. degree option prepares students for graduate study or employment in government or industry. The B.A. degree (Natural Science, Physics Option) is typically used by students interested in pursuing a teaching career at the secondary level.

SPECIFIC GOALS AND OBJECTIVES

GOAL 1. To provide students with a background in the fundamental areas of physics.

- Objective 1. Successful students will pass courses in the fundamental areas listed above.
- Objective 2. Students will be provided with experience in important additional topics through elective courses.

GOAL 2. To provide adequate opportunity for students to apply their knowledge to practical experimental and theoretical problems.

- Objective 1. Two required lower division laboratory courses (4AL, 4BL) and two required and one elective upper division laboratories (104, 110, 130) along with independent study projects (Phys 190) will provide practical experience.

Objective 2. Students will gain computational experience through the use of "Mathematica" and/or "Excel" and other software packages in laboratory analysis and in lecture course homework.

Objective 3. Students will be required to become familiar with the operation of sophisticated research instruments.

GOAL 3. To prepare students to assume responsible positions in education or science or industry and to provide scientific writing experience.

Objective 1. Students will solve problems, write laboratory experiment reports and present homework problem solutions in class.

Objective 2. Students will gain experience in scientific writing, and in using word processing, spreadsheet and graphics software in preparing written reports, transparencies, etc.

Objective 3. Students will acquire the requisite educational/technical background.

GOAL 1. To provide students with a background in the fundamental areas of physics.

Objective 1. Successful students will pass courses in the fundamental areas listed in the Introduction.

Outcome Criteria: Undergraduate physics majors will be able to correctly describe and discuss the major concepts of physics.

Assessment Method: Specific embedded questions on exams of Physics 4A-B-C, 102, 105A-B, 107A, and 110. It is the eventual goal of the physics department to also administer a locally written pre-test and post-test of first our majors, and later all students taking either 2A, 2B or 4A, 4B.

Time Frame: According to the course assessment schedule (see end of document)

Who Will Do The Assessment: The course instructor and assessment committee*.

Type of Feedback: The course instructor will tabulate final course grades and the names of physics majors who took the course. This information will be passed on to and reviewed by the assessment committee. The assessment committee will compare the course performance of the students against their performance on national, standardized assessment tools (the Major Field Achievement Test -- MFAT -- and similar tests). See Goal 3, Objective 3.

* Note: The department Assessment/Curriculum Committee will consist of three faculty members elected to three-year terms on a staggered basis. The election shall occur annually during the first week of school in the fall semester.

How Will The Data Be Used To Improve The Program And Revise Curricula: The assessment committee will summarize their findings and forward the summary to the appropriate instructor along with possible comments and suggestions.

Objective 2. Elective courses will provide students with experience in important additional topics.

Outcome Criteria: Students will broaden their physics knowledge beyond the fundamental subjects listed earlier. They will gain an understanding of some specialized areas in physics (see list in introduction), and be able to see how the fundamental subjects provide a foundation for these specialized areas.

Assessment Method: Specific embedded questions on exams of Physics 107B, 115, 130, 140, 162, 170A, 175T.

Time Frame: According to the course assessment schedule (see end of document).

Who Will Do The Assessment: The course instructor in each of the listed courses.

Type of Feedback: The course instructor will tabulate final course grades and the names of physics majors who took the course. This information will be passed on to and reviewed by the assessment committee. The assessment committee will compare the course performance of the students against national, standardized assessment tools (the MFAT and similar tests). See Goal 3, Objective 3.

How Will The Data Be Used To Improve The Program And Revise Curricula: The assessment committee will summarize their findings and forward the summary to the appropriate instructor along with possible comments and suggestions.

GOAL 2. To provide adequate opportunity for students to apply their knowledge to practical experimental and theoretical problems.

Objective 1. Two required lower division laboratory courses and two required and one elective upper division laboratories, along with independent study projects, will provide practical experience.

Outcome Criteria: Students will become familiar with basic physics laboratory techniques by carrying out standard sets of experiments in mechanics, electromagnetism, thermodynamics and modern physics. Special projects will be available in Physics 190.

Assessment Method. The student will write laboratory reports which should display a thorough grasp of the theoretical and experimental methods used in the laboratory.

Time Frame: According to the course assessment schedule (see end of document).

Who Will Do The Assessment: Faculty instructors of the laboratory courses will grade the lab reports and tabulate the final course grades and names of physics majors for the assessment committee.

Type of Feedback: The instructor and the assessment committee will review and discuss student performance. The course performance will be compared with responses on the alumni survey forms that deal with the rigor of the experimental background, and also with departmental norms.

How Will The Data Be Used To Improve The Program And Revise Curricula: After the committee reviews student performance, any shortcomings in either the theoretical or experimental understanding displayed by the students, will result in modifications to the content or structure of the laboratory.

Objective 2. Computational experience will be gained using "Mathematica" and/or "Excel" and other software packages in coursework and laboratory analyses.

Outcome Criteria: Students will be able to use mathematical software to analyze data, solve theoretical problems, and display their final results in a compact and understandable format.

Assessment Method: The laboratory courses will mandate that students analyze some of their data using common software programs designed for this purpose. In the Mathematical Physics course (PHYS 170A), some portion of the homework will be completed by using symbolic computer programs such as "Mathematica".

Time Frame: According to the course assessment schedule for Physics 4AL, 4BL, 104, 110, 130 and 170A.

Who Will Do The Assessment: The course instructors will report on software usage and student performance to the assessment committee.

Type of Feedback: The instructor and the assessment committee will review and discuss student performance.

How Will The Data Be Used To Improve The Program And Revise Curricula: The assessment committee will suggest changes, as need be, to course instructors.

Objective 3. Students will be required to become familiar with the operation of sophisticated research instruments.

Outcome Criteria: Students will use various research tools to take and analyze data within the framework of the laboratory classes.

Assessment Method: Students will make laboratory measurements and write up laboratory experiments. Their laboratory performance and written reports will demonstrate experimental competence.

Time Frame: According to the course assessment schedule (see end of document).

Who Will Do The Assessment: The laboratory instructor (and the course professor in courses which have both lecture and lab).

Type of Feedback: The assessment committee will meet at the end of the spring semester to review brief summaries and examples of student work provided by the laboratory instructor.

How Will Data Be Used To Improve The Program And Revise Curricula: After the assessment committee reviews the summaries and example laboratory reports, any significant deficiencies in student laboratory skills will lead to recommendations to revise the laboratory curriculum or research project format to address these deficiencies.

GOAL 3. To prepare students to assume responsible positions in education or science or industry and to provide scientific writing experience.

Objective 1. Students will organize and write laboratory experiment reports.

Outcome Criteria: Students will be able to effectively communicate the results and conclusions of a physics problem solution or experiment or investigation, in a written report and/or via an oral presentation in class or, on occasion, in a departmental colloquium.

Assessment Method: Written reports will be evaluated by the laboratory or course instructors.

Time Frame: According to the course assessment schedule (see end of document).

Who Will Do The Assessment: The course instructor.

Type of Feedback : Faculty instructors of the laboratory courses will summarize laboratory report writing quality for the assessment committee.

How Will The Data Be Used To Improve The Program And Revise Curricula: The instructor and the assessment committee will review and discuss student performance and, if necessary, modify the course to address any deficiency.

Objective 2. Students will gain experience using word-processing and graphics software in preparing written reports, transparencies, etc.

Outcome Criteria: Students will be able to utilize current software to prepare their written reports.

Assessment Method: Written reports will be evaluated by the laboratory or course instructors.

Time Frame: According to the course assessment schedule (see end of document).

Who Will Do The Assessment: The course instructor.

Type of Feedback : Faculty instructors of the laboratory courses will summarize graphics and word-processing software usage for the assessment committee.

How Will The Data Be Used To Improve The Program And Revise Curricula: The instructor and the assessment committee will review student performance and, if necessary, modify the course to address any deficiency.

Objective 3. Students will acquire the requisite educational background.

Outcome Criteria: Students will exhibit their competence by achieving a satisfactory score on the Physics II MFAT Examination produced by the Educational Testing Service (ETS). In addition, every five years, a general questionnaire will be mailed to alumni to solicit their feedback on the adequacy of their physics education.

Assessment Method: ETS examination outcome and survey form analysis.

Time Frame: According to the course assessment schedule (see end of document). Note that this is a rotating schedule, so that every academic year only four courses will be assessed.

Who Will Do The Assessment: The Physics Department will administer the ETS examination and send the examination papers to ETS for grading and tabulation. The assessment committee will design, mail and analyze the survey form.

Type of Feedback: : ETS test results will be reviewed yearly by the assessment committee. The survey form results will be reviewed after each use.

How Will The Data be Used to Improve The Program and Revise Curricula: Specific deficiencies will be addressed by appropriately revising the curriculum.

COURSE ASSESSMENT SCHEDULE

2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
2A and 2AL	2B and 2BL	4C	10	PSci 21
4A and 4AL	4B and 4BL	102	105	NSci 4
107	110	115	130	NSci 1A
136	140	162	170A	NSci 115

Senior Year: Administer the ETS examination (every year).
Five-Year Intervals: Send out alumni survey form.