Name of Proposer:
Mari-Anne Rosario

Name of Department/Program of Proposer:
Physics and Astronomy Department

Name of Department/Program housing the course:
Physics and Astronomy Department

Name of Chair/Program Director:
Jessica Kintner

Type the course acronym, course number and course title:

PHYS 001/002, Introduction to Physics I and Introduction Physics I Laboratory. Concurrent enrollment in both courses is required

How often is this course taught:
yearly

Course prerequisites:
Math 27 or Math 13 (either may be taken concurrently)

Unit value of the course:
1.25

Normal class size:
60

Number of sections expected in Fall 2012:
2

Number of sections expected in Spring 2012:
0

Is the course designed for and/or appropriate for first-year students:
Yes

Choose the working groups and learning goals:
Scientific Understanding

Teaching: how the course will guide students to achieving the learning outcomes.

Physics 1 is the first in a two-course sequence designed for students majoring in physics, chemistry and mathematics, and for students preparing for an engineering program. The majority of the students are freshmen intending to pursue either physics or engineering. Physics 2 is the laboratory that accompanies Physics 1.

(1) Demonstrate an understanding of scientific concepts, principles, and theories that explain the natural and physical world.

This course will guide students towards achieving the first learning outcome by exploring Newtonian mechanics and thermodynamics. As two of the main branches of classical physics, both Newtonian mechanics and thermodynamics involve "scientific concepts, principles and theories that explain the natural and physical world." Newtonian mechanics is science's primary framework for understanding the motion of objects larger than atoms. Subtopics and applications of Newtonian mechanics considered in this course include kinematics, dynamics, energy, momentum, vibrations and oscillations, and waves. The class presents topics in a logical structure. Describing motion (kinematics) is, for example, followed by the cause of motion (dynamics). Each concept, itself, follows from definitions and physical observations. Finally, concepts are used to analyze and model numerous physical systems.

The topics are primarily covered in a lecture format, but classes routinely include short discussions, active physical demonstrations, and time for students to apply concepts themselves by doing problems. The laboratory also explores these same topics. As a hands-on experience, laboratory is an opportunity to analyze and model a real system based on physical principles.

(2) Collect, analyze, and interpret empirical data gathered in a laboratory or field setting.

This course has a required laboratory that meets for one 3-hour session per week. In addition to emphasizing physics concepts, the laboratory introduces students to methods of experimentation in physics including good measurement technique, simple data analysis, and scientific writing. Each experiment requires students to setup and calibrate an experimental system, collect data, analyze data, and interpret the data.

Students are provided with a written description of each experiment covering the physical concepts, a description of the experimental setup, guidelines on how to collect data, procedures on how to analyze the data, and questions that guide them in interpreting the data in light of the physical principles. Students carry out these activities themselves. The instructor periodically advises on specific procedures or concepts.

(3) Examine social or ethical issues that arise in the process of scientific inquiry or out of scientific or technological developments.

As stated in the implementation notes, “the introduction-to-the-major science courses (specifically Chemistry 8/9, Physics 1/2 and Physics 10/11) need to meet only outcomes #1 and #2."

Learning: how coursework will be used to measure student learning of the outcomes

(1) Demonstrate an understanding of scientific concepts, principles, and theories that explain the natural and physical world.

This learning outcome will be assessed through homework, midterm exams, and a comprehensive final exam. The bulk of the homework and exams involves problems. Problems are the primary way students can demonstrate their understanding. Solutions to problems require more than a numerical answer. Acceptable problem solutions start with identifying appropriate physical principles relevant to the situation, identifying the correct physical quantities to calculate, and presenting a logical mathematical progression to arrive at a final value. Homework and exams occasionally include questions that require text explanations.

The laboratory also allows for students to demonstrate their understanding. The laboratory coursework requires students to give written and verbal explanations of the physical principles and main calculations involved in the experiment.

(2) Collect, analyze, and interpret empirical data gathered in a laboratory or field setting.

Students can demonstrate that they have done and understood these tasks in the following ways: (1) submitting a formal lab report or informal notebook entry that documents their efforts using text, diagrams, and calculations; (2) taking a quiz that requires analyzing and interpreting a different set of data using the same techniques; and (3) giving a verbal explanation or physical demonstration of the physical principles, measurement techniques and data analysis used in the experiment.

(3) Examine social or ethical issues that arise in the process of scientific inquiry or out of scientific or technological developments.

As stated in the implementation notes, the introduction to the major science courses "need to meet only outcomes #1 and #2."

Chair will oversee submission of student work:
Yes

Chair will oversee instructor participation in Norming and Assessment exercises:
Yes

Once you have completed this form, please send your syllabi to Darcy Tarbell:
ok :)

Thank you:
ok :)