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SCI 101 Fundamentals of Physics-DEAdd-2015-09-03

Form Information
Page Naming Example: CRIM 101 Intro to Criminology-DEAdd-2015-08-10

Please direct any questions to curriculum-approval@iup.edu

***Indicates a required field**

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Course Level* undergraduate-level

Distance Education Section

- Complete this section only if adding Distance Education to a New or Existing Course

Course Prefix/Number

SCI 101

Course Title Fundamentals of Physics

Type of Proposal

See CBA, Art. 42.D.1 for Definition

online

Brief Course Outline

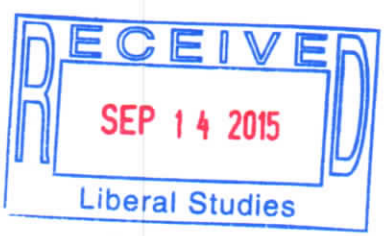
Give an outline of sufficient detail to communicate the course content to faculty across campus. It is not necessary to include specific readings, calendar or assignments

As outlined by the federal definition of a "credit hour", the following should be a consideration regarding student work - For every one hour of classroom or

direct faculty instruction, there should be a minimum of two hours of out of class student work.

Mechanics

- Kinematics
  - Displacement, velocity, Acceleration
  - Free Fall and Air Resistance
- Dynamics- Newton
  - Newton's Laws of Motion- Inertia, Force, and Action-Reaction
  - Impulse-Momentum
  - Friction
  - Nonlinear Motion
  - Projectiles



- Circular motion

Energy

- Work and Power
- Potential and Kinetic Energies
- Simple Machines
- Conservation of Energy
- Gravity and Satellite Motion

Properties of Matter

- Atomic Nature of Matter
- Solids and Density
- Liquids -Buoyancy in Liquids, sinking and floating
- Gases and Buoyancy

Heat

- Temperature, Heat, and Expansion
- Heat Transfer - Conduction, Conduction and Radiation
- Change of State
- Heat Energy - Sources and Uses

Sound

- Vibrations and waves
- Sound, music and hearing

Electricity and Magnetism

- Static Electricity
- Current Electricity and Circuits
- Electricity and the Body
- Magnetism
- Electromagnetic Induction

Light

- Properties of Light
- Reflection and Mirrors
- Refraction and Lenses
- Vision and Color
- Dispersion and Scattering
- Light Waves
- Interference and Diffraction
- Polarization
- Light Emission
- Incandescence
- Fluorescence
- Phosphorescence

Quantum Physics

Discovery of the Nucleus

Spectra

Energy levels

The Nucleus and Radioactivity

X -Rays and Radioactivity

Radiation

Isotopes

Half-life and Decay

Radiation and the Body

Fission and Fusion

Fission and Reactors

Fusion and the Stars

Rationale for Proposal (Required Questions from CBA)

How is/are the instructor(s) qualified

in the Distance Education delivery

method as well as the discipline?

Dr. Stanley Sobolewski, who is one of the instructors, has taught PHYS 101 Energy and Our Environment on-line for several semesters, over the past six years. This class is a liberal studies non-lab science class. In addition, he has taught PHYS 111 General Physics I as well as PHYS 112 General Physics II on line. Most of the on-line classes that the proposer has developed included elements such as: asynchronous recorded lectures with embedded questions, randomized quiz questions from a large test bank that included publisher and instructor questions, and student submissions of short essays' as well as longer papers. The instructor has used WebCT, Blackboard, Moodle and D2L as enhancements to traditional classes, as well as on-line only format.

Dr. Muhamad Numan, the second instructor, has taught the SCI 105 Physical Science Lab online which is similar to the SCI 101 lab proposed here. He has also taught online PHYS 112 General Physics II, LBST 499 The Atomic Bomb and Its Impact, and PHYS 533 Thermal and Statistical Physics. He has developed or co-developed these online courses that he has taught since 2004. The instructor has used WebCT, Moodle, and D2L platforms for the courses delivered online.

For each outcome in the course, describe

how the outcome will be achieved using

Distance Education technologies.

1. To develop an understanding of the role of physics in describing the phenomena of nature.

Readings from the text book as well as on-line lectures will allow students to make connections between physics concepts and natural phenomena. The on-line laboratory activities will permit students to modify a system and observe the consequence of that alteration.

2. To provide the necessary experiences in the laboratory so that the processes of observation, classification and generalization may be used.

Since this is being modified as an on-line course, the laboratories will consist of students manipulating simulations at the University of Colorado's PhET site. Students will be able to formulate a hypothesis, change variables in the system, and then support or refute their hypothesis. Experiments performed on the model will generate data that students will use to make generalizations and to classify results.

3. To be able to explain some of the more common natural phenomena in terms of the physical processes involved.

Common natural phenomena are discussed in the text book. Short written assignments will ensure students demonstrate the ability to explain natural phenomena.

4. To be able to use mathematics and graphical techniques to arrive at numerical answers for scientific problems.

In the text book, during on line lectures, as well in laboratory activities, students will be provided with examples of solving simple algebraic problems as well as plotting graphs from data gathered.

5. Describe the relevance of science in modern society.

The text book provides many examples of the use of science in modern society. Students will be asked to write a short paper on the impact of physics on society in general. Students will be provided with a list of topics to write about. Topics may include: cell phones, Global Positioning Systems, nuclear power and the like.

6. Evaluate how scientific applications impact human welfare as a foundation for making intelligent judgments concerning the worth of the applications of science.

The text book as well as some laboratory simulations will address the impact of science and technology on the welfare of humanity. This can also be addressed in the short paper mentioned above.

7. Provide an understanding of some of the "great moments" in the history of physics and the individuals, including women and minorities, responsible for them.

Once again, the text book related many stories about the history of physics and the contributions of women and minorities. Assignments illustrating the people of science and their great discoveries will enhance this appreciation.

How will the instructor-student and

student-student interaction take place?

(If applicable)

Teacher-student interaction will be both synchronous as well as asynchronous. Students will be watching pre-recorded lectures produced by the instructor on topics in the course. During the lecture, a dialog box will prompt the student to answer a question concerning the topic just covered. Students answers to the questions will count toward their grade by the means of a SCORM file. Occasionally during the course, groups of students will participate in small discussion groups with the instructor be means of Blackboard Collaborate. The D2L Chat tool will also be used by students to ask as well as answer questions of their peers as well as the instructor.

How will student achievement be evaluated?

On line quizzes consisting of multiple choice, mathematical, and short answer items. There will also be one or two short discussion papers which will be submitted through the drop box. The lab portion will consist of lab reports constructed as D2L quizzes.

How will academic honesty for tests

and assignments be addressed?

Multiple choice items will be randomly pulled from a test bank of more than one-hundred items; each student will have a unique set of questions. The comprehensive assessments will be timed to limit the opportunity of searching for the answer. Originality of short written papers will be checked for plagiarism by TurnItIn There will also be an "assessment" interview, best described as an oral exam using the Blackboard Collaborate. This is a large time commitment. However, the instructor has done this in the past, and is effective to broadly assess student achievement.