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		Contact	Person Dennis	Whitson and W	. Larry Freeman Phone 7-4593/4592
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<sup>+</sup> Director of Liberal Studies (where applicable)

## Syllabus of Record for PHYS 100

## I. Catalog Description

PHYS 100 Prelude to Physics

3 lecture hours 0 lab hours 3 credits (3c-0l-3sh)

Prerequisite: Math 100 or Equivalent High School Preparation

This course is designed to prepare students for their first course in quantitative physics by reviewing fundamental concepts involving measurement and error, graphing, motion and applications of Newton's Laws in developing problem solving skills. In addition the course will present an historical perspective as well as introduce students to the many opportunities that exist for those with a background in Physics.

## II. Course Objectives

Upon successful completion of this course, the student will be able to:

- 1. Converse with a working knowledge of the language applicable to a first course in physics. The course is designed to enable the student to adequately deal with the concepts of basic physics as applied to fundamental principles of measurement, error propagation, and graphical analysis in the study of the kinematics and dynamics of motion.
- 2. Apply the basic concepts of physics developed through Newton's Laws of Motion.
- 3. Take her/his first quantitative course in physics with a high probability of success.
- 4. Apply concepts and techniques in mathematics applicable to quantitative physics.
- 5. Explain and discuss the historical development of physics from the Greeks to the modern era.
- 6. See the professional opportunities available to those with knowledge of physics.

### III Course Outline for Lectures (42 hrs)

#### A. Physics (3 hrs)

- 1. An historical perspective from the early Greeks through the "modern era"
- 2. The impact of physics upon society and professional opportunities
  - a) entertainment
  - b) medical
  - c) energy and power production
  - d) military

- e) environment
- f) communications
- g) computers
- B. Problem Solving and Analytical Skills (10 hrs)
  - 1.) critical thinking
  - 2.) estimation and error
  - 3.) graphing techniques
  - 4.) Vectors
  - 5.) Kinematics
- C. Newton's Laws of Motion (10 hrs)
  - 1.) Forces
  - 2.) Work
  - 3.) Momentum
- D. Energy (10 hrs)
  - 1.) Kinetic energy
  - 2.) Potential energy
  - 3.) Universal Law of Gravitation
  - 4.) Gravitational potential
  - 5.) Gravitational potential energy
- E. Rotational Motion (7 hrs)
  - 1.) Kinematics
  - 2.) Torque
  - 3.) Energy

Testing (2 hrs)

#### IV. Evaluation Methods

The final grade for the course will be determined as follows:

- Tests. Three tests (two during the semester and the final) consisting of solving word problems and writing short essays.
- 30% Homework
- The average of all quizzes in the lecture on the textbook and supplemental assignments.

Grading Scale: .

90-100%: A; 80-89%: B; 70-79%: C; 60-69%: D; below 60% F.

Attendance Policy: The attendance policy will conform to the University wide attendance criteria.

## V. Required textbooks, supplemental books and readings

Textbook: Katz-Stone, D. M. and Hubbard, K. A., *The Physics Toolbox*, McGraw Hill, 1998

### Supplemental Readings:

- 1. Physics today (Journal published by the American Physical Society)
- 2. The Physics Teacher\_(Journal published by the American Association of Physics Teachers)
- 3. Handouts

### VI. Special resource requirements

None

### VII. Bibliography

- 1. Cole, R., So You Want to Take Physics, Saunders College Publishing, 1993
- 2. Coletta, V. P, College Physics, Mosby Year-Book, Inc., 1995
- 3. Heuvelen, A. V., ActivPhysics<sup>TM</sup> 1, Addison Wesley Interactive, 1997
- 4. McDermott, L. C., Shaffer, P. and the Physics Education Group, *Tutorials in Introductory Physics*, Prentice Hall, 1998
- 5. Ohanian, H. C., Principles of Physics, 1114, W. W. Norton & Co., 1994
- 6. Pickar, A. D., *Preparing for General Physics*, Addison Wesley Publishing Co., 1992
- 7. Swartz, C., Prelude to Physics, John Wiley and Sons, 1983

# Course Analysis Questionnaire PHYS 100, Prelude to Physics

## **Section A: Details of the Course**

A1 This course is a requirement for the proposed degrees Associate in Applied Science in Electro-Optics (A.A.S.E.O.) and Associate in Science in Electro-Optics (A.S.E.O.). This course is not intended for inclusion in the Liberal Studies program. This course is intended for students who are inadequately prepared to take PHYS 111, PHYS 115, or PHYS 131

- A2 This course does not require changes in any other courses in the department. The Applied Physics program will have an additional track associated with the A.S.E.O. degree and this course will be part of that track.
- A3 This course is being offered on a trial basis at IUP during the Fall session of the academic year, 2000, for inadequately prepared students in the Physics, Applied Physics, and Pre-engineering programs.
- A4 This course is not intended to be dual level.
- A5 This course is not to be taken for variable credit.
- A6 Similar courses are offered at the following institutions:
  University of Alabama at Birmingham
  PY 100, Preparatory Physics (3)
  University of California at Irvine
  Physics 1, Preparation for Physics (4)
  SUNY at Buffalo PHY 100, Introduction to Physics (4)
- As far as I know, the contents or skills of this proposed course are not recommended or required by a professional society, accrediting authority, law or other external agency. The content and/or skills of this course cannot be incorporated into an existing course. Some of this material is taught in PHYS 111, PHYS 115, and PHYS 131, but at a much faster pace.

#### **Section B: Interdisciplinary Implications**

- B1 This course will be taught by one instructor.
- **B2** The original proposal for PHYS 100, Prelude to Physics, included approximately ten hours of applied mathematical concepts necessary in elementary physics. At the request of the authors of the course, the Department of Mathematics reviewed the proposed course and decided not to support its implementation. They suggested that other alternatives to teaching ten hours of mathematics content in the physics course be explored. For example that we might make MATH 100 a prerequisite or co-requisite for PHYS 100. In response to their suggestions the proposed ten hours of applied mathematics have been eliminated from PHYS 100 and students will take the Mathematics Placement test in the summer before entering the program. For students in the Electro-Optics program, if their preparation and background is shown to be inadequate, they will be expected to take MATH 100 on the main campus of IUP during the second Summer Term. Similarly, if students, who are enrolled at the main campus, in one of the Physics programs, show inadequate mathematical preparation they will also be advised to take MATH 100 during the second Summer Term. (See Attachment B2-A)
- B3 Seats will be available in this course for students in the School of Continuing Education.

## **Section C: Implementation**

The faculty resources are not adequate. In order to teach PHYS 100, as part of the Electro-Optics program, there is a need for 0.125 FTE. (For the source of this faculty resource see pg. 23 of "SSHE Requirements for New Programs".)

#### C2 Other Resources

#### a. Space

It is anticipated that a new building will be constructed at the North Pointe (Slate Lick) site near Kittanning, PA before this program starts in the Fall of 2002. This building will house the Electro-Optics program. If the building is not ready by Fall of 2002 the program will be housed in the Electro-Optics Center (EOC) located in the West Hills.

## b. Equipment

No additional equipment is required for this course.

## c. Laboratory Supplies and other Consumable Goods

About \$200 for consumable goods per year.

## d. Library Materials

No additional library materials are required for this course.

#### e. Travel Funds

None anticipated

- C3 No grant funds are associated with the maintenance of this course.
- C4 This course will be offered once a year, usually in the Fall semester.
- C5 One section of this course will be offered at a time.
- C6 For the Electro-Optics program twenty-four students will be accommodated because it is the maximum number allowed in the program.
- C7 There is no professional society that recommends enrollment limits or parameters for a course of this nature.

#### Section D: Miscellaneous

No additional information is necessary.

#### Attachment B2-A

Dr. Dennis Whitson and Dr. Larry Freeman informed Dr. Buriok of their intention to initiate a new course called PHYS 100 that would be part of the new Program in Electro-Optics. They gave Dr. Buriok a copy of the Syllabus for the course and a copy of the curriculum for the program. Dr. Buriok later requested that we make a breakout of the Math subjects that would be taught in the course. This breakout explicitly listed 10 hours of math that would be taught in the course.

### Dr. Whitson and Dr. Freeman received the following e-mail on 10/23/00:

Professors Whitson and Freeman:

Thank you for informing the Mathematics Department faculty of your desire to initiate a new course, PHYS100 Prelude to Physics, for the Associate Degree Electro-Optics programs to be offered at the Armstrong Campus. As these programs have been developing, you have kept us informed of the need for mathematics courses. We are very appreciative of that, and in turn, we are supportive of the development of these programs.

In addition to the materials you prepared for the College Curriculum Committee, the "Summary of Mathematics Topics in PHYS100 for the Elector-Optics Program" is very helpful. Since enrollment in this course will be restricted to students in the Associate in Applied Science in Electro-Optics and the Associate in Science in Electro-Optics, the topics you listed seem appropriate and we have no objection to their inclusion in the course. If students are unable to reach the appropriate level of mathematical knowledge with this course, I assume you will recommend they schedule MATH100 Intermediate Algebra to gain the proper background rather than going directly to MATH110 Elementary Functions.

Gerald Buriok, Chairman Mathematics Department

At this point we informed Dr. Buriok that we did have plans on also teaching PHYS 100 on main campus to some of our students whom we felt were inadequately prepared for taking PHYS 131. We did not plan on restricting the enrollment to Electro-Optics students.

#### Dr. Whitson and Dr. Freeman received the following e-mail on 10/27/00:

Professors Whitson and Freeman:

I distributed to the faculty of the Mathematics Department the materials you sent me regarding your proposal for PHYS 100 Prelude to Physics, and we discussed the proposal at a department meeting on October 26, 2000. A motion was passed at that meeting stating that we do not support the approval of PHYS 100. It was suggested that you consider other alternatives rather than teaching ten hours of mathematics content in this

course. For example, you might make MATH100 a prerequisite or corequisite for PHYS100.

Gerald Buriok, Chairman Mathematics Department

We followed the suggestions of the Mathematics Department and took out the ten hours of mathematics and made MATH 100 a prerequisite if the student appears to need some more background in mathematics, which is determined by the student's class ranking, his/her board scores, and his/her score in the BA (basic algebra) test given to all incoming freshman. The following e-mail was received by Dr. Whitson and Dr. Freeman on 11/7/00.

Professors Freeman and Whitson:

The most recent version of the syllabus and course analysis questionaire for PHYS100 Prelude to Physics you sent to the Mathematics Department deals with the concerns expressed by faculty of our department with regard to remedial mathematics. As a result, we no longer have an objection to your seeking university approval of this course. Gerald Buriok, Chairman Mathematics Department