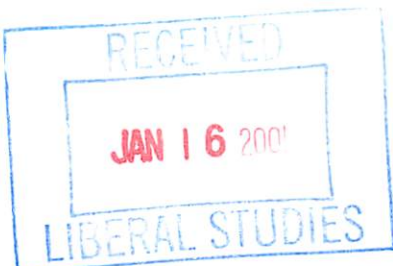


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Submission Date: _____
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CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dennis Whitson and W. Larry Freeman Phone 7-4593/4592

Department Physics

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE Phys I Elec-Optics
Suggested 20 character title

New Course* PHYS 115 Physics I for Electro-Optics
Course Number and Full Title

Course Revision _____
Course Number and Full Title

Liberal Studies Approval + _____
for new or existing course Course Number and Full Title

Course Deletion _____
Course Number and Full Title

Number and/or Title Change _____
Old Number and/or Full Old Title

_____ New Number and/or Full New Title

Course or Catalog Description Change _____
Course Number and Full Title

PROGRAM: Major Minor Track

New Program* _____
Program Name

Program Revision* _____
Program Name

Program Deletion* _____
Program Name

Title Change _____
Old Program Name

_____ New Program Name

III. Approvals (signatures and date)

Kenneth E. Hershman 11/16/00
Department Curriculum Committee

Richard D. Roberts 11/16/00
Department Chair

[Signature] 01/12/01
College Curriculum Committee

[Signature] 1/12/01
College Dean

[Signature] 1/15/01
*Provost (where applicable)

+ Director of Liberal Studies (where applicable)

Syllabus of Record for PHYS 115

I. Catalog Description

PHYS 115 Physics I for Electro-Optics

2 lecture hours

3 lab hours

3 credits

(2c-3l-3sh)

Prerequisite: PHYS 100

Corequisite or Prerequisite: MATH 110 or MATH 121

This course is designed to introduce students to the mechanical universe through the study of the motion of matter and waves and the causes of waves. The learning of quantitative problem solving skills will be emphasized. There is a lab component with this course.

II. Course Objectives

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

1. Discuss the motion and causes thereof of solid objects, mechanical waves, and sound.
2. Describe the theoretical connections between the various topics and in some cases develop theories from first principles, definitions, and laboratory observations.
3. Convert written or described physical word problems into a specific symbolic set of known and unknown physical parameters.
5. Solve for multiple unknowns in word problems using the known physical laws, free-body diagrams, trigonometry, algebra, and geometry.
6. State Newton's Laws and apply them in solving problems related to the motion of solid matter, mechanical waves and sound.

III-A Course Outline for Lectures (28 hrs)

- A. Kinematics and Vectors (3 hrs)
 1. Motion in straight line
 2. Vectors
 3. Motion in a plane
 - a. projectile motion
 - b. uniform circular motion
 - c. relative motion
- B. Forces and Motion (3 hrs)
 1. Force & mass
 2. Newton's Laws of motion
 3. Friction
 4. Uniform circular motion

- C. Work and Energy (5 hrs)
 - 1. Work
 - 2. Kinetic energy
 - 3. Power
 - 4. Potential energy
 - 5. Conservative and non-conservative forces
 - 6. Conservation of energy

- D. Collisions (4 hrs)
 - 1. Center of mass
 - 2. Momentum
 - 3. Conservation of momentum
 - 4. Impulse and momentum
 - 5. Elastic and inelastic collisions

- E. Rotational Motion (3 hrs)
 - 1. Rotational kinematics
 - 2. Torque
 - 3. Moment of inertia
 - 4. Kinetic energy, work, power
 - 5. Conservation of angular momentum

- F. Other Topics in Mechanics (5 hrs)
 - 1. Rigid bodies in static equilibrium
 - 2. Elasticity
 - 3. Oscillatory motion
 - a. simple harmonic motion
 - b. energy of a simple harmonic oscillator
 - c. pendulum
 - 4. Newton's universal law of gravity

- G. Waves (3 hrs)
 - 1. Mathematical representation of waves
 - 2. Speed of longitudinal and transverse waves
 - 3. Superposition and interference
 - 4. Standing waves
 - 6. Sound waves
 - 7. Doppler effect

Testing (2 hrs)

III-B. Course Outline for Labs (14 labs, 3 hours per lab)

- A. Introduction (1 lab)
- B. Measurement and Error (1 lab)
- C. Vectors (1 lab)

- D. Graphical Analysis (1.5 labs)
- E. Acceleration, Force, and Equilibrium (1.5 labs)
- F. Impulse-Momentum and Work-Energy (1.5 labs)
- G. Elastic and Inelastic Collisions (1.5 labs)
- H. Rotational Motion and Torque (1.5 labs)
- I. Oscillatory Motion (1.5 labs)
- J. Standing Waves (1 lab)
- I. Lab Practical: Students will be required to take and analyze some data from set-ups that are similar to those they worked with during the semester. (1 lab)

IV. Evaluation Methods

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

- 50% Tests. Three tests (two during the semester and the final) consisting of solving word problems and writing short essays.
- 20% Homework
- 20% The average of all laboratory work.
- 10% 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: Hecht E., *Physics: Algebra/Trig, 2nd*, Brooks/Cole, 1998

Supplemental Readings:

1. *The Physics Teacher* (Journal published by the American Association of Physics Teachers)
2. Handouts

VI. Special resource requirements

None

VII. Bibliography

1. Beiser, A., *Modern Technical Physics, 6th Ed.*, Addison Wesley, 1992
2. Cole, R., *So You Want to Take Physics*, Saunders College Publishing, 1993
3. Coletta, V. P., *College Physics*, Mosby Year-Book, Inc., 1995
4. Katz-Stone, D. M. and Hubbard, K. A., *The Physics Toolbox*, McGraw Hill, 1998
5. McDermott, L. C., Shaffer, P. and the Physics Education Group, *Tutorials in Introductory Physics*, Prentice Hall, 1998
6. Ohanian, W., *Principles of Physics*, W. Norton & Co., 1994
7. Pickar, A. D., *Preparing for General Physics*, Addison Wesley Publishing Co., 1992
8. Romine, G.S., *Applied Physics: Concepts into Practice, 1st Ed.*, Prentice-Hall, 2001
9. Serway, *Principles of Physics, 2nd*, Saunders College Publishing, 1998
10. Wilson, J.D. and Buffa, A.J., *College Physics, 4th Ed.*, Prentice-Hall Academic, 1999.

Course Analysis Questionnaire PHYS 115, Physics I for Electro-Optics

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.
- 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 has not been offered on a trial basis at IUP.
- 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:

1. Camden County College; Blackwood, New Jersey
PHY-101 Physics I
2. Indian Hills Community College; Ottumwa, Iowa
EL 147V Technical Physics I
3. Monroe Community College; Rochester, New York
PHY 131 Applied Physics I
4. Northcentral Technical College; Wausau, Wisconsin
806-180 Technical Physics I
5. Pueblo Community College; Pueblo, Colorado
PHY 112 Algebra Based Physics
6. Vincennes University; Vincennes, Indiana
SPT 101 Technical Physics

A7 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. The material taught in this course is a subset of the material taught in PHYS 111 and PHYS 131. Geometric Optics, Wave Optics, and Electronics are not taught in PHYS 116 because this material is covered in detail in EOPT 110 (Geometric Optics), EOPT 120 (Wave Optics), and EOPT 125 (Introduction to Electronics). Because of this the subject matter in PHYS 115 doesn't match the subject matter taught in PHYS 111 and PHYS 131.

Section B: Interdisciplinary Implications

- B1 This course will be taught by one instructor.
- B2 PHYS 115, Physics I for Electro-Optics, does not overlap any course taught in other departments.
- B3 Seats will be available in this course for students in the School of Continuing Education.

Section C: Implementation

- C1 The faculty resources are not adequate. In order to teach PHYS 115 as part of the Electro-Optics program there is a need for 0.208 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 before this program starts in the Fall of 2002. This building will house the Electro-Optics program. If the building is not ready by Spring of 02-03 AY the program will be housed in the Electro-Optics Center (EOC) located in the West Hills.

b. Equipment

In order to implement this course, we will need approximately \$35,000 for hardware and software about 6 months before classes start. The lead-time is necessary because of the time it takes to order and receive equipment; also the labs have to be tried out and the bugs worked out before classes start.

c. Laboratory Supplies and other Consumable Goods

About \$2,000 approximately 6 months before classes start and about \$2000 per year after that.

d. Library Materials

About \$250 in years 0 and 1 and about \$100 in the following years.

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 Spring 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 in this course. Available laboratory resources and exercises restrict the number of allowed students.
- 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.