~~13-HE.14-5d.~~

LSC Use Only Proposal No:	UWUCC Use Only Proposal No: ~~12-29e.~~
LSC Action-Date: AP-10/11/12	UWUCC Action-Date: App-9/30/14 Senate Action Date: App 11/4/14

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) **Stan Sobolewski**	Email Address **sobolews@iup.edu**
Proposing Department/Unit **Physics**	Phone **7-4590 or 7-2370**

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

_____ New Course _____ Course Prefix Change _____ Course Deletion

X Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

Current course prefix, number and full title: **PHYS 121 Physics I Lab**

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate

X This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

_____ Learning Skills X Knowledge Area _____ Global and Multicultural Awareness _____ Writing Intensive (include W cover sheet)

_____ Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

_____ Global Citizenship _____ Information Literacy _____ Oral Communication

_____ Quantitative Reasoning ___ Scientific Literacy _____ Technological Literacy

3. Other Designations, as appropriate

_____ Honors College Course _____ Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

_____ Catalog Description Change _____ Program Revision _____ Program Title Change _____ New Track

_____ New Degree Program _____ New Minor Program _____ Liberal Studies Requirement Changes _____ Other

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)		4/23/2012
Department Chairperson(s)		4/23/2012
College Curriculum Committee Chair		4/23/2012
College Dean		4/23/12
Director of Liberal Studies (as needed)		9/25/14
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs		9/30/14

COURSE SYLLABUS

I. CATALOG DESCRIPTION

PHYS 121 Physics I Laboratory 0c-3l-1cr

Corequisite: PHYS 111

Physics laboratory at the level of Physics I; exercises in mechanics, wave motion, and sound.

II. COURSE OBJECTIVES

1) Students will demonstrate laboratory techniques such as graphing, error analysis and data manipulation.

EUSLO 1 *Informed Learners and* EUSLO 2 *Empowered Learners*

Rationale: Based upon the activities presented in the lab class, students will interpret, analyze, and use numerical and graphical data. This empowers and informs the learner enabling them to perform similar skills in their career.

2) Students will apply the use of probes and sensors connected through an interface to a computer to collect data and construct mathematical models. These models will then be used to make predictions on the phenomena under study.

EUSLO 1 *Informed Learners and* EUSLO 2 *Empowered Learners*

Rationale: Based upon the activities presented in the lab class, students will become familiar with the use of computer based data collection. This empowers and informs the learner enabling them to perform similar skills in their career.

III. COURSE OUTLINE

Laboratory exercises (one experiment each week plus an introduction the first week of classes to give a total of 14 weeks.)

1) Introduction
2) Measurement
3) Error
4) Acceleration of a freely falling body
5) Uniformly accelerated motion: the Atwood machine
6) Graphs and empirical equations
7) Air tracks and friction
8) Impulse and momentum
9) Collisions: Elastic and inelastic
10) Rotational motion
11) Half-life of a water column
12) The harmonic oscillator
13) Standing waves
14) Forced harmonic oscillator with damping

IV. EVALUATION METHODS

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

50% laboratory reports
40% weekly quizzes or pre-lab questions
10% subjective evaluation – based upon interest and personal involvement in the laboratory experience.

V. GRADING SCALE

Score			Grade
100 %	to	90%	A
89%	to	80%	B
79%	to	70%	C
69%	to	60%	D
Less than		60%	F

VI. ATTENDANCE POLICY

Students are expected to attend all labs. Individual faculty members assigned to this course will determine the specific attendance requirements for this course. In certain situations, such as illness, personal emergency or active military duty, students will be excused for missing class if a written excuse or other proof of absence is provided to the instructor. Individual faculty members will determine how the assignments or other work will be made up in the event of an excused absence. . Course attendance policy will be consistent with the Undergraduate Attendance Policy in the IUP Undergraduate Catalog.

VII. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Laboratory manual written by several members of the Physics Department.

VIII. SPECIAL RESOURCE REQUIREMENTS

One packet of linear graph paper.

IX . BIBLIOGRAPHY

Bueche, F., Hecht, **Schaum's Outline of College Physics**, 11th Edition 2011, McGraw-Hill;

Giancoli, D., **Physics for Scientists and Engineers with Modern Physics,** 4th edition, 2008, Addison-Wesley

Knight, R., **Physics for Scientists & Engineers with Modern Physics**, 3rd Edition, 2013, Addison-Wesley

Serway, R., **Physics for Scientists & Engineers** 9th Edition, 2009, Brooks Cole

Wolfson, R., Essential **University Physics**, 2nd Edition, 2012 Addison-Wesley

Young, H., **College Physics,** 9th edition May 6, 2012, Addison Wesley

Young, H., Freedman, R., **University Physics with Modern Physics**, 11th Edition 2011, Addison Wesley

Liberal Studies Course Approval General Information
On a separate sheet of paper, please answer these questions

(Do not include this sheet or copies of the questions in your proposal; submit only the answers)

1) All sections use the same text book and lab manual. There is a Physics Department Faculty Lab committee meeting once per week where the current laboratory is discussed. All faculty who are assigned to sections of this course attend the meeting.

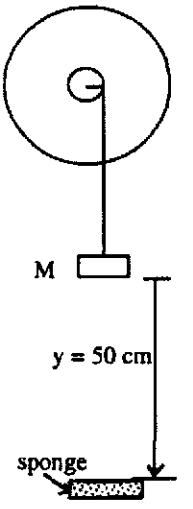
2) This is an introductory course in physics for science majors. The bulk of the course content is on the concepts of physics and problem solving. This lab class also requires the lecture class. These issues will be covered in the lecture class.

3) Since this class is a skill based laboratory course, there will be no outside reading.

4) This class is the introductory course for natural science majors.

Scoring rubric - each correct answer is worth one point, for a total of six points.

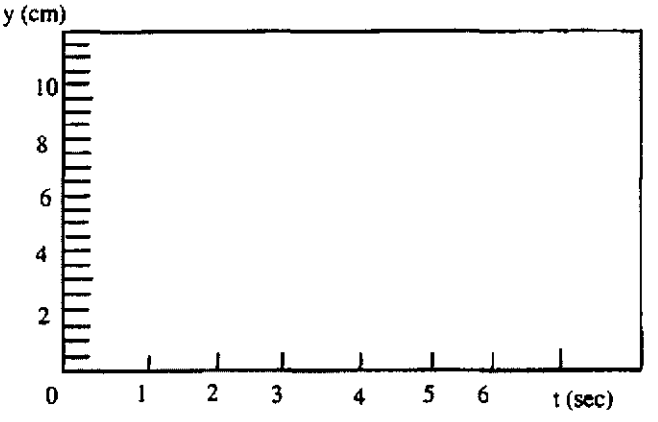
ROTATIONAL MOTION



1. Consider the figure at the right. The radius of the axle is 1.0×10^{-2} m. The mass M = 0.10 kg starts at a height of 0.50 m above the floor. After being released from rest, the mass falls to the floor in 3.0 sec.
   a) Determine the acceleration of the falling mass.
   b) Using Newton's second law, calculate the tension in the string attached to the falling mass.
   c) What is the final speed of the falling mass just before it impacts with the floor?
   d) From the work energy principle, find the moment of inertia, I, of the wheel.

2. Using equation (3) from the manual, if the applied torque is plotted against the angular acceleration of the wheel, to what physical quantities will the slope and intercept of the resulting straight line be equal?

3. Given that $y = (10 \pm 1) \times 10^{-2}$ m and $t = (3.0 \pm 0.5)$ sec, plot the point and the error bars associated with that point.



4. If the axle has a radius of 4.20×10^{-3} m and 1.10 m of string unwinds as the attached weight descends, calculate the total angle through which the wheel-axle system turns. (Ans: 262 rad)

5. If a frictional torque acting on the system of question 4 above had a magnitude of 9.00×10^{-5} N·m, calculate the work done on the system by the frictional torque. (Ans: -2.36×10^{-2} J)

6. Is the work done by the frictional torque positive or negative? Explain your answer.
   (Ans: negative)

OLD COURSE SYLLABUS

CATALOG DESCRIPTION

PHYS 121 Physics I Laboratory

1 credit
3 lab hours
0c-1l-1cr

Corequisite: ·PHYS 111 or PHYS 131

Physics laboratory at the level of Physics I; exercises in mechanics, wave motion, and sound.

II. COURSE OBJECTIVES

Basic training in laboratory techniques such as graphing, error analysis, etc.

III. COURSE OUTLINE
Laboratory exercises (one experiment each week)
1. Measurement
2. Error
3. Acceleration of a freely falling body
4. Uniformly accelerated motion: the Atwood machine
5. Graphs and empirical equations
6. Air tracks and friction
7. Impulse and momentum
8. Collisions: Elastic and inelastic
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IV. EVALUATION METHODS
The final grade for the course will be determined as follows:

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V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS
Laboratory manual written by several members of the Physics Department.

VI. SPECIAL RESOURCE REQUIREMENTS One packet of linear graph paper.