

13-144/4-5e.

LSC Use Only Proposal No:

UWUCC Use Only Proposal No: 12-297

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) <b>Stan Sobolewski</b>	Email Address <b>sobolews@iup.edu</b>
Proposing Department/Unit <b>Physics</b>	Phone <b>7-4590 or 7-2370</b>

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

Current course prefix, number and full title: **PHYS 122 Physics II Lab**

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

**2. Liberal Studies Course Designations, as appropriate**

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

Learning Skills     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)		
Department Chairperson(s)		4/25/12
College Curriculum Committee Chair		4/23/12
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

Received

SEP 10 2014

Liberal Studies

Received

APR 24 2012

Liberal Studies

## COURSE SYLLABUS

### I. CATALOG DESCRIPTION

PHYS 122 Physics II Laboratory

0c-3l-1cr

Corequisite: PHYS 112

Physics laboratory at level of Physics II; exercises in optics, electricity and magnetism, and radioactivity.

### 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. This empowers and informs the learner enabling them to perform similar skills in their career.

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.

### 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. Introduction to D.C. circuits
3. Null method of measurement
4. Electrical measurements
5. The oscilloscope and its applications
6. Exponential functions and servo systems
7. Capacitors, Inductors
8. Non-linear circuit elements
9. RCL circuits
10. Intro to nuclear counting
11. Linear amplification
12. Measurement of radioactivity

13. Spectroscopic analysis of atomic emission spectra

14. Optical phenomena

#### **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**

<b>Score</b>			<b>Grade</b>
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 E., **Schaum's Outline of College Physics**, 11th Edition 2011, McGraw-Hill;

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

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

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

Wolfson, R., **Essential University Physics**, 2<sup>nd</sup> Edition, 2012 Addison-Wesley

Young, H., **College Physics**, 9<sup>th</sup> edition May 6, 2012, 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)

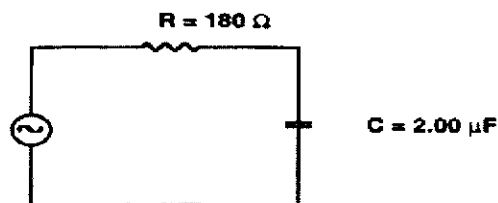
- 1) All sections use the same text book and lab manual. There is a Physics Department Faculty Lab committee meeting once per week where the current laboratory is discussed. All faculty who are assigned to sections of this course attend the meeting.
- 2) This is an introductory course in physics for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

Sample Assessment

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

**CAPACITORS IN AC CIRCUITS**

1. What is meant by the reactance of a capacitor ? How does it differ from the resistance of a resistor?
2. How are the voltage (rms) across the capacitor and the resistor related to the voltage across their series combination?
3. What is the phase relation between the voltage across the capacitor,  $V_C$ , and the voltage across the resistor,  $V_R$ , in an RC circuit?
4. In the circuit below, the rms voltage,  $V$ , of the AC Supply Voltage is 30.0 V and its frequency,  $f$ , is 500 Hz. Calculate:
  - a) The capacitive reactance  $X_C$ . (Ans:  $X_C = 159 \Omega$ )
  - b) The circuit impedance  $Z$ . (Ans:  $Z = 240 \Omega$ )
  - c) The rms current in the circuit  $I$ . (Ans:  $I_{rms} = 0.125 A$ )
  - d) The voltage across the resistor,  $V_R$ . (Ans:  $V_R = 22.5 V$ )
  - e) The voltage across the capacitor  $V_C$ . (Ans:  $V_C = 19.9 V$ )



## Old COURSE SYLLABUS

### CATALOG DESCRIPTION

PHYS 122 / PHYS 142 Physics I Laboratory

1 credit  
3 lab hours  
0c-11-1cr

Corequisite: ·PHYS 112 / PHYS 132

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. Intro to D.C. circuits
2. Null method of measurement
3. Electrical measurements
4. The oscilloscope and its applications
5. Exponential functions and servo systems
6. Capacitors, Inductors
7. Non-linear circuit elements
8. RCL circuits
9. Intro to nuclear counting
10. Linear amplification
11. Measurement of radioactivity
12. Spectroscopic analysis of atomic emission spectra
13. Optical phenomena

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

- 50% laboratory reports
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- 10% subjective evaluation

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