UNDERGRADUATE COURSE CHANGE
NON-GENERAL EDUCATION

Proposal for a Course Change

Department Chemistry and Physics   **Submission Date** 1/7/2016

Catalog Year of Implementation 2016-2017

I.   Proposed Course Change Information

	CURRENT	Check Box if no Change	PROPOSED CHANGE
Discipline Prefix	PHYS	x	
Course Number	260	x	
Course Title	Introduction to Experimental Design.	x	
Credit Hours	2		3

If yes, attach a justification for the change in credit hours and copies of current and proposed syllabi.

May this course be repeated for credit when content changes?

☐ Yes   ☒ No   Maximum hours? _____

Prerequisites	PHYS 202	x	
Speaking Intensive	Yes	x	

If adding a speaking intensive designation, attach a copy of the department speaking intensive policy to the proposal.

Writing Intensive	Yes	x	

If Cross-Listed:

Secondary Prefix	No	x	
Course Number		x	

Current Catalog Copy:

PHYS 260. Introduction to Experimental Design. This intermediate-level laboratory course involves the study of experimental design and measurement techniques, data reduction and analysis methods, and oral and written presentation skills. Experiments will vary with availability of equipment and technologies. Prerequisite: PHYS 202. 2 credits. SP and WR.

Proposed New Catalog Copy (***Must match description on course syllabus):***

PHYS 260. Introduction to Experimental Design. This intermediate-level laboratory course involves the study of experimental design and measurement techniques, data reduction and analysis methods, and oral and written presentation skills. Experiments will vary with availability of equipment and technologies. Two lecture and one 2-hour lab periods. Prerequisite: PHYS 202. 3 credits. SP and WR.

| | Delete Course from Catalog | | Submit to Storage

Please attach a proposed syllabus in Longwood format that contains proposed changes.

II.   Required for Major, Minor, Concentration (please specify):

Required for Physics Major – General Physics Concentration, Dual-Degree Engineering Concentration, and Biophysics Concentration.

III.   Rationale for Proposed Changes:

This course has received support for expanding its research component as a Research Experience for Aspiring Leaders Inquiry-focused course (REAL Inquiry). To meet the needs of the expanded goals of the course, including more work in information literacy, research opportunities, and critically evaluating both the historical context and modern applications of their experiments, the course is being expanded from 2 to 3 hours.

IV.   Resource Assessment, if change warrants it:

A.   How frequently do you anticipate offering this course?

Once per year

B.   Describe anticipated change in staffing for the course:

The extra hour will be fit into the normal faculty load.

C.   Estimate the cost of new equipment required due to change:

None.

D.   Estimate the cost of and describe additional library resources:

One hour of librarian time will be needed.

E.   Will the change in the course require additional computer use, hardware or software?

☐ Yes   ☒ No   If yes, please describe and estimate cost:

F.   Will a new or changed course fee be assessed?   ☐ Yes   ☒ No

If yes, the Fee Recommendation Worksheet must accompany this form. It is found at the following url: www.longwood.edu/budget

A change to the title or course number on this form implies that title or course number will change anywhere it occurs in the catalog.

SIGNATURE PAGE
UNDERGRADUATE COURSE CHANGE
NON-GENERAL EDUCATION

Course Name/Number   PHYS 260   Course Title   Introduction to Experimental Design

V.   Approvals

	Date Received	**Date Approved**	**Signature**
1. Department Curriculum Committee Chair	_____	_____	_____
2. Department Chair	_____	_____	_____

The Department Chairs, whose programs may be affected, have been notified:

Department _____ Date Notified _____
Department _____ Date Notified _____
Department _____ Date Notified _____

3. College Dean	_____	_____	_____
4. College Curriculum Committee	_____	_____	_____
5. #EPC	_____	_____	_____
6. #Faculty Senate Chair	_____	_____	_____
7. Date received by Registrar	_____		

#EPC & Senate approval required for change in credit hours

All curriculum proposals/changes are processed in the date order received. In order to be included in the next academic year's catalog, all paperwork must be submitted no later than:

February 1st to the College Curriculum Committee
March 1st to the Educational Policy Committee (EPC)

Submission within the deadlines does not guarantee processing in time for the next academic year's catalog.

Revised Summer 2015

Course Syllabus – *PHYS 260 Introduction to Experimental Design*– Spring 2017 and beyond

Instructor: **Dr. Kenneth A. Pestka II**	*Time:* **M 2-3:40 PM** **F 2-3:40 PM**
Office: **208 C Chichester Science Center**	*Lecture Hall:* **109 Chichester Science Center**
Office Hours: **MWF 1-2pm, MWF 11:30-12PM or by appointment (email me!)**	*Textbook:* **"**An Introduction to Error Analysis; 2nd edition," by John R. Taylor, University Science Books publishing; (ISBN: 978-0-935702-75-0) Style for Students: https://www.e-education.psu.edu/styleforstudents/c1.htm
Office Phone: **434-395-2717**	*e-mail:* **pestkaka@longwood.edu**

Course Catalog Description:

PHYS 260 - Introduction to Experimental Design
This intermediate-level laboratory course involves the study of experimental design and measurement techniques, data reduction and analysis methods, and oral and written presentation skills. Experiments will vary with availability of equipment and technologies. Prerequisites: PHYS 202. 3 credits. SP and WR.

Materials: In addition to the textbook, the student will need a scientific calculator with trigonometric functions (such as a TI-30X) and a bound laboratory notebook.

Lectures: will not necessarily cover all of the material on which the student will be tested
-The student is responsible for the material indicated by the instructor.

Objectives:

• The student will understand the main principles of error analysis and be able to apply these principles to classical introductory and intermediate physics experiments
• The student will understand how to estimate the uncertainty associated with measurements made by various common measuring instruments, and how the uncertainties propagate to produce a margin of error on the final result of a calculation
• The student will become proficient at setting up sensitive laboratory equipment and become familiar with data acquisition tools and techniques
• The students will learn the proper techniques of keeping a laboratory notebook
• The student will develop your writing and oral presentations skills in the area of scientific inquiry
• The students will learn how to write a professional scientific lab report
• The student will learn about current research both at Longwood and beyond, and be able to communicate your understanding of these ideas clearly and effectively

Grading:

10%	Quizzes, Class Participation & Homework (drop 1)
35%	Lab Notebook
35%	Scientific Lab Reports*

20%	Oral and Poster Presentations**

* Writing Intensive

** Speaking Intensive

I will adhere to the definition of grades as outlined in the Longwood Catalogue:

A: **Indicates excellence in learning and scholarship and the ability to communicate information effectively and understand the importance of the information**
B: **Indicates substantial mastery of the objectives of the course**
C: **Indicates average work**
D: **Indicates substandard work of sufficient quality and quantity to be counted toward graduation if balanced by above average work in other courses**
F: **Indicates failure to meet the objectives of the course**.

This is the standard grading scale. A more generous scale may be used if necessary.

A	93-100%
A-	90-93%
B+	87-90%
B	83-87%
B-	80-83%
C+	77-80%
C	73-77%
C-	70-73%
D+	67-70%
D	63-67%
D-	60-63
F	0-60%

Homework: Periodic homework assignments including, but not limited to, textbook problems, writing and speaking exercises and background research assignments will be due *at the beginning of class*.

Class Participation: Students may be required to present assigned problems, lead group discussion, participate in group activities as directed by your instructor and participate in in-class problem solving sessions. Student attendance will be recorded as well as evaluation on their level of preparation and level of participation.

Quizzes: Periodic announced and unannounced quizzes may be given at the beginning or end of class.

Lab Notebook: Each of the labs will be scored out of 20 points. The point value for various parts of the lab notebook will be discussed prior to the start of each lab activity as well as specific lab details but a general guide is provided in the laboratory notebook handout. Lab notebooks must be turned in on specific due dates. Lab notebooks will be graded by your instructor using the rubric provided with the syllabus.

Formal Scientific Lab Reports: Several of experiments will be written up using any digital format (word, Latex etc.). The format of these papers will be discussed in class. Formal reports will be graded by your

instructor using the rubric provided with the syllabus.

Presentations: There will be two oral presentations in this course. At least one oral presentation will be presented using Microsoft Power Point and another presentation will be a professional poster. Presentations will be graded by your instructor using the rubric provided with the syllabus.

Attendance Policy Class attendance is required. Attendance will be taken at each class session via a sign-in sheet. It is your responsibility to make sure that you sign the attendance sheet each class period. Signing in for a classmate is considered a violation of the Honor Code set forth by Longwood University, and appropriate measures will be taken if a violation occurs. Per university policy, if you fail to attend 25% of the scheduled class meetings (lectures and labs combined, excused or unexcused absences) you will receive a final grade of an F for the course.

Honor Code Policy

Instructors strongly support the Longwood Honor Code.

The pledge states: "I have neither given nor received help on this work, nor am I aware of any infractions of the Honor Code."

Students should pledge all work. Any infractions of the Honor Code will be reported to the Honor Board and appropriate actions will be taken.

***Cheating of ANY kind will result in an F for the course* as well as notification of the appropriate offices, which may result in suspension or expulsion.**

Special Accommodations

Anyone needing special assistance should contact me at the start of the course. Please provide me with a letter from the Office of Disability Resources outlining your accommodations and I will be happy to discuss any adaptations required.

All students are also encouraged to take advantage of the special services provided by the Longwood Center for Academic Success, including tutoring sessions for this course: http://www.longwood.edu/academicsuccess/

Inclement Weather Policy:
    If inclement weather occurs, check the Longwood website for information on class status or call (434) 395-2000. Commuter and campus-based disabled students will be permitted to make decisions about whether to attend class and labs. If the University is open, it is expected that resident students will attend class and lab.

Course Outline (Tentative)

Any changes to this schedule will be announced in class

Week/Dates	Reading & Topics	Assignments	Labs
1	Chapter 1 (Taylor): Preliminary Description of Error Analysis Chapter 2(Taylor): How to Report and Use Uncertainty Chapter 1: Style for	Writing Exercise Research Journal Exercises	**Exp. 0 Practice with Writing and Error Analysis and Library Resources**

	Students		
2	Chapter 3 (Taylor): Propagation of Uncertainty Chapter 2-3:Style for students	Homework 1 (Taylor text problems) Writing Exercise Research Journal Exercises	**Exp. 0: More Practice with Writing and Error Analysis Library Resources**
3	Chapter 4(Taylor): Statistical Analysis of Random Uncertainty Chapter 8(Taylor): Least-Squares Fitting	Homework 2 (Taylor text problems)	**Exp. 1: Hooke's Law and Simple Harmonic Motion**
4	Chapter 5(Taylor): The Normal Distribution	Lab Notebook 1 Homework 3 (Taylor text problems)	**Exp. 2: Magnetic Field of the Earth**
5	Chapter 6(Taylor): Rejection of Data	Lab Notebook 2 Homework 4 (Taylor text problems)	**Exp. 3: Dice and Statistical Mechanics**
6	Chapter 10(Taylor): The Binomial Distribution Chapter 7(Taylor): Weighted Averages	Homework 5 (Taylor text problems) **Formal Lab Report of Exp. 3 draft**	**Exp. 3: Dice and Statistical Mechanics**
7	Charge to Mass Ratio	**Formal Lab Report of Exp. 3** Lab Notebook 3	**Lab 4: Charge to Mass Ratio**
8	Spring Break		
9	Photo Electric Effect	Lab Notebook 4	**Lab 5: Photo electric Effect**
10	Prepare for Presentations	**Formal Lab Report** Lab Notebook 5	**Oral Presentations!**
11	Atomic Spectra	Homework 6 (external activity)	**Lab 6 Atomic Spectra**
12	The Hubble relationship	Lab Notebook 6	**Lab 7: The Hubble Relationship**
13	Topic TBA	Lab Notebook 7	**Lab 8: TBA**
14	Prepare for Presentation	Lab Notebook 8 Homework 7 (external activity)	**Presentation Prep.**
15	Prepare for Presentation	Homework 8 (external activity)	**Presentation Prep. Continued**
16	**Final Exam Week Presentations!**	**Final Formal Lab Report**	**Poster Presentation!**

Course Syllabus – *PHYS 260 Introduction to Experimental Design*– Spring 2015

Instructor: **Dr. Kenneth A. Pestka II**	*Time:* **M 2-2:50PM** **F 2-3:40PM**
Office: **208 C Chichester Science Center**	*Lecture Hall:* **109 Chichester Science Center**
Office Hours: **MWF 1-2pm, MWF 11:30-12PM or by appointment (email me!)**	*Textbook:* **"**An Introduction to Error Analysis; 2nd edition," by John R. Taylor, University Science Books publishing; (ISBN: 978-0-935702-75-0)
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Materials: In addition to the textbook, the student will need a scientific calculator with trigonometric functions (such as a TI-30X) and a bound laboratory notebook.

Lectures: will not necessarily cover all of the material on which the student will be tested
 -The student is responsible for the material indicated by the instructor.

Objectives:

• Understand the main principles of error analysis and be able to apply these principles to classical introductory and intermediate physics experiments
• Understand how to estimate the uncertainty associated with measurements made by various common measuring instruments, and how the uncertainties propagate to produce a margin of error on the final result of a calculation.
• Become proficient at setting up sensitive laboratory equipment and become familiar with data acquisition tools and techniques
• Learn the proper techniques of keeping a laboratory notebook
• Continue to develop your writing and oral presentations skills in the area of scientific   inquiry
• Know how to write a professional scientific lab report

Grading:

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C-	70-73%
D+	67-70%
D	63-67%
D-	60-63
F	0-60%

Homework: All assignments will be due _at the beginning of class_. NO HOMEWORK WILL BE ACCEPTED AFTER THE DUE DATE. Homework problems showing only the answer WILL NOT BE GRADED (show your work and clearly label each step!).

Class Participation: Students may be required to present assigned problems as part of the in class problem solving sessions and will be evaluated on their level of preparation and level of participation.

Quizzes: Periodic announced and unannounced quizzes may be given at the beginning or end of class.

Lab Notebook: Each of the labs will be scored out of 20 points. The point value for various parts of the lab notebook will be discussed prior to the start of each lab activity as well as specific lab details but a general guide is provided in the laboratory notebook handout. Lab Notebooks must be turned in on specific due dates.

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Important University Dates
- January 19:   MLK Jr. day, no classes
- January 20:   Last day for students to add/drop classes
- February 23:   Grade estimates due
- March 2-6:   Spring break
- March 9:   Deadline for students to withdraw from a class with a "W"
- April 24:   Last day of classes
- April 27-30:   Final Exams

Course Outline (Tentative)

Any changes to this schedule will be announced in class

Week/Dates	Reading & Topics	Assignments	Labs
1: 1/12 – 1/16	Chapter 1: Preliminary Description		**Exp. 0 Practice with**

	of Error Analysis Chapter 2: How to Report and Use Uncertainty Chapter 3: Propagation of Uncertainty		**Writing and Error Analysis**
2: 1/19 – 1/23 **MLK Jr. Holiday: No classes on 1/19**	Chapter 3: Propagation of Uncertainty Chapter 4: Statistical Analysis of Random Uncertainty	Homework 1 (Due 1/23)	**Exp. 0: More Practice with Writing and Error Analysis**
3: 1/26 – 1/30	Chapter 4: Statistical Analysis of Random Uncertainty Chapter 8: Least-Squares Fitting	Homework 2 (Due 1/30)	**Exp. 1: Magnetic Field of the Earth**
4: 2/2 – 2/6	Chapter 8: Least-Squares Fitting **Bring Laptops** Chapter 5: The Normal Distribution	Lab Notebook 1 Homework 3 (Due 2/6)	**Exp. 2: Hooke's Law and Simple Harmonic Motion**
5: 2/9 – 2/13	Chapter 5: The Normal Distribution Chapter 6: Rejection of Data Chapter 10: The Binomial Distribution	Lab Notebook 2 Homework 4 (Due 2/13)	**Exp. 3: Dice and Statistical Mechanics**
6: 2/16 – 2/20	Chapter 10: The Binomial Distribution Chapter 7: Weighted Averages	Homework 5 **Lab Report of Exp. 3 draft** (Due 2/20)	**Exp. 3: Dice and Statistical Mechanics**
7: 2/23 – 2/27	Charge to Mass Ratio	**Lab Report of Exp. 3** Lab Notebook 3 Homework 6 (Due 2/27)	**Lab 4: Charge to Mass Ratio**
8: 3/2 – 3/6 **Spring Break - No classes**			
9: 3/9 – 3/13	Photo Electric Effect	Lab Notebook 4 (Due 3/13)	**Lab 5: Photo electric Effect**
10: 3/16 – 3/20	Prepare for Presentations	**Lab Report** Lab Notebook 5	**Presentations!**

		(Due 3/27)	
11: 3/23 – 3/27	Atomic Spectra		**Lab 6 Atomic Spectra**
12: 3/30 –4/3	The Hubble relationship	Lab Notebook 6 (Due 4/3)	**Lab 7: The Hubble Relationship**
13: 4/6 – 4/10	Topic TBA	Lab Notebook 7 (Due 4/10)	**Lab 8: TBA**
14: 4/13 – 4/17	Prepare for Presentation	Lab Notebook 8 (Due 4/17)	**Presentation Prep.**
15: 4/20 – 4/24	Prepare for Presentation		**Presentation Prep. continued**
16: 4/27 – 5/1	**Final Exam Week Presentations!**	**Lab Report** Due @ the Final 4/27	**Presentation!**
Final Exam: Monday April 27, 11:30AM-2PM			