

Lyon College Course Syllabus

Course Number and Section: PHY250.01
Course Title: Fundamentals of Physics II
Course Meeting Days/Times: MWF08-8:50

Semester/Year: SP2016

Professor's Information

Name: Stuart Hutton
Office Location: Derby248
E-mail Address: stuart.hutton@lyon.edu

Office Hours: MW11-11:50 F10-10:50
Phone Number: 307-7560

STANDARD POLICIES

Honor Code

All graded work in this class is to be pledged in accordance with the Lyon College Honor Code.

Class Attendance Policy

Students are expected to attend all class periods for the courses in which they are enrolled. They are responsible for conferring with individual professors regarding any missed assignments. Faculty members are to notify the Registrar when a student misses the equivalent of one, two, three, and four weeks of class periods in a single course. Under this policy, there is no distinction between "excused" and "unexcused" absences, except that a student may make up work missed during an excused absence. A reminder of the college's attendance policy will be issued to the student at one week, a second reminder at two weeks, a warning at three weeks, and notification of administrative withdrawal and the assigning of an "F" grade at four weeks. Students who are administratively withdrawn from more than one course will be placed on probation or suspended.

Disabilities

Students seeking reasonable accommodations based on documented learning disabilities must contact the Dean of the Faculty at (870) 307-7332.

Harassment, Discrimination, and Sexual Misconduct

Title IX and Lyon's policy prohibit harassment, discrimination and sexual misconduct. Lyon encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to Clarinda Foote, Title IX Coordinator, or Patrick Mulick, Dean of Students and Title IX Investigator, about what happened so they can get the support they need and Lyon can respond appropriately. Lyon is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource (Chaplain, Counselor, or Nurse). As a faculty member, I am required to report possible Title IX violations and must provide our Title IX coordinator with all relevant details. I cannot, therefore, guarantee confidentiality.

Withdrawal Deadlines

Last day to drop with no record of the course is 26 January 2016.

Last day to drop with a W is 21 March 2016

Tentative Syllabus for Physics 250: Spring 2016

Professor: Dr. Stuart Hutton

Office: Derby Center: 248 Research Lab: Derby 219: General Physics lab: 148

Phone: 870 307 7560

Email: stuart.hutton@lyon.edu

To access the Physics Gateway: <http://nmr.lyon.edu/~shutton>

During tests: All networked devices are to be switched off and no communication between students is to occur.

Grading

As a general guide to grades, grades will be assigned as follows:

100-90]	(90-80]	(80-70]	(70-60]	<(60
A	B	C	D	F

In this course, you will have several grading opportunities, tests, homework and in-class problems. The various weight of each of these activities in your final point grade is shown below. Late assignments will normally not be accepted. Additionally, since we will be doing in-class problems, poor attendance will negatively affect your grade: in particular, you will not receive credit for class participation for unexcused absences. There are no make-ups for in-class worksheets.

Tests (4 tests and 1 [comprehensive] final exam)=85%

Each test is worth 17% of your grade.

Homework / in-class problems/ class participation=15%

Physics Lab (Phy251) is a separate course. The grade in Phy251 has no impact upon the grade in this course except as a co-requisite.

Your work on tests will be graded for correctness and clarity. **Failure to supply details leading to a result will result in very little credit for a problem.** If you want full credit for a problem, **you must** supply the logical steps that led to the result and the result **must include proper units.** Diagrams should be included where appropriate to define quantities used in your result. Homework and worksheets may be graded for completion. Students are generally expected to commit two hours of study outside of class for each hour of lecture. You will also notice that before each of the 4 tests, I have scheduled an Untest. On this day, you should come prepared to work as if this were the actual test. I have also scheduled several Unquizzes. Time permitting, we will allow about 10 minutes for you to complete self-diagnostic Unquizzes.

Course Description

In this course you will be exposed to fundamentals of physics. Among the topics that we will cover are electrostatics, magnetism and optics. Refer to Student Learning Outcomes for a discussion of minimal course outcome expectations.

Course Objectives

As a consequence of this course, you should obtain an enhanced understanding of the fundamentals of physics. In addition, you should come away from this course with an ability to solve fundamental problems involving physical principles.

Course Prerequisites

You are expected to be proficient with algebra and trigonometry. It is strongly recommended that your life will be made easier if you review trigonometry. Additionally you must satisfy the calculus prerequisites for physics 250. You need to be enrolled in or to have previously completed Phy251 to take this course.

Text

The textbook in this course is:

Physics 250:

Principles of Physics, Serway and Jewett, Fourth edition
ISBN: 0-534-49143-X

You may use earlier editions of this text (which can be obtained at much lower prices online {\$0.25 for example is a low price}) but you will need to be sure to read the correct portions of the text.

The schedule is designed around this particular text edition. You may use earlier or later editions but you will need to be sure to read the correct portions of the text. The text must be considered to be a very important resource so students are expected to be reading along in the text as the course progresses.

You have many resources on the campus: the library, your colleagues and your professor. Your prime learning resource, however, must be considered to be the classroom.

Punctual and complete class attendance is expected. Absences will negatively impact your final grade. Use of a networked device to communicate (aside from downloading class materials) during class will be considered equivalent to an unexcused absence. Tardiness is considered to be an unexcused absence and will negatively impact your final grade; in general you do not have permission to enter the classroom after class has started.

Academic Honesty

It is expected and encouraged that students in this class will work together on homework problems. If you use reference work, be sure to include proper references. On tests, students are required to keep notes and books closed except as instructed. **Your professor will supply all the paper needed for the tests.** All questions during tests should be directed to the professor only and students are not permitted to communicate with each other during tests. **CELL PHONES AND ANY OTHER WIRELESS OR NETWORKED DEVICES (INCLUDING COMPUTERS, WATCHES, RINGS, etc.) MAY NOT BE USED DURING TESTS; they must be switched off and placed away.** If you do use such devices during a test, it will automatically be considered to be a violation of the Lyon College Honor Code.

Tentative Master Schedule: R.1 for Physics 220 and Physics 250 and Physics 251 Spring 2016

labs	Worksheet Number	Date	220: Cutnell: 8th ed. Assignment Reading : Homework	250: Serway 4th ed Assignment: Reading: homework
	Worksheet 01: Electrostatics 1	W January 13	chapter 18	chapter 19
Lab01A: Electrostatics 1		F January 15	chapter 18	chapter 19
	Martin Luther King Day (no class)	M January 18		
	Worksheet 02: Electrostatics 2	W: January 20	chapter 18	chapter 19
Lab 01B: Electrostatics 2		F January 22	chapter 19	chapter 19
	Worksheet 03: Gauss' Law	M January 25	chapter 19	chapter 20
	Worksheet 03A: Problems	W January 27	chapter 19	chapter 20
Lab 02: In-Lab Problems		F January 29	chapter 19	chapter 20
	Worksheet 04: potential	M: February 01	chapter 19	chapter 20
	Untest01	W February 03		
Lab 03: Series and parallel R & C	Test #1	F: February 05		
	Worksheet 05: capacitance	M February 08	chapter 19	chapter 21
	Worksheet 06: Problems	W February 10	chapter 20	chapter 21
Lab 04: EMF and RC Circuit	Worksheet 07: emf, RC circuit	F February 12	chapter 20	chapter 21
Snow Gap day		M February 15	chapter 20	chapter 21
	Worksheet 08: Kirchhoff's laws 1	W February 17	chapter 21	chapter 22
Lab05: current balance	Worksheet 09: Kirchhoff's laws 2	F February 19	chapter 21	chapter 22
	Worksheet 10: Magnetic fields 1	M: February 22	chapter 21	chapter 22
	Worksheet 11: Magnetic fields 2	W February 24	chapter 22	chapter 23
Lab 06: magnetic Levitation	Worksheet 12: Ampere's law	F February 26	chapter 22	chapter 23
	Worksheet 13: Calculating B	M February 29		
	Untest02	W March 02		
Lab 07: solenoids	Test #2	F March 04		
	Spring Break	March 7 - March 11		
	Worksheet 14: Faraday's law	M: March 14	chapter 22	chapter 23
	Worksheet 15: Inductance <small>No ws16</small>	W March 16	chapter 22	chapter 23
Lab 08: oscilloscopes	Worksheet 17: RLC Circuits 1	F March 18	chapter 23	chapter 23
	Worksheet 18: RLC Circuits 2	M: March 21	chapter 23	Chapter 23
	Worksheet 19: Thin Lens Eqtn. 1	W: March 23	chapter 23	chapter 24
Snow LTBA	If needed	R: March 24		
	Easter Vacation	F March 25 -M March 28		
	Untest03	W: March 30		
Lab TBA	Test #3 (coverage to WS 19)	F: April 01		
	Worksheet 20: Thin Lens Eqtn. 2	M April 04	chapter 26	chapter 26
	Worksheet 21: Refraction	W: April 06	chapter 26	chapter 25
Lab 09: focal lengths	Worksheet 22: Mirror Equation	F April 08	chapter 25	chapter 25
	Worksheet 23: Multiple lenses	M: April 11	chapter 25	chapter 25
	Geometrical Optics, Ray trace	W: April 13	chapter 25	chapter 27
Lab10: reflection	Worksheet 24: Thin films	F: April 15	chapter 27	chapter 27
	Worksheet 25: interference	M: April 18	chapter 27	chapter 28
	Untest04	W: April 20		
Lab TBA	Test #4	F April 22		
	TEM Waves	M April 25	chapter 24	chapter 24
	Bohr Model	W April 27	chapter 30: 30.1 - 30.4	Chapter 29: 29.1, 29.2
No Lab	Last Day of Class	F: April 29		
	Final Exams	May 01 - May 06		

CLASS SCHEDULE / OFFICE HOURS Spring 2016

Office Derby 248	General Lab Derby 148	Research Lab Derby 219		
PROFESSOR Stuart Hutton				
Monday	Tuesday	Wednesday	Thursday	Friday
8:00-8:50 PHY250.01 Fundamentals of Physics I Derby 011	8:00-9:15	8:00-8:50 PHY250.01 Fundamentals of Physics I Derby 011	8:00-9:15	8:00-8:50 PHY250.01 Fundamentals of Physics I Derby 011
9:00-9:50 PHY220.01 Gen Physics I Derby 011	9:30-10:45	9:00-9:50 PHY220.01 Gen Physics I Derby 011	9:30-10:45	9:00-9:50 PHY220.01 Gen Physics I Derby 011
10:10-10:50 phy382.01 Derby 015		10:10-10:50 phy382.01 Derby 015		10:10-10:50 Office Hours Derby 248
11:00-11:50 Office Hours Derby 248	11:00 - 11:50 phy382.01 Derby 015	11:00-11:50 Office Hours Derby 248	11:00-11:50	11:00-11:50
12:00 - 12:50		12:00 - 12:50		12:00 - 12:50
1:00-1:50	1:00-2:15	1:00-1:50	1:00-3:50 PHY251.01 Fund Physics II Lab Derby 148	1:00-3:50 PHY251.02 Fund Physics II Lab Derby 148
2:00-2:50	2:30-3:45	2:00-2:50		
3:00-3:50				
4:00-4:50		4:00-4:50		4:00-4:50

Physics Problem Solving Rubric Rev SP2016

	1	0.7	0.4	0
<p>1, Critical Thinking:</p> <p>Solution started correctly.</p> <p>Note: sketches may be considered here as required in problem statement.</p>	<p>correct approach</p> <p>If required, sketches were correct.</p>	<p>approach would lead to correct result</p> <p>Sketches miss one label or some other component absent or incorrect.</p>	<p>Something is right in the approach but insufficient to reach problem solution.</p> <p>Sketches miss multiple labels, directions incorrectly indicated</p>	<p>incorrect approach</p> <p>Sketch not present or not at all correctly labeled.</p>
<p>2. Quantitative Literacy:</p> <p>Solution proceeded quantitatively</p>	<p>Mathematical operations correct and units correct</p>	<p>Mathematical operations and units correct however an error usually related to incorrect units or the final numerical result present</p>	<p>Mathematical operations have some correct steps but misapplication or other errors prevented problem completion. Units reported in final result not present or incorrect .</p>	<p>Necessary mathematical operations incorrect and units absent</p>
<p>3, Scientific Thought & Informational Literacy</p> <p>Note: this may be contained within an equation starting the problem solution.</p>	<p>correctly stated physical principle or law and physical terminology needed to solve problem.</p>	<p>physical principle or law used shown however omission or extraneous material present. physical terminology needed to solve problem used but not complete or absent important concept.</p>	<p>statement of physical principle or law present but would not apply to present problem so as to lead to solution. physical terminology needed to solve problem incomplete and would not have lead to problem completion.</p>	<p>no statement of physical principle/ law or incorrect physical principle/ law. Did not use physical terms needed to solve problem or incorrect terms used.</p>

Problem scoring: maximum per **problem section** is about 5 points, some sections may have fewer points. In a test containing 4 problems, this equates to 25% of the total test score. The final score per problem is calculated as follows:

$$P_i = \frac{\text{total number of points from rubric}}{\text{maximum rubric points per problem}} \times \frac{100}{\# \text{ of problems on test (normally 4)}}$$

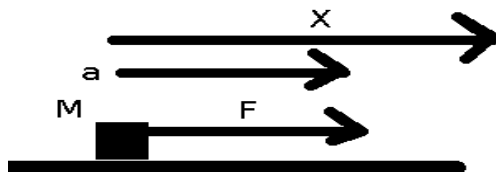
The test score is then determined by

$$\text{percentagetest grade} = \sum_{i=1}^{i=\text{Number of problems on test}} P_i$$

Example of a complete solution

Find the vector position at time t of an object of mass M when subjected to a constant force $\vec{F}=F\hat{x}$ for a time t if the object was initially at $x=0$ and at rest. Provide a numerical result with correct SI units for $F=1$ N, $M=1/2$ kg and $t=2$ s. Include a correctly labeled sketch showing F acting on M , a and x .

Solution:



$$\text{Newton's law: } \vec{F}=M\vec{a}\Rightarrow\vec{a}=\frac{\vec{F}}{M}; \vec{F}=F\hat{x}\Rightarrow\vec{a}=\frac{F}{M}\hat{x} : a_x=\frac{F}{M}$$

Constant force : kinematic equations of motion in x direction for position:

$$x=x_0+v_{x,0}t+\frac{1}{2}a_x t^2$$

Object initially at rest: $v_{x,0}=0$ m/s . Object initially at $x=0$: $x_0=0$ m .

Kinematic equation reduces to: $x=\frac{F}{2M}t^2$

$$\text{With numerical values: } x=\frac{1\text{N}}{2 \times \frac{1}{2}\text{kg}}(2\text{s})^2=4\frac{\text{Ns}^2}{\text{kg}}=4\text{m}$$

Final answer with vectors: $\vec{x}=4\text{m}\hat{x}$

Score:

1: Started with Newton's law and used correct equation of motion, additionally a correctly labeled sketch was drawn showing correct vector directions as was required=1

2: Algebra (including vectors) correctly lead to final result, unit algebra correct=1

3: Correctly used physical information in the problem which were mass M , initial conditions (at $x=0$, at rest) , time t , constant force, vector directions. Correct numerical quantities (including correct vectors) provided in final result with correct SI units reported=1

Student Learning Outcomes for the Physics Program at Lyon College Rev SP2016

1. Students who complete the physics [210]/[220], [240]/[250], [241]/[251] sequence are able to

1a. Articulate the basic principles of physics.

1b. Apply the basic principles of physics to solve a variety of qualitative and quantitative problems at the introductory physics level.

This can be measured with portions of currently-used standard exams and exam problems.

General Education learning outcomes for [210,240,241]/[220,250,251]

Critical thinking: [210,240,241]/[220,250,251]

Inquiry and analysis: [241]/[251]

Quantitative literacy: [210,240,241]/[220,250,251]

Teamwork: [241]/[251]

Information literacy: [210,240,241]/[220,250,251]

Scientific thought: [210,240,241]/[220,250,251]

Portions related to [241]/[251] will be evaluated for **2** selected labs with rubric data recorded. Since students are allowed to submit revised reports, it is anticipated that this will normally serve as verification, however data is recorded for the initial submission before revision. Portions related to [210/240]/[220/250] rubric will have data recorded for **4** selected problems; one from each exam.

Critical thinking is regularly evaluated in [210,240,241]/[220,250,251]. In [210,240] / [220,250] it is evaluated in terms of starting with correct physical principles applicable to a given situation and being able to follow it through to completion. It is evaluated by use of exam problems. In [241]/[251], it is part of the process of scientific thought and is evidenced by use of supporting data for a hypothesis as is required by the lab rubric.

Inquiry and analysis is regularly evaluated in [241]/[251] as part of the required element of completed lab write ups. It is evidenced by student explanation of the experiment and is a required element by the rubric.

Quantitative literacy is evidenced primarily in [210,240]/[220,250] by successful completion of physical problems with correct units and correct numerical operations. It is evaluated by use of exam problems. Quantitative literacy is exhibited in [241/251] by students being able to follow through with calculations partially enabled by spreadsheet examples and being able to interpret the results. This is evidenced by the write up and is a required element by the rubric.

Teamwork is regularly evaluated in [241]/[251] and is evidenced by successful team completion of lab write ups as is required by the rubric.

Information literacy is regularly evaluated in [241]/[251] and is evidenced by correct physical terminology in lab reports as required by the lab rubric. It is also a significant portion of [210,240]/[220,250] and is evidenced by student success in using the basic physical terminology enabling students to correctly initiate quantitative solutions to physical situations.

Scientific thought is regularly evaluated in [241]/[251] and is evidenced by use of hypothesis with supporting evidence (or not supporting evidence) based upon experiment as is required by the lab rubric for 3 selected labs.