| Lyon College Course Syllabus | | |
|---|---|---|
| **Course:** Phy220.01/SP17 | General Physics II | **MWF**09–09:50/Derby011 |
| **Professor:** Stuart Hutton | **Office:** Derby 248 | |
| **Email:** stuart.hutton@lyon.edu | **Office Hours:** **MWF** 10:00–10:50/AR | **Office Phone:** ***.307.7560 |
| **Physics Email:** lyonphysics@*****.*** | **Physics Web Gateway:** physics.lyon.edu **Backup:** logcabinphysics.x10.bz | **Physics SMS:** 307.***.8765 |

## 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 Students who are administratively withdrawn from more than one course will be placed on probation or suspended.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 **Wednesday January 25, 2017**.

Last day to drop with a W is **Monday March 20, 2017**.

**Tentative Syllabus for Physics 220: Spring 2017**

**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. You need to be enrolled in or to have previously completed Phy251 to take this course.

## Text

The textbook in this course is:

**Physics 220**:

Physics, 8th Edition, by John D. Cutnell, Kenneth W. Johnson

ISBN: 978-0-470-22355-0

**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. Texting during class is a self-selection process that will invariably lead to less than stellar success for the person texting. Disruptive and/or persistent texting is not permitted and you may be asked to leave if you do this.**

## 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 including sharing calculators during a test. CELL PHONES AND ANY OTHER WIRELESS OR NETWORKED DEVICE (INCLUDING COMPUTERS, WATCHES, RINGS, GLASSES, CALCULATORS, etc. ) MAY NOT BE USED DURING TESTS; they must be switched off and placed away. Students are specifically prohibited from discussing any aspect of tests until all students have completed the test. Contravention of these conditions will automatically be considered to be a violation of the Lyon College Honor Code.**

| CLASS SCHEDULE / OFFICE HOURS Spring 2017 | | | | |
|---|---|---|---|---|
| Office | | General Lab | | Research Lab |
| Derby 248 | | Derby 148 | | Derby 219 |
| PROFESSOR Stuart Hutton | | | | |
| Monday | Tuesday | Wednesday | Thursday | Friday |
| 8:00-8:50<br>PHY250.01<br>Fundamentals<br>of Physics II<br>Derby 011 | 8:00-9:15 | 8:00-8:50<br>PHY250.01<br>Fundamentals<br>of Physics II<br>Derby 011 | 8:00-9:15 | 8:00-8:50<br>PHY250.01<br>Fundamentals<br>of Physics II<br>Derby 011 |
| 9:00-9:50<br>PHY220.01<br>Gen Physics II<br>Derby 011 | 9:30-10:45 | 9:00-9:50<br>PHY220.01<br>Gen Physics II<br>Derby 011 | 9:30-10:45 | 9:00-9:50<br>PHY220.01<br>Gen Physics II<br>Derby 011 |
| 10:10-10:50<br>Office Hours<br>Derby 248 | | 10:10-10:50<br>Office Hours<br>Derby 248 | | 10:10-10:50<br>Office Hours<br>Derby 248 |
| 11:00-11:50 | | 11:00-11:50 | 11:00-11:50 | 11:00-11:50 |
| 12:00 - 12:50 | 12:00 - 12:50 | 12:00 - 12:50 | 12:00 - 12:50 | 12:00 - 12:50 |
| | 13:00-14:20 | 1:00-1:50 | 13:00-15:50<br>PHY251.01<br>Fund Physics<br>II llab<br>Derby 148 | 13:00-15:50<br>PHY251.02<br>Fund Physics<br>II llab<br>Derby 148 |
| 2:00-2:50 | 14:20-16:00 | 2:00-2:50 | | |
| 3:00-3:50 | | 3:00-3:50 | | |

**Tentative Master Schedule: R.1 for Physics 220 and Physics 250 and Physics 251 Spring 2017**

| labs | Worksheet Number | Date | 220: Cutnell: 8th ed. Assignment Reading : Homework | 250:Serway 4th ed Assignment: Reading: homework |
|---|---|---|---|---|
| | **Worksheet 01: Electrostatics 1** | W January 11 | chapter 18 | chapter 19 |
| **Lab01A: Electrostatics 1** | | F January 13 | chapter 18 | chapter 19 |
| | **Martin Luther King Day (no class)** | **M January 16** | | |
| | **Worksheet 02: Electrostatics 2** | W: January 18 | chapter 18 | chapter 19 |
| **Lab 01B: Electrostatics 2** | | F January 20 | chapter 19 | chapter 19 |
| | **Worksheet 03: Gauss' Law** | M January 23 | chapter 19 | chapter 20 |
| | **Worksheet 03A: Problems** | W January 25 | chapter 19 | chapter 20 |
| **Lab 02: In-Lab Problems** | | F January 27 | chapter 19 | chapter 20 |
| | **Worksheet 04: potential** | M: January 30 | chapter 19 | chapter 20 |
| | **Untest01** | **W February 01** | | |
| **Lab 03: Series and parallel R & C** | **Test #1** | **F: February 03** | | |
| | **Worksheet 05: capacitance** | M February 06 | chapter 19 | chapter 21 |
| | **Worksheet 06: Problems** | W February 08 | chapter 20 | chapter 21 |
| **Lab 04: EMF and RC Circuit** | **Worksheet 07: emf, RC circuit** | R,F February 09,10 | chapter 20 | chapter 21 |
| **Snow Gap day** | | M February 13 | chapter 20 | chapter 21 |
| | **Worksheet 08: Kirchhoff's laws 1** | W February 15 | chapter 21 | chapter 22 |
| **Lab05: current balance** | **Worksheet 09: Kirchhoff's laws 2** | R,F February 16,17 | chapter 21 | chapter 22 |
| | **Worksheet 10: Magnetic fields 1** | M: February 20 | chapter 21 | chapter 22 |
| | **Worksheet 11: Magnetic fields 2** | W February 22 | chapter 22 | chapter 23 |
| **Lab 06: magnetic Levitation** | **Worksheet 12: Ampere's law** | R,F February 23,24 | chapter 22 | chapter 23 |
| | **Worksheet 13: Calculating B** | M February 27 | | |
| | **Untest02** | **W March 01** | | |
| **Lab 07: solenoids** | **Test #2** | **R,F March 02,03** | | |
| | **Spring Break** | **March 6 – March 10** | | |
| | **Worksheet 14: Faraday's law** | M: March 13 | chapter 22 | chapter 23 |
| | **Worksheet 15: Inductance** No ws16 | W March 15 | chapter 22 | chapter 23 |
| **Lab 08: oscilloscopes** | **Worksheet 17: RLC Circuits 1** | R,F March 16,17 | chapter 23 | chapter 23 |
| | **Worksheet 18: RLC Circuits 2** | M: March 20 | chapter 23 | Chapter 23 |
| | **Worksheet 19: Thin Lens Eqtn. 1** | W: March 22 | chapter 23 | chapter 24 |
| **Lab TBA** | **Untest03** | **R,F: March 23,24** | | |
| | **Test #3** | **M: March 27** | | |
| | **Worksheet 20: Thin Lens Eqtn. 2** | W: March 29 | chapter 26 | chapter 26 |
| **ab 09: focal lengths** | **Worksheet 21: Refraction** | R,F: March 30,31 | chapter 26 | chapter 25 |
| **L** | **Worksheet 22: Mirror Equation** | M: April 03 | chapter 25 | chapter 25 |
| | **Worksheet 23: Multiple lenses** | W: April 05 | chapter 25 | chapter 25 |
| **Lab10: reflection** | **Geometrical Optics, Ray trace** | R,F: April 06,07 | chapter 25 | chapter 27 |
| | **Worksheet 24: Thin films** | M: April 10 | chapter 27 | chapter 27 |
| | **Worksheet 25: interference** | W: April 12 | chapter 27 | chapter 28 |
| **Lab TBA** | | **R: April 13** | | |
| | **Easter Break** | **F: April 11–M: April 17** | | |
| | **Untest04** | **W: April 19** | | |
| **Lab TBA** | **Test #4** | **R,F April 21** | | |
| | **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** | **April 30 – May 5** | | |

# Physics Problem Solving Rubric Rev SP2016

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

**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:

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

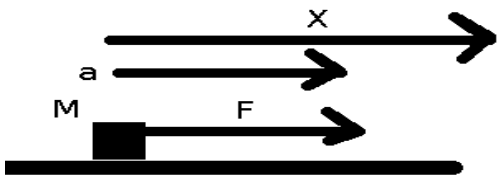
The test score is then determined by

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

## 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:**




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

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: $x=\frac{F}{2\mathrm{M}}t^2$

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

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

**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 RSP2017**

**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 Phy220/Phy250/Phy251

**Critical thinking:** 220,250,251
**Inquiry and analysis**: 251
**Quantitative literacy:** 220,250,251
**Teamwork:** 251
**Scientific thought and Information literacy:** 220,250,251

Portions related to Phy251 will be evaluated for **2** selected labs with rubric data recorded. Since students are allowed to submit revised reports, the initial submission will normally serve as the indicator since students are given the opportunity to revise submission based upon my comments. Portions related to 220/250 rubric will have data recorded for 4 selected problems; one from each exam.

**Critical thinking** is regularly evaluated in phy220, phy250 and phy251. In Phy220 and Phy250 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 Phy251, 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 phy251 as part of the required element of completed lab writeups. It is evidenced by student explanation of the experiment and is a required element by the rubric.

**Quantitative literacy** is evidenced primarily in phy220 and phy250 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 phy251 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 writeup and is a required element by the rubric.

**Teamwork** is regularly evaluated in phy251 and is evidenced by successful team completion of lab writeups as is required by the rubric.

**Scientific thought and information literacy** is regularly evaluated in phy251 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. Information literacy is regularly evaluated in phy251 and is evidenced by correct physical terminology in lab reports as required by the lab rubric. It is also a significant portion of phy220 and phy250 and is evidenced by student success in using the basic physical terminology enabling students to correctly initiate quantitative solutions to physical situations.