| Lyon College Course Syllabus | | |
|---|---|---|
| **Course:**Phy241.01,02/FA16 | Fundamentals of Physics Lab 1 | **R/F**13:00-15:50/Derby148 |
| **Professor:** Stuart Hutton | **Office:** Derby 248 | **Office Phone:** ***.307.7560 |
| **Email:** stuart.hutton@lyon.edu | **Office Hours:** **MWF** 10:00–10:50/AR | |
| **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 Students who are administratively withdrawn from more than one course will be placed on probation or suspended.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 **Monday August 29, 2016**.

Last day to drop with a W is **Thursday October 20, 2016**.

**Tentative Syllabus for Physics Lab 241: Fall 2016**
**Professor: Dr. Stuart Hutton**
**Professor: Dr. Stuart Hutton**
**Office: Derby Center: 248 Research Lab: Derby 219: General Physics lab: 148**
**SMS: 307.***.8765 / lab email: lyonphysics@<*****.com> web: physics.lyon.edu**
**Phone: ***.307.7560 Email: stuart.hutton@lyon.edu**

# During class periods, cell phones are to be switched off.

## 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 |

There are about 10 labs this semester and each lab provides 10 points in your final grade. The particular grade in each individual lab is awarded as follows: 70% of the grade (or 7 points) is awarded for successful completion of the lab awarded contingent upon submission of an acceptable lab report. The other 30% (or 3 points) is awarded for submission of an acceptable report following the guidelines and rubric on the lab website. Note, however, that in the event that an acceptable lab report is not submitted, the lab is considered to not have been done and the final course grade will be lowered by 1 letter grade. Each student team is to submit an individual and independent lab report for each experiment completed in order to obtain credit with each student in the team submitting an electronic lab report. You will have the opportunity during lab to respond to comments from the received electronic labs and then revise and resubmit your reports. Refer to Student Learning Outcomes for a discussion of minimal course outcome expectations.

**Note: If you miss one of the labs when experiments are done and it is not made up, your lab grade will be lowered by one letter grade for each missed lab which is not made up. The full lab, including writeup, must be completed or your grade will be reduced by one letter grade for each lab not fully completed. You must make up any excused absences at the first opportunity.**

A portion of your lab grade from any particular experiment may come from oral answers to questions when you turn in your lab report or lab quizzes. Thus, it is important that you understand what you did during the lab before turning the lab report in to your professor. Your work on lab write-ups will be graded for correctness, clarity and completeness. **Failure to supply details leading to a result will result in very little credit for a lab**. If you want full credit for a lab, **you must** supply the logical steps that led to the result and the result **must include proper units**. You should supply sample calculations where appropriate. Diagrams and graphs should be included where appropriate. Aside from data tables and graphs, the components required for the proper lab write-up should take about 2 - 3 pages maximum for any given lab. Be sure that each lab starts with a cover page as indicated in the lab write-up guidelines. Make sure that your lab write-up is in the form of paragraphs with correct English grammar as indicated on the lab write-up guidelines. Failure to follow the guidelines will negatively impact your grade.

**This course grade is completely separate from Phy210 and Phy240.**

In this course, your grade will depend upon successful completion of lab experiments and reports. **You are also expected to have read the lab before coming to class.** You should bring your text, a calculator, and paper to lab. Labs will be completed and submitted during lab. In order to do this, you will need to come to lab on time. **You can not show up late for lab. Labs start at 13:00 promptly. Simply said, do not come late; doing so will result in the equivalent to an unexcused absence.** Making up the lab for such absences is normally not permitted: it is thus in your interest to show up to lab on time. Additionally, you should **never plan** other activities during the lab period since labs normally will occupy the entire period. Your prime learning resource is the classroom: **punctual** and **complete** class attendance is expected**. Absences will negatively impact your final grade**. **Tardiness is considered to be an unexcused absence and will negatively impact your final grade; in particular you should not expect to arrive late and be permitted to do the lab**. **Use of a networked device to communicate during lab, except as required to do the lab, will be considered equivalent to an unexcused absence and a zero will be recorded for the lab grade without the possibility for a makeup. What this means: try to come in late or text during lab and you will lose a letter grade in lab.**

**Lab report formats**

If you miss a lab for an excused reason, you must make up the lab as soon as possible. If you hand in a lab report late for an unexcused reason, you will lose a minimum of 10% of your grade. Labs must be submitted in **pdf** format electronically. **When including spreadsheets in your reports, be sure to format tables so they fit on the page. I should be able to read your lab (as a single document in pdf format) without having to change anything. This means, check (proofread) your pdfs before you send them to make sure you can read them. Specifically, you must check your sent email to confirm that any attachments sent were correctly attached, could be opened, and were in pdf format.**

**If you miss a lab for an excusable reason, you must make up the lab for credit as soon as the schedule permits. If you schedule a makeup lab and fail to show up for the makeup, no future makeup labs will be permitted. If you miss 3 or more labs (unexcused), you will fail the course. If you miss one or more of the labs without makeup, your lab grade will be lowered by one letter grade for each missed lab which is not made up. You are required to submit your completed lab writeup for the makeup lab within 2 days of completion. Do not submit non-pdf attachments or corrupted files via email and expect to obtain extra time to complete the lab.**

## Course Description

In this course you will be exposed to the experimental side of physics. Among the topics that we will investigate are mechanics, waves, and thermodynamics.

## Course Objectives

As a consequence of this course, you should obtain an enhanced understanding of the experimental nature of physics. In addition, you should come away from this course with an ability to interpret data in a scientifically valid manner and to have increased experience with writing brief technical reports. Refer to Student Learning Outcomes for a discussion of minimal course outcome expectations.

## Course Prerequisites

In order to be taking the physics lab, you must be currently enrolled in either physics 210 or physics 240 and therefore you must satisfy the prerequisites for those courses.

## Text

The text will consist of handouts in electronic format obtained via the physics gateway at: http://physics.lyon.edu

## CLASS SCHEDULE / OFFICE HOURS Fall 2016

| Office | | General Lab | | Research Lab |
|---|---|---|---|---|
| Derby 248 | | Derby 148 | | Derby 219 |

**PROFESSOR Stuart Hutton**

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|
| 8:00-8:50<br>PHY240.01<br>Fundamentals<br>of Physics I<br>Derby 011 | 8:00-9:15 | 8:00-8:50<br>PHY240.01<br>Fundamentals<br>of Physics I<br>Derby 011 | 8:00-9:15 | 8:00-8:50<br>PHY240.01<br>Fundamentals<br>of Physics I<br>Derby 011 |
| 9:00-9:50<br>PHY210.01<br>Gen Physics I<br>Derby 011 | 9:30-10:45 | 9:00-9:50<br>PHY210.01<br>Gen Physics I<br>Derby 011 | 9:30-10:45 | 9:00-9:50<br>PHY210.01<br>Gen Physics I<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<br>Phy390<br>Physics Seminar | 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 |
| 12:50 - 13:50<br>Phy335<br>Modern Physics | 13:00-14:20 | 1:00-1:50 | 13:00-15:50<br>PHY241.01<br>Fund Physics<br>I Lab<br>Derby 148 | 13:00-15:50<br>PHY241.02<br>Fund Physics<br>I Lab<br>Derby 148 |
| 2:00-2:50 | 14:20 - 15:50<br>Phy335<br>Modern Physics | 2:00-2:50 | | |
| 3:00-3:50 | | | | |

**Schedule for Phy210, Phy240, and Phy241: Fall 2015: Revision 01**

| labs | Worksheet Number | Date | 210: Cutnell: 8th ed. Assignment Reading : Homework | 240:Serway 4th ed Assignment: Reading: homework |
|---|---|---|---|---|
| | pt | W: August 19, 2015 | Chapter 01: Units, vectors, math and trig | Chapter 01 Introduction and Vectors |
| **TBA:lab 0: intro lab** | Worksheet 01 units trig | F :August 21, 2015 | Chapter 01:H01 | Chapter 01:H01 |
| | Worksheet 02 1d motion | M: August 24, 2015 | Chapter 02:H02: 1d motion | Chapter 02:H02 1d motion |
| | Worksheet 03 freefall | W: August 26, 2015 | Chapter 02:H03 | Chapter 02:H03 |
| **Lab 01: Forces & Vectors** | Worksheet 04 2d motion1 | F: August 28, 2015 **UQ1** | Chapter 03:H04: 2d motion | Chapter 03:H04: 2d motion |
| | Worksheet 05 2d motion2 | M: August 31, 2015 | Chapter 03:H05 | Chapter 03:H05 |
| | Worksheet 05 2d motion2 | W: September 02, 2015 | Chapter 03:H05 | Chapter 03:H05 |
| **Lab 02: 1 and 2 D motion** | Worksheet 06 force1, fbd | F: September 04, 2015 **UQ2** | Chapter 04:H06: Forces, fbd | Chapter 04:H06 Forces, fbd |
| | Worksheet 07 force 2, fbd | M: September 07, 2015 | Chapter 04:H07 | Chapter 04:H07 |
| | **UnTest#1** | **W: September 09, 2015** | **Chapter 04** | |
| **Lab 03: Planes & Friction** | **Test 1:coverage: ws01-ws07** | **F: September 11, 2015** | | |
| | Worksheet 08 inclined plane | M: September 14, 2015 | Chapter 06:H08: work and energy | Chapter 06:H08 Energy and Energy Transfer |
| | Worksheet 09 inclined 2 | W: September 16, 2015 | Chapter 06: H09 | Chapter 07:H09 Potential Energy |
| **Lab 04: Atwood's, mechanical advantage, work & Energy** | Worksheet 10 energy 2 | F: September 18, 2015 **UQ3** | Chapter 07:H10: impulse, momentum | Chapter 08:H10 Momentum and Collisions |
| | Worksheet 11 spring energy | M: September 21, 2015 | Chapter 07: H11 | Chapter 08:H11 |
| | Worksheet 12 collisions1 | W: September 23, 2015 | Chapter 05:H12: Uniform Circular Motion | Chapter 10:H12 Rotational Motion |
| **TBA** | Worksheet 13 collisions2 | F: September 25, 2015 **UQ4** | Chapter 08:H13: Rotational kinematics | Chapter 10:H13 |
| | Worksheet 14 ucm 1 | M: September 28, 2015 | Chapter 08: H14 | Chapter 10:H14 |
| | Worksheet 15 acc frames | W: September 30, 2015 | Chapter 09:H15: Rotational dynamics | Chapter 10:H15 |
| **Lab 05: Centripetal Force & Hooke's Law** | Worksheet 16 non ucm | F: October 02, 2015 | Chapter 09: H16 | Chapter 10:H16 |
| | **UnTest#2** | **M: October 05, 2015** | | |
| | **Test 2:coverage: ws08-ws16** | **W: October 07, 2015** | | |
| **TBA** | Worksheet 17 rotate2 energy | F: October 09, 2015 | Chapter 09: H17 | Chapter 10:H17 |
| | **Fall Break** | **Mon: Oct 12 - Tues:Oct 13** | | |
| | Worksheet 18 torque,L | W: October 14, 2015 | Chapter 09: H18 | Chapter 10:H18 |
| **Lab 06: Static Equilibrium** | Worksheet 19 statics | F: October 16, 2015 **UQ5** | Chapter 10: H19 Simple Harmonic Oscillation | Chapter 12:H19 Oscillatory Motion |
| | Worksheet 20 osc1:spring | M: October 19. 2015 | Chapter 10: H20 | Chapter 12:H20 |
| | Worksheet 21 osc2:pendulum | W: October 21, 2015 | Chapter 10: H21 | Chapter 12:H21 |
| **Lab 07: Simple Harmonic Oscillation** | Worksheet 22 string waves1 | F: October 23, 2015 **UQ6** | Chapter 16:H22 waves and sound | Chapter 13:H22 Mechanical Waves |
| | Worksheet 23:string waves2 | M: October 26, 2015 | Chapter 16:H23 | Chapter 13:H23 |
| | Worksheet 24 sound waves | W: October 28, 2015 | Chapter 17:H24: wave superposition | Chapter 14:H24 :Superposition and Standing Waves |
| **Lab 08: Standing Waves and Vibrations** | Worksheet 25 beats, doppler | F: October 30, 2015 | Chapter 17: H25 | Chapter 14:H25 |
| | Worksheet 26 archimedes (not on test 3) | M: November 02, 2015 | Chapter 17:H26 | Chapter 15: H26:Fluid Mechanics :Sections 15.1 – 15.4 |
| | **Untest#3:** | **W: November 04, 2015** | | |
| **Lab09: Archimedes' Principle & Pressure** | **Test 3: Coverage: ws17-ws25** | **F: November 06, 2015** | Chapter 12: Temperature and Heat | Chapter 16: Temperature and the kinetic theory of gasses |
| | Worksheet 27 thermo1 | M: November 9, 2015 | Chapter 13:H27: transfer of heat | Chapter 16:H27 |
| | Worksheet 28 thermo2 | W: November 11, 2015 | Chapter 14:H28: IDG and kinetic theory | Chapter 17: H28:Energy in Thermal Processes: 1st law of thermo |
| **Lab 10: Thermodynamics** | Worksheet 29 thermo3 | F: November 13, 2015 **UQ7** | Chapter 15::H29: thermodynamics | Chapter 18: H29: Heat Engines, Entropy, and the 2nd law of thermo |
| | Worksheet 30 thermo4 | M: November 16, 2015 | Chapter 15: H30 | Chapter 18:H30 |
| | Worksheet 31 fluids1 | W: November 18, 2015 | Chapter 11: H31: Fluids | Chapter 16: H31:Fluid Mechanics: Sections 15.5-15.9 |
| **TBA** | **Untest #4** | **F: November 20, 2015** | | |
| | **Test 4:Coverage ws26-ws31** | **M: November 23, 2015** | | |
| | **Thanksgiving** | **W: Nov 25- Sun:Nov 29** | | |
| | | M: November 30, 2015 | | |
| | | W: December 02, 2015 | | |
| | Course Review / last day | F: December 04, 2015 | | |
| | **Final Exams** | **December 07-11, 2015** | | |

Safety regulations for General Physics Labs

(1) Anytime springs are used in lab, safety goggles must also be worn.
(2) Anytime boiling water is used in lab, safety goggles must be worn.
(3) You should not look at laser light or point it towards other people.
(4) In the event of a spill (which will be water), dispense a towel from the spill kit (aka towel dispenser) and wipe up the spill.
(5) The sink in the physics prep room is not a sink and should not be used as one.
(6) Food and drink are not permitted in lab.
(7) Appropriate clothing is required in lab although lab aprons are not needed.

Attach this form to your email (as an extra attachment today) when you send in your introductory lab report. In your lab report, right below your name, you should say this:
I have read the safety regulations attached to this email.

**Notes on the lab write-up for physics labs (Fall 2015)**

Your first (cover) page should include the following information:
Your Name, Date, Partners, Title of Experiment and the abstract.

***Each lab must be the unique written effort of the student team submitting the report. You may NOT reference or use lab reports (prepared by others, outside your team) in your report preparation.***

**Lab reports must be electronically submitted to the appropriate address as a single pdf document.**

**Title**: Concise wording that describes the essence of the lab.

**Abstract** - a summary of your research including general methods and major conclusions. This is usually one paragraph long and should convince someone to read your paper. Include a statement of your hypothesis here and if data supported it.

**Introduction**: An overview of your experiment, statement of hypothesis, what you did and what the theory was behind the experiment.

**Methods:** - A brief discussion of experimental techniques. Diagrams are usually appropriate in this section.

**Results** -written usually in the past perfect tense or passive voice; describes your findings, data collected, and includes data tables, graphs, general trends, derived formulas, etc. All work and data tables must be shown here. In general, you need to have a copy of your original data with you but the data included in the lab report can be copied from your original data. Data should be absent of obvious errors (since you would have tracked down these items).

**Discussion and analysis** - tense can vary, describes your results in relation to other data, discusses problem associated with the lab, postulates trends in the data, predicts results given different circumstances, suggests sources of error, etc. Discuss how the data supports, or does not support your hypothesis and how well such support is in terms of error analysis such as percent differences. **Be sure to include sample calculations in this section.**

**Literature Cited** - a list of books, articles, etc., that you used to assist you in presenting your data and which were referred to in the write-up. **When citing a reference from the internet, you MUST include the URL that points directly to the document so that a single click of the mouse will bring up that exact document. Every lab report will have at least 1 citation or the report will not be accepted.**

Your presentation of the lab is important. Be sure it is grammatically correct and neatly typed. Be careful of tense changes within a paragraph. Data collected during a lab must be authentic. "Fudging" is unacceptable and unnecessary.
Lab write-ups should be as **concise** as possible within these guidelines. I am not looking for exhaustive tomes of work in a lab write-up.

**Physics Lab Grading Rubric**

Note: Each student has the opportunity to revise deficient portions of the lab report during the lab period except for teamwork, arrival and departure.

| | 1 | 0.5 | 0 |
|---|---|---|---|
| Scientific Thought | Hypothesis in abstract and introduction. Supporting evidence (or non-supporting) discussed in conclusion. | Hypothesis in abstract and introduction but not relevant and supporting evidence (or non-supporting) not discussed in conclusion. | Hypothesis absent in abstract and introduction; Supporting evidence (or non-supporting) not discussed in conclusion |
| Critical thinking | Correct discussion of experiment, and how results relate to hypothesis. | Incomplete discussion of experiment iand how results relate to hypothesis | poor of absent discussion of experiment, and how results relate to hypothesis. |
| Inquiry and Analysis | Complete discussion of experimental technique and data results | incomplete discussion of experimental technique and data results | poor or absent discussion of experimental technique and data results |
| Informational Literacy | Correct physical terminology contained in report. At least one reference present. | incomplete physical terminology contained in report. Reference present but not correct. | incorrect or absence of physical terminology contained in report. Reference not present. |
| Quantitative Literacy | Correct usage of calculations including spreadsheets | correct usage of calculations including spreadsheets but something significant missing | Absent or incorrect usage of calculations including spreadsheets |
| Teamwork | Successful team completion of lab | | Unsuccessful team completion of lab |
| Arrival | on time | | tardy or absent |
| Departure | Work space returned as it was when arriving | | Workspace left in disorder upon departure |
| Overall report | All required elements present | | Required elements missing. |
| Quality | experimental results presented without obvious errors | | experimental results presented with obvious errors |

**Student Learning Outcomes for the Physics Program at Lyon College RFA2016**

**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 Phy210/Phy240/Phy241

**Critical thinking:** 210,240,241
**Inquiry and analysis**: 241
**Quantitative literacy:** 210,240,241
**Teamwork:** 241
**Scientific thought and Information literacy:** 210,240,241

Portions related to Phy241 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 210/240 rubric will have data recorded for 4 selected problems; one from each exam.

**Critical thinking** is regularly evaluated in phy210, phy240 and phy241. In Phy210 and Phy240 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 phy241, 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 phy241 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 phy210 and phy240 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 phy241 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 phy241 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 phy241 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 phy241 and is evidenced by correct physical terminology in lab reports as required by the lab rubric. It is also a significant portion of phy210 and phy240 and is evidenced by student success in using the basic physical terminology enabling students to correctly initiate quantitative solutions to physical situations.