

# Lyon College Course Syllabus

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Course Number and Section: phy241.01,241.02

Course Title: Fundamentals of Physics Lab I

Course Meeting Days/Times:

Semester FALL

Year: 2020

241.01: R 13:00-15:50 241.02: F 13:00 – 15:50

## **Professor's Information**

Name: Stuart Hutton

Office Location: Derby 248

Office Hours:

MWF 10-10:50

E-mail Address: Stuart.Hutton@lyon.edu

Phone Number: 870-307-7560

## **STANDARD POLICIES**

### ***Honor Code***

All graded work in this class is to be pledged in accordance with the Lyon College Honor Code. The use of a phone for any reason during the course of an exam is considered an honor code violation.

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 Students who are administratively withdrawn from more than one course will be placed on probation or suspended.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

If a student has a disability that qualifies under the American with Disabilities Act (ADA) and requires accommodations, they should contact the Office of Disability Services in the Morrow Academic Center for information on appropriate policies and procedures. Disabilities covered by ADA may include learning, psychiatric, physical disabilities, and/or chronic health disorders. Students can contact Office of Disability Services if they are not certain whether a medical condition/disability qualifies.

Location: Morrow Academic Center

Staff: Danell Hetrick, Director of Academic Support

Email: danell.hetrick@lyon.edu

Telephone: 870-307-7021

### ***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 Dr. Patrick Mulick, Dean of Students and Title IX Coordinator, 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 incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident.

**Tentative Syllabus for Physics Lab 241: Fall 2020**  
**Professor: Dr. Stuart Hutton**

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SMS: 307.\*\*\*.8765 /lab email: [lyonphysics@<\\*.com>](mailto:lyonphysics@lyon.edu) web: [physics.lyon.edu](http://physics.lyon.edu)  
[Phone: \\*\\*\\*.307.7560](tel:307.307.7560) [Email: stuart.hutton@lyon.edu](mailto: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:**

<b>100-90]</b> <b>A</b>	<b>(90-80]</b> <b>B</b>	<b>(80-70]</b> <b>C</b>	<b>(70-60]</b> <b>D</b>	<b>&lt;(60</b> <b>F</b>
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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 is to submit an individual and independent electronic lab report for each experiment completed and the report must be accepted in order to obtain credit. 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.**

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. 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.

**Phy241 is a separate course from either Phy210 or Phy240.**

**The grade in Phy241 has no impact upon the grade in either Phy210 or Phy240 except as a co-requisite.**

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. 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.**

### **Lab report formats**

If you miss a lab for an excused reason, you must make up the lab as soon as possible. If you fail to hand in a lab report late which is accepted, you will lose a minimum of 10% of your grade. Labs must be submitted in **pdf** format electronically. **When including spreadsheet screen captures 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 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. Do not submit non-pdf attachments or corrupted files via email and expect to obtain extra time to complete the lab.**

**Do note: the labs in this unusual circumstance will be in the form of spreadsheet simulations and animations. I have worked quite hard to make the lab experience come as close as possible to what will happen in a face to face lab. The labs will also have measurements that will include experimental error. I recommend that you obtain and learn to use a screen capture program for your operating system and I also suggest that you should run the labs in LibreOffice although they will probably import into excel with small variations. LibreOffice can be downloaded from <https://www.libreoffice.org/> and there is an android app for OpenOffice. The cost for libreoffice is \$0.00 since it is open source. You will also want to get experience with incorporating photos into your documents that come from your cell phone.**

### **An important note about the unexpected**

**An event such as a thunderstorm at my house or internet difficulties may mean that I will need to provide the lecture during these events in an asynchronous manner.**

### **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>

### **Academic Integrity**

Each student is to submit an individual and independent electronic lab report for each experiment completed and the report must be accepted in order to obtain credit. Students are specifically prohibited from reference to lab reports prepared by other students in the preparation of their own reports.

**CLASS SCHEDULE / OFFICE HOURS Fall 2020**

Pandemic Version

Professor: Stuart Hutton

Monday	Tuesday	Wednesday	Thursday	Friday
8:00-8:50 PHY240.01 Fundamentals of Physics I	8:00-9:15	8:00-8:50 PHY240.01 Fundamentals of Physics I	8:00-9:15	8:00-8:50 PHY240.01 Fundamentals of Physics I
9:00-9:50 PHY210.01 General Physics 1	9:30-10:00	9:00-9:50 PHY210.01 General Physics 1 Derby 011	9:30-10:00	9:00-9:50 PHY210.01 General Physics 1
10:10-10:50  Office Hours	10:00 - 10:50	10:10-10:50  Office Hours	10:00 - 10:50	10:10-10:50  Office Hours
11:00-11:50 PHY335.01 Modern Physics	11:00-11:50  Lunch	11:00-11:50 PHY335.01 Modern Physics	11:00-11:50  Lunch	11:00-11:50 PHY335.01 Modern Physics
12:00-12:50	12:00-12:50	12:00 - 12:50	12:00 - 12:50	12:00 - 12:50  SGA
13:00-13:30  Phy390.01DS Physics Seminar	13:00-14:50	13:00-14:50	13:00-15:50 PHY241.01 Fundamentals of Physics Lab 1 Derby 148	13:00-15:50 PHY241.02 Fundamentals of Physics Lab 1 Derby 148
	4-4:50 FRC			

**Pandemic Schedule for Phy210, Phy240, and Phy241: Fall 2020: Revision 0**

<b>labs</b>	<b>Worksheet Number</b>	<b>Date</b>	<b>210: Cutnell: 8<sup>th</sup> ed. Assignment Reading : Homework</b>	<b>240: Serway 4<sup>th</sup> ed Assignment: Reading: homework</b>
	Class Initialization	W August 19	Chapter 01: Units, vectors, math and trig	Chapter 01 Introduction and Vectors
<b>RF Lab 00: intro lab</b>	Worksheet 01 units trig	F August 21	Chapter 01:H01	Chapter 01:H01
	Worksheet 02 1d motion	M August 24	Chapter 02:H02: 1d motion	Chapter 02:H02 1d motion
	Worksheet 03 free fall	W August 26	Chapter 02:H03	Chapter 02:H03
<b>RF Lab 01: Forces &amp; Vectors</b>	Worksheet 04 2d motion1	F August 28 <b>UQ01</b>	Chapter 03:H04: 2d motion	Chapter 03:H04: 2d motion
	Worksheet 05 2d motion2	M August 31	Chapter 03:H05	Chapter 03:H05
	Worksheet 05 2d motion2	W September 02	Chapter 03:H05	Chapter 03:H05
<b>RF Lab 02: 1 and 2 D motion</b>	Worksheet 06 force1, fbd	F September 04 <b>UQ02</b>	Chapter 04:H06: Forces, fbd	Chapter 04:H06 Forces, fbd
	Worksheet 07 force 2, fbd	M September 07	Chapter 04:H07	Chapter 04:H07
	<b>UnTest#1</b>	<b>W September 09</b>	<b>Chapter 04</b>	
<b>RF Lab 03: Planes &amp; Friction</b>	<b>Test 1: coverage: ws01-ws07</b>	<b>F September 11</b>		
	Worksheet 08 inclined plane	M September 14	Chapter 06:H08: work and energy	Chapter 06:H08 Energy and Energy Transfer
	Worksheet 09 inclined 2	W September 16	Chapter 06: H09	Chapter 07:H09 Potential Energy
<b>RF Lab 04: Atwood's, mechanical advantage, work &amp; Energy</b>	Worksheet 10 energy 2	F September 18 <b>UQ03</b>	Chapter 07:H10: impulse, momentum	Chapter 08:H10 Momentum and Collisions
	Worksheet 11 spring energy	M September 21	Chapter 07: H11	Chapter 08:H11
	Worksheet 12 collisions1	W September 23	Chapter 05:H12: Uniform Circular Motion	Chapter 10:H12 Rotational Motion
<b>RF Lab 05: Centripetal Force &amp; Hooke's Law</b>	Worksheet 13 collisions2	F September 25 <b>UQ04</b>	Chapter 08:H13: Rotational kinematics	Chapter 10:H13
	Worksheet 14 ucm 1	M September 28	Chapter 08: H14	Chapter 10:H14
	Worksheet 15 acc frames	W September 30	Chapter 09:H15: Rotational dynamics	Chapter 10:H15
<b>RF: No Lab</b>	Worksheet 16 non ucm	F October 02 <b>UQ05</b>	Chapter 09: H16	Chapter 10:H16
	<b>UnTest#2</b>	<b>M October 05</b>		
	<b>Test 2: coverage: ws08-ws16</b>	<b>W October 07</b>		
<b>RF Lab 06: Static Equilibrium</b>	Worksheet 17: Rotate2 energy	F October 09	Chapter 09: H17	Chapter 10:H17
	Worksheet 18 Torque, L	M October 12	Chapter 09: H18	Chapter 10:H18
	<b>Service Day</b>	<b>W October 14</b>		
<b>RF Lab 07: Simple Harmonic Oscillation</b>	Worksheet 19 statics	F October 16 <b>UQ06</b>	Chapter 10: H19 Simple Harmonic Oscillation	Chapter 12:H19 Oscillatory Motion
	Worksheet 20 osc1:spring	M October 19	Chapter 10: H20	Chapter 12:H20
	Worksheet 21 osc2:pendulum	W October 21	Chapter 10: H21	Chapter 12:H21
<b>RF Lab 08: Standing Waves and Vibrations</b>	Worksheet 22 string waves1	F October 23 <b>UQ07</b>	Chapter 16:H22 waves and sound	Chapter 13:H22 Mechanical Waves
	Worksheet 23:string waves2	M October 26	Chapter 16:H23	Chapter 13:H23
	Worksheet 24 sound waves	W October 28	Chapter 17:H24: wave superposition	Chapter 14:H24 :Superposition and Standing Waves
<b>RF Lab09: Archimedes' Principle &amp; Pressure</b>	Worksheet 25 beats, Doppler	F October 30	Chapter 17: H25	Chapter 14:H25
	<b>UnTest 3</b>	<b>M November 02</b>		
<b>Test 2: coverage: ws08-ws016</b>	<b>Test 3: coverage: ws19-ws25</b>	<b>W November 04</b>		
<b>RF Lab 10: Thermodynamics</b>	Worksheet 27 therm 01	F November 06	Chapter 12: Temperature and Heat	Chapter 16: Temperature and the kinetic theory of gasses
	Worksheet 28 therm 02	M November 09	Chapter 13:H27: transfer of heat	Chapter 16:H27
	Worksheet 29 therm 03	W November 11	Chapter 14:H28: 1DG and kinetic theory	Chapter 17: H28:Energy in Thermal Processes: 1 <sup>st</sup> law of thermo
	<b>Second Service Day</b>	<b>R November 12</b>		
<b>RF: No Lab</b>	Worksheet 30 therm 04	F November 13 <b>UQ08</b>	Chapter 15::H29: thermodynamics	Chapter 18: H29: Heat Engines, Entropy, and the 2 <sup>nd</sup> law of thermo
	Worksheet 30 (continued)	M November 16	Chapter 15: H30	Chapter 18:H30
	Worksheet 26 Archimedes Worksheet 31 Fluids 1	W November 18	Chapter 11: H31: Fluids Chapter 17:H26	Chapter 15: H26:Fluid Mechanics :Sections 15.1 – 15.4 Chapter 16: H31:Fluid Mechanics: Sections 15.5-15.9
<b>RF: No Lab</b>	<b>UnTest 4: coverage: ws27-ws31</b>	<b>F November 20</b>		
	<b>Last day of classes</b>	<b>F November 20</b>		
	<b>Final Exams</b>	<b>November 21 - November 24</b>		\

## **Notes on the lab write-up for physics labs Fall 2020**

Your first (cover) page should include the following information:

Your Name, Date, Partners, Title of Experiment and the abstract.

(Then insert a page break)

***Each lab must be the unique written effort of the student submitting the report. You may NOT reference or use lab reports (prepared by others) in your report preparation although you are most certainly encouraged to talk to your lab colleagues.***

**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 Fall 2020

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

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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 and how results relate to hypothesis	poor or 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 Fall 2020

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.