Lyon College Course Syllabus

Course Number and Section:PHY240.01

Course Title: Fundamentals of Physics 1

Course Meeting Days/Times: MWF 8-8:50 Semester/Year:FA2022

Professor's Information

Name Stuart Hutton

Office Location: Derby 248 Office Hours: MWF 10-10:50/AR

E-mail Address: stuart.hutton@lyon.edu Phone Number: ***.307.7560

Physics: Email: lyonphysics@*****.*** SMS:307.***.8765 Gateway: physics.lyon.edu

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 curse of an exam is considered an honor code violation.

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 Students who are administratively withdrawn from more than one course will be placed on probation or suspended.

Academic Support

The Morrow Academic Center (MAC) helps students who want to improve grades by providing peer-led services including Supplemental Instruction (SI), tutoring, the Writing Center, and academic coaching as well providing 24-hour, online tutoring for all subjects through Tutor.com. A schedule of peer-led services is available at lyon.edu/mac and Tutor.com is accessed through courses in Schoology. Contact Donald Taylor, Director of Academic Support, at 870-307-7319 or donald.taylor@lyon.edu for more information about MAC services.

Technology Support

For general technology support, you can contact the IT department by emailing support@lyon.edu or by calling 870-307-7555. For assistance with classroom-related technologies, such as the learning management system (LMS), you can request support using the methods above, or you can contact sarah.williams@lyon.edu directly for assistance. Your course content will be accessible digitally using either the Schoology or Canvas LMS. Both LMS platforms will use your myLyon credentials for your student login.

- For Canvas, login at lyon.instructure.com
- For Schoology, login at lyon.schoology.com

Disabilities

Students seeking reasonable accommodations based on documented learning disabilities must contact Interim Director of Academic Support Donald Taylor in the Morrow Academic Center at (870) 307-7019 or at donald.taylor@lyon.edu.

Harassment, Discrimination, and Sexual Misconduct

Lyon College seeks to provide all members of the community with a safe and secure learning and work environment that is free of crime and/or policy violations motivated by discrimination, sexual and bias-related harassment, and other violations of rights. The College has a zero-tolerance policy against gender-based misconduct, sexual assault, and interpersonal violence toward any member or guest of the Lyon College community. Any individual who has been the victim of an act of violence or intimidation is urged to make an official report by contacting a campus Title IX coordinator or by visiting www.lyon.edu/file-a-title-ix-report. A report of an act of violence or intimidation will be dealt with promptly. Confidentiality will be maintained to the greatest extent possible within the constraints of the law. For more information regarding the College's Title IX policies and procedures, visit www.lyon.edu/title-ix.

Mental & Behavioral Health

Lyon College is dedicated to ensuring each student has access to mental and behavioral health resources. The College's Mental and Behavioral Health Office is located in Edwards Commons and is partnered with White River Health System's Behavioral Health Clinic. The office is committed to helping the Lyon community achieve maximum mental and behavioral wellness through both preventative and reactive care. A full-time, licensed, professional counselor provides counseling, consultations, outreach, workshops, and many more mental and behavioral services to Lyon students, faculty, and staff at no cost. The Mental and Behavioral Health Office also provides access to White River Health System's services and facilities, including medication management and in-patient and out-patient care. To make an appointment, contact counseling@lyon.edu.

College-Wide COVID-19 Policies for Fall, 2022

- The College does not require masks in instructional and meeting spaces inside academic buildings. However, if instructors require masks in their classroom, lab, or studio, then students and guests must comply with that requirement.
- Vaccines are strongly encouraged for all faculty, staff, and students. Vaccines are not mandated for Lyon College community members, although there may be specific courses involving interactions with vulnerable, external populations where a vaccine may be required.
- The College will continue to offer symptomatic testing for students, faculty and staff.

Details specific to this course may be found in the subsequent pages of this syllabus. Those details will include at least the following:

1. A description of the course consistent with the Lyon College catalog.
2. A list of student learning outcomes for the course.
3. A summary of all course requirements.
4. An explanation of the grading system to be used in the course.
5. Any course-specific attendance policies that go beyond the College policy.
6. Details about what constitutes acceptable and unacceptable student collaboration on graded work.
7. A clear statement about which LMS is being used for the course.We will use schoology this fall.

Tentative Syllabus for Physics 240: Fall 2022

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**
Note: in my classes and labs, masks must be properly worn at all times.

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, and in-class problems. I expect active participation in our class. 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 (3 tests and 1 [comprehensive] final exam)=90%
Each test is worth 22.5% of your grade.
Homework / in-class problems/ class participation=10%

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.

Your work on tests will be graded for correctness. You are expected to become proficient with physical quantities and units in addition to being able to do the physics leading to the solution of problems. You are expected to each day come prepared for class. This is accomplished by having looked over the worksheet before class, and then working the problems for complete understanding after class. 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. The format of the untests is not multiple choice. Instead you are expected to work through the problems as if it were an actual test. I have also scheduled several Unquizzes. Time permitting, we will allow about 10 minutes for you to complete self-diagnostic Unquizzes. During unquizzes and untests, you are encouraged to ask questions and discuss approaches to the solutions.

Course Description: Physics 240

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

Course Objectives: Physics 240

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: Physics 240

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 240. Phy241 is a concurrent requirement.

Text: Physics 240

The textbook in this course is:
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. Again, 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.

Punctual and complete class attendance is expected. Absences will negatively impact your final grade. Attendance will be taken.

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. Questions during tests should be directed to the professor only and students are not permitted to communicate with each other during tests. Students are specifically prohibited from discussing any aspect of tests until all students have completed the test in both phy240 and phy210. Contravention of these conditions will be considered to be a violation of the Lyon College Honor Code.

CLASS SCHEDULE / OFFICE HOURS Fall 2022
Pandemic Part 3 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	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	11:00-11:50	11:00-11:50	11-11:50	11:00-11:50
12:00-12:50	12:00-12:50	12:00 - 12:50	12:00 - 12:50 Phy390.01 **Seminar** Derby 148	12:00 - 12:50 SGA
13:00-15:50	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	13:00-15:50 PHY241.03 Fundamentals of Physics Lab 1 Derby 148

Schedule for Phy210, Phy240, and Phy241: Fall 2022: Revision 01

labs	Worksheet Number	Date	210: Cutnell: 8th ed. Assignment Reading : Homework	240:Serway 4th ed Assignment: Reading: homework
WRF Lab 00: intro lab	Class Initialization	W August 17	Chapter 01: Units, vectors, math and trig	Chapter 01 Introduction and Vectors
	Worksheet 01 units trig	F August 19	Chapter 01:H01	Chapter 01:H01
	Worksheet 02 1d motion	M August 22	Chapter 02:H02: 1d motion	Chapter 02:H02 1d motion
WRF Lab 01: Forces & Vectors	Worksheet 03 free fall	W August 24	Chapter 02:H03	Chapter 02:H03
	Worksheet 04 2d motion1	F August 26**UQ01**	Chapter 03:H04: 2d motion	Chapter 03:H04: 2d motion
	Worksheet 05 2d motion2	M August 29	Chapter 03:H05	Chapter 03:H05
WRF Lab 02: 1 and 2 D motion Problems	Worksheet 05 2d motion2	W August 31	Chapter 03:H05	Chapter 03:H05
	Worksheet 06 force1, fbd	F September 02**UQ02**	Chapter 04:H06: Forces, fbd	Chapter 04:H06 Forces, fbd
	Labor Day Holiday	**M September 05**		
WRF Lab 03: Planes & Friction	Worksheet 07 force 2, fbd	W September 07	Chapter 04:H07	Chapter 04:H07
	UnTest#1	**F September 09**	**Chapter 04**	
	Test 1:coverage: ws01-ws07	**M September 12**		
WRF Lab 04: Atwood's, mechanical advantage, work & Energy	Worksheet 08 inclined plane	W September 14	Chapter 06:H08: work and energy	Chapter 06:H08 Energy and Energy Transfer
	Worksheet 09 inclined 2	F September 16**UQ03**	Chapter 06: H09	Chapter 07:H09 Potential Energy
	Worksheet 10 energy 2	M September 19	Chapter 07:H10: impulse, momentum	Chapter 08:H10 Momentum and Collisions
WRF Lab 05: Centripetal Force & Hooke's Law	Worksheet 11 spring energy	W September 21	Chapter 07: H11	Chapter 08:H11
	Worksheet 12 collisions1	F September 23**UQ04**	Chapter 05:H12: Uniform Circular Motion	Chapter 10:H12 Rotational Motion
	Worksheet 13 collisions2	M September 26	Chapter 08:H13: Rotational kinematics	Chapter 10:H13
WRF Lab 06: Static Equilibrium	Worksheet 14 ucm 1	W September 28	Chapter 08: H14	Chapter 10:H14
	Worksheet 15 acc frames	F September 30**UQ05**	Chapter 09:H15: Rotational dynamics	Chapter 10:H15
	Fall Break	**October 01 – October 05**		
WRF: Lab TBA	Worksheet 16 non ucm	W October 05		
	UnTest#2	**F October 07**		
	Test 2	**M October 10**		
WRF Lab 07: Simple Harmonic Oscillation	Worksheet 17: Rotate2 energy	W October 12	Chapter 09: H17	Chapter 10:H17
	Worksheet 18 Torque, L	F October 14**UQ06**	Chapter 09: H18	Chapter 10:H18
	Worksheet 19 statics	M October 17	Chapter 10: H19 Simple Harmonic Oscillation	Chapter 12:H19 Oscillatory Motion
WF Lab TBA	Worksheet 20 osc1:spring	W October 19		
	Service Day	**R October 20**		
	Worksheet 21 osc2:pendulum	F October 21**UQ07**		
	Worksheet 22 string waves1	M October 24	Chapter 10: H20	Chapter 12:H20
WRF Lab 08: Standing Waves and Vibrations	Worksheet 23:string waves2	W October 26	Chapter 10: H21	Chapter 12:H21
	Worksheet 24 sound waves	F October 28**UQ08**	Chapter 16:H22 waves and sound	Chapter 13:H22 Mechanical Waves
	Worksheet 25 beats, Doppler	M October 31	Chapter 16:H23	Chapter 13:H23
WRF Lab TBA	**UnTest 3**	**W November 02**		
	Test 3	**F November 04**		
	Worksheet 27 therm 01	M November 07	Chapter 12: Temperature and Heat	Chapter 16: Temperature and the kinetic theory of gasses
WRF Lab09: Archimedes' Principle & Pressure	Worksheet 28 therm 02	W November 09	Chapter 13:H27: transfer of heat	Chapter 16:H27
	Worksheet 29 therm 03	F November 11**UQ09**	Chapter 14:H28: IDG and kinetic theory	Chapter 17: H28:Energy in Thermal Processes: 1st law of thermo
	Worksheet 30 therm 04	M November 14	Chapter 15::H29: thermodynamics	Chapter 18: H29: Heat Engines, Entropy, and the 2nd law of thermo
WRF Lab 10: Thermodynamics	Worksheet 30 (continued)	W November 16	Chapter 15: H30	Chapter 18:H30
	Untest #4	**F November 18**		
	Thanksgiving	**November 23 – November 28**		
	Test 4	**M November 28**		
	Worksheet 26 Archimedes Worksheet 31 Fluids 1 {Gravitational Interactions}	W November 30	Chapter 17: H25 Chapter 11: H31: Fluids	Chapter 14:H25 15: H26:Fluid Mechanics :Sections 15.1 – 15.4 Chapter 16: H31:Fluid Mechanics: Sections 15.5-15.9
	Course Review / last day	**F December 02**		
	Final Exams	**December 04-December 10**		

Physics Problem Solving Rubric Rev Fall 2022

	1	0.7	0.4	0
1, Critical Thinking: Solution started correctly. Note: sketches may be considered here as required in problem statement.	correct approach If required, sketches were correct.	approach would lead to correct result Sketches miss one label or some other component absent or incorrect.	Something is right in the approach but insufficient to reach problem solution. Sketches miss multiple labels, directions incorrectly indicated	incorrect approach Sketch not present or not at all correctly labeled.
2. Quantitative Literacy: 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 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:

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

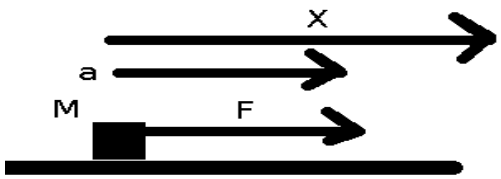
The test score is then determined by

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

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: $\vec{F}=M\vec{a}\Rightarrow\vec{a}=\frac{\vec{F}}{M}:\vec{F}=F\hat{x}\Rightarrow\vec{a}=\frac{F}{M}\hat{x}$: $a_x=\frac{F}{M}$

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 FA2022

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 exam problems.

General Education learning outcomes for Phy 210/Phy240/ Phy241/Phy220/Phy250/Phy251

Critical thinking: 210,240.241,220,250,251
Inquiry and analysis: 241.251
Quantitative literacy: 210,240.241,220,250,251
Scientific thought and Information literacy: 210,240.241,220,250,251

Portions related to Phy241,Phy251 will be evaluated for **1** selected labs with rubric data recorded. Since students are allowed to submit revised reports, the initial submission will normally serve as the indicator. Portions related to 210,240,220/250 rubric will have results recorded from exams.

Critical thinking is regularly evaluated in 210,240.241,220,250,251. 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 writeups. 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 writeup and is a required element by the rubric.

Scientific thought and information literacy 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. 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.