Tentative Syllabus for Physics 210: Fall 2015

Professor: Dr. Stuart Hutton
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To access the Physics Gateway: http://hutton.lyon.edu

During tests: All networked devices are to be switched off.

Office Hours

I will schedule several office hour blocks. I will be very close to my office or research lab during these times. Otherwise, I will usually be close to my office or research lab. If you want to find me outside of office hours, make an appointment so that you will be sure to find me. My schedule is located on the physics home page which you may review to determine office hours.

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. In class, two late arrivals will be equivalent to 1 absence. A late arrival is an entry after the class has started.**

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 (Phy241) is a separate course and as such the grade in Phy241 has no impact upon the grade in Phy210 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 mechanics, waves and thermodynamics. 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 math prerequisites for physics 210. You need to be enrolled in or to have previously completed Phy241 to take this course.

Text

The textbook in this course is:

Physics 210:

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**. **Tardiness is considered to be an unexcused absence and 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.**

Attendance

The Lyon College Catalogue for 2015-2016 states:

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 (see Academic Probation and Academic Suspension).

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.** Any questions during tests should be directed to the professor only. **CELL PHONES AND ANY OTHER WIRELESS OR NETWORKED DEVICES (INCLUDING COMPUTERS, WATCHES, RINGS, etc.) MAY NOT BE USED DURING TESTS.** If you do use such devices during a test, it will automatically be considered to be a violation of the Lyon College Honor Code.

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

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

Withdrawal Deadlines

Last day to drop with no record of the course is 31 August 2015.
Last day to drop with a W is 21 October 2015.

Syllabus statement recommended by the Office of Civil Rights

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.

CLASS SCHEDULE / OFFICE HOURS FALL 2015

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 **Office Hours** Derby 248		**10:10-10:50** **Office Hours** Derby 248		**10:10-10:50** **Office Hours** Derby 248
11:00-11:50	**10:50 0 11:50** **PHY390.01** Physics Seminar **Derby 021**	**11:00-11:50**	**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** **PHY241.01** Fund Physics I Lab Derby 148	**1:00-3:50** **PHY241.02** Fund Physics I 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**

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**		

Student Learning Outcomes for the Physics Program at Lyon College RFA2015

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 3 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.

Physics Problem Solving Rubric Rev FA2015

	1	0.75	0.5	0-.25
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 3 points, some sections may have only 2 points or 1 point. In a test containing 4 problems, this equates to 25% of the total test score. The final score per problem is calculated as follows:

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

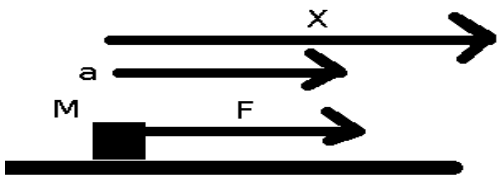
The test score is then determined by

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

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