Tentative Syllabus for Physics 210: Fall 2012

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://hutton.lyon.edu

During class periods and during tests: cell phones 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.**

Tests (4 tests and 1 [comprehensive] final exam)=85%
Each test is worth 17% of your grade.
Homework / in-class problems/ class participation=15%
Note: Physics Lab (Phy241) is a separate course and as such the grade in Phy241 has no impact upon the grade in Phy240.

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 will be graded for completion. Students are generally expected to commit two hours of study outside of class for each hour of lecture.

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 Assessable Learning Outcomes for a more complete presentation of topics.

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.

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**. **If you use cell phones during class, you will be asked to leave and this will be considered an unexcused absence.**

Attendance

The Lyon College Catalogue for 2012-2013 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 OTHER WIRELESS OR NETWORKED DEVICES (INCLUDING COMPUTERS) 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 Office of Academic Services at 307-7332."

Tentative Schedule: R.1 for Physics 210, 240 and 241 Fall 2012

labs	Worksheet Number	Date	210: Cutnell: 8th ed. Assignment Reading : Homework	240:Serway 4th ed Assignment: Reading: homework
	pt	W: August 22, 2012	Chapter 01: Units, vectors, math and trig	Chapter 01 Introduction and Vectors
TBA	Worksheet 01 units trig	F :August 24, 2012	Chapter 01:H01	Chapter 01:H01
	Worksheet 02 1d motion	M: August 27, 2012	Chapter 02:H02: 1d motion	Chapter 02:H02 1d motion
	Worksheet 03 freefall	W: August 29, 2012	Chapter 02:H03	Chapter 02:H03
Lab 01: Forces & Force Tables	Worksheet 04 2d motion1	F: August 31, 2012	Chapter 03:H04: 2d motion	Chapter 03:H04: 2d motion
	Worksheet 05 2d motion2	M: September 03, 2012	Chapter 03:H05	Chapter 03:H05
	Worksheet 05 2d motion2	W: September 05, 2012	Chapter 03:H05	Chapter 03:H05
Lab 02: Motion in 1 and 2 dimensions	Worksheet 06 force1, fbd	F: September 07, 2012	Chapter 04:H06: Forces, fbd	Chapter 04:H06 Forces, fbd
	Worksheet 07 force 2, fbd	M: September 10, 2012	Chapter 04:H07	Chapter 04:H07
	UnTest#1	**W: September 12, 2012**	**Chapter 04**	
Lab 03: Inclined Planes & Friction	**Test 1: Coverage: ws01-ws07**	**F: September 14, 2012**		
	Worksheet 08 inclined plane	M: September 17, 2012	Chapter 06:H08: work and energy	Chapter 06:H08 Energy and Energy Transfer
	Worksheet 09 inclined 2	W: September 19, 2012	Chapter 06: H09	Chapter 07:H09 Potential Energy
Lab 04: Atwood's Machine, Mechanical Advantage, Work and Energy	Worksheet 10 energy 2	F: September 21, 2012	Chapter 07:H10: impulse, momentum	Chapter 08:H10 Momentum and Collisions
	Worksheet 11 spring energy1	M: September 24, 2012	Chapter 07: H11	Chapter 08:H11
	Worksheet 12 collisions1	W: September 26, 2012	Chapter 05:H12: Uniform Circular Motion	Chapter 10:H12 Rotational Motion
TBA	Worksheet 13 collisions2	F: September 28, 2012	Chapter 08:H13: Rotational kinematics	Chapter 10:H13
	Worksheet 14 ucm 1	M: October 01, 2012	Chapter 08: H14	Chapter 10:H14
	Worksheet 15 acc frames	W: October 03, 2012	Chapter 09:H15: Rotational dynamics	Chapter 10:H15
Lab 05: Centripetal Force & Hooke's Law	Worksheet 16 non ucm	F: October 05, 2012	Chapter 09: H16	Chapter 10:H16
	UnTest#2	**M: October 08, 2012**		
	Test 2: Coverage: ws08-ws16	**W: October 10, 2012**		
	Fall Break	**October 11-14**		
	Worksheet 17 rotate2 energy	M: October 15, 2012	Chapter 09: H17	Chapter 10:H17
	Worksheet 18 torque,L	W: October 17, 2012	Chapter 09: H18	Chapter 10:H18
Lab 06: Static Equilibrium	Worksheet 19 statics	F: October 19, 2012	Chapter 10: H19 Simple Harmonic Oscillation	Chapter 12:H19 Oscillatory Motion
	Worksheet 20 osc1:spring	M: October 22. 2012	Chapter 10: H20	Chapter 12:H20
	Worksheet 21 osc2:pendulum	W: October 24, 2012	Chapter 10: H21	Chapter 12:H21
Lab 07: Simple Harmonic Oscillation	Worksheet 22 string waves1	F: October 26, 2012	Chapter 16:H22 waves and sound	Chapter 13:H22 Mechanical Waves
	Worksheet 23:string waves2	M: October 29, 2012	Chapter 16:H23	Chapter 13:H23
	Worksheet 24 sound waves	W: October 31, 2012	Chapter 17:H24: wave superposition	Chapter 14:H24 Superposition and Standing Waves
Lab 08: Standing Waves and Vibrations	Worksheet 25 beats, doppler	F: November 02, 2012	Chapter 17: H25	Chapter 14:H25
	Worksheet 26 archimedes (not on test 3)	M: November 05, 2012	Chapter 17:H26	Chapter 15: H26:Fluid Mechanics Sections 15.1 – 15.4
	Untest#3:	**W: November 07, 2012**		
Lab09: Archimedes' Principle & Pressure	**Test 3: Coverage: ws17-ws25**	**F: November 09, 2012**	Chapter 12: Temperature and Heat	Chapter 16: Temperature and the kinetic theory of gasses
	Worksheet 27 thermo1	M: November 12, 2012	Chapter 13:H27: transfer of heat	Chapter 16:H27
	Worksheet 28 thermo2	W: November 14, 2012	Chapter 14:H28: IDG and kinetic theory	Chapter 17: H28:Energy in Thermal Processes: 1st law of thermos
Lab 10: Thermodynamics	Worksheet 29 thermo3	F: November 16, 2012	Chapter 15::H29: thermodynamics	Chapter 18: H29: Heat Engines, Entropy, and the 2nd law of thermo
	Worksheet 30 thermo4	M: November 19, 2012	Chapter 15: H30	Chapter 18:H30
	Thanksgiving	**November 21-25**		
	Worksheet 31 fluids1	M: November 26, 2012	Chapter 11: H31: Fluids	Chapter 16: H31:Fluid Mechanics Sections 15.5-15.9
	Untest #4	**W: November 28, 2012**		
TBA	**Test 4: coverage ws26 – ws31**	F: November 30, 2012		
		M: December 03, 2012		
		W: December 05, 2012		
TBA	Course Review	F: December 07, 2012		
	Final Exams	**December 12-16, 2012**		

Non-exhaustive Topical Guide to worksheet coverage: physics 210FA12

1: dimensional and unit analysis: SI units: basic trigonometry: basic vectors: dot product: displacement vector
2: 1-d motion with constant acceleration:1-d equations of motion: average velocity quadratic solution to 1-d equation of motion
3:freefall:vector g: introduction 2-d freefall
4:2-d motion: velocity vector: relative motion:2-d relative motion
5:monkey shoot: orbital velocity: more relative motion: standard 2-d problem
6:newton's law (1,2,3):obtain a from F: obtain f from a FBD (free body diagram)1
7:FBD 2:friction:tension:atwood's machine
8:FBD 3:inclined plane
9:Work:Conservative vs Non-conservative: Hooke's law:
Energy conservation for conservative forces: Newton's law: work energy theorem
10: applications of work energy theorem with conservative, non-conservative and rotated systems.
11:additional applications of work energy theorem with conservative, non-conservative and rotated systems.
12: uniform circular motion with applications
13:Forcing one's mind into an inertial reference frame: the hard problems.
14:momentum and conservation of momentum: applications in problems with friction
15:additional applications of momentum conservation
16: non-uniform circular motion
17: torque and moment of inertia: Angular momentum 1:Rotational KE (kinetic energy)
18:static equilibrium: problems involving statics
19:Archimedes' principle, density
20: rotational quantities: additional applications: conservation of angular momentum
21: vibrations and SHO (simple harmonic oscillation):restoring forces
22: SHO: simple pendulum
23: waves I
24: modes of vibration on a string, energy and power
25: open and closed organ pipes: standing longitudinal waves of sound
26: beat frequencies and the Doppler shift
27: specific heat and linear expansion
28: isovolumeric, isobar, isotherm, latent heat
29: adiabatic, Carnot cycle
30: entropy
31:applications of Bernoulli's equation

Educational Goals for Physics Students & Assessable Learning Outcomes

PHY 210 GENERAL PHYSICS I / 3 credits

Newtonian mechanics, sound propagation, heat transfer, and thermodynamics using algebra and trigonometry. Prerequisite: MTH 110 or permission of instructor.

General Education Objectives (proposed)

1. Students can apply critical thinking to pose and answer questions.

2. Students can use the processes and methods of science and mathematics to demonstrate how reproducible results give rise to the discovery of fundamental laws and the development of theories.

3. Students can articulate a basic knowledge of current scientific understanding of the universe and the scientific and mathematical laws that govern it.

4l Students can summarize, interpret, analyze, and critically evaluate data and reports relating to the natural sciences and mathematics.

Physics Program Objectives

There are several general goals of the Physics program that students completing the physics program should have. A non-exhaustive list of these program objectives include:

(a) Ability to perform a mathematical formulation of a physical system
(b) Ability to discuss (mathematically and linguistically) a physical system drawing upon a well-developed foundation built upon physical fundamentals.
(c) Ability to formulate complex arguments based upon physical foundations and which are testable by experimentation.
(d) Ability to produce technologically enabled students with an understanding of the basis for experimental design.

A non-exhaustive list of intended learning outcomes follows

(a) Ability to convert units.
(b) Ability to work with algebraic vectors.
(c) Ability to describe 1-dimensional motion in the presence of uniform accelerations.
(d) Ability to describe 2-dimensional motion in the presence of uniform accelerations.
(e) Ability to use Newton's laws of motion in algebraic form.
(f) Ability to construct and use free-body diagrams in problem formulation.
(g) Ability to apply principles of energy conservation for conservative and non-conservative systems.
(h) Ability to work with Newton's law of gravitation and gravity in general as an example of a conservative force.
(i) Ability to provide mathematical analysis necessary to describe systems undergoing uniform circular motion.
(j) Ability to apply principles of momentum conservation to physical systems.
(k) Ability to provide mathematical analysis necessary to describe systems undergoing non-uniform circular motion in the presence of uniform external torques.
(l) Ability to provide mathematical analysis necessary to describe systems undergoing simple harmonic oscillation and the effect of linear restoring forces upon systems.
(m) Ability to provide mathematical analysis necessary to describe pulses, waves, traveling harmonic waves, transverse and longitudinal oscillations.
(n) Ability to work with Archimedes' principle and Bernoulli's equation[4].

(o) Ability to model the non-leaky ideal gas thermodynamically and to expand this theory to cover systems with more than one degree of freedom.
(p) Calorimetry and linear expansion.
(q) Ability to apply the four laws of thermodynamics.
(r) Ability to apply black body radiation[6], Newton's law of cooling and the greenhouse effect.