Tentative Syllabus for Physics 240: Fall 2013

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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%
Physics Lab (Phy241) is a separate course and as such the grade in Phy241 has no impact upon the grade in Phy240 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 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. Additionally you must satisfy the calculus prerequisites for physics 240. You need to be enrolled in or to have previously completed Phy241 to take this course.

Text

The textbook in this course is:

Physics 240:

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. 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 Dean of the Faculty at (870) 307-7332."

Withdrawal Deadlines

Last day to drop with no record of the course is 02 September 2013.
Last day to drop with a W is 23 October 2013.

Schedule for Phy210, Phy240, and Phy241: Fall 2013: Revision 01

labs	Worksheet Number	Date	210: Cutnell: 8th ed. Assignment Reading : Homework	240:Serway 4th ed Assignment: Reading: homework
	pt	W: August 21, 2013	Chapter 01: Units, vectors, math and trig	Chapter 01 Introduction and Vectors
TBA:lab 0: intro lab	Worksheet 01 units trig	F :August 23, 2013	Chapter 01:H01	Chapter 01:H01
	Worksheet 02 1d motion	M: August 26, 2013	Chapter 02:H02: 1d motion	Chapter 02:H02 1d motion
	Worksheet 03 freefall	W: August 28, 2013	Chapter 02:H03	Chapter 02:H03
Lab 01: Forces & Vectors	Worksheet 04 2d motion1	F: August 30, 2013 **UQ1**	Chapter 03:H04: 2d motion	Chapter 03:H04: 2d motion
	Worksheet 05 2d motion2	M: September 02, 2013	Chapter 03:H05	Chapter 03:H05
	Worksheet 05 2d motion2	W: September 04, 2013	Chapter 03:H05	Chapter 03:H05
Lab 02: 1 and 2 D motion	Worksheet 06 force1, fbd	F: September 06, 2013 **UQ2**	Chapter 04:H06: Forces, fbd	Chapter 04:H06 Forces, fbd
	Worksheet 07 force 2, fbd	M: September 9, 2013	Chapter 04:H07	Chapter 04:H07
	UnTest#1	**W: September 11, 2013**	**Chapter 04**	
Lab 03: Planes & Friction	**Test 1:coverage: ws01-ws07**	**F: September 13, 2013**		
	Worksheet 08 inclined plane	M: September 16, 2013	Chapter 06:H08: work and energy	Chapter 06:H08 Energy and Energy Transfer
	Worksheet 09 inclined 2	W: September 18, 2013	Chapter 06: H09	Chapter 07:H09 Potential Energy
Lab 04: Atwood's, mechanical advantage, work & Energy	Worksheet 10 energy 2	F: September 20, 2013 **UQ3**	Chapter 07:H10: impulse, momentum	Chapter 08:H10 Momentum and Collisions
	Worksheet 11 spring energy	M: September 23, 2013	Chapter 07: H11	Chapter 08:H11
	Worksheet 12 collisions1	W: September 25, 2013	Chapter 05:H12: Uniform Circular Motion	Chapter 10:H12 Rotational Motion
TBA	Worksheet 13 collisions2	F: September 27, 2013 **UQ4**	Chapter 08:H13: Rotational kinematics	Chapter 10:H13
	Worksheet 14 ucm 1	M: September 30, 2013	Chapter 08: H14	Chapter 10:H14
	Worksheet 15 acc frames	W: October 02, 2013	Chapter 09:H15: Rotational dynamics	Chapter 10:H15
Lab 05: Centripetal Force & Hooke's Law	Worksheet 16 non ucm	F: October 04, 2013	Chapter 09: H16	Chapter 10:H16
	UnTest#2	**M: October 07, 2013**		
	Test 2:coverage: ws08-ws16	**W: October 09, 2013**		
	Fall Break	**Thurs: Oct 10 - Sun:Oct 13**		
	Worksheet 17 rotate2 energy	M: October 14, 2013	Chapter 09: H17	Chapter 10:H17
	Worksheet 18 torque,L	W: October 16, 2013	Chapter 09: H18	Chapter 10:H18
Lab 06: Static Equilibrium	Worksheet 19 statics	F: October 18, 2013 **UQ5**	Chapter 10: H19 Simple Harmonic Oscillation	Chapter 12:H19 Oscillatory Motion
	Worksheet 20 osc1:spring	M: October 21. 2013	Chapter 10: H20	Chapter 12:H20
	Worksheet 21 osc2:pendulum	W: October 23, 2013	Chapter 10: H21	Chapter 12:H21
Lab 07: Simple Harmonic Oscillation	Worksheet 22 string waves1	F: October 25, 2013 **UQ6**	Chapter 16:H22 waves and sound	Chapter 13:H22 Mechanical Waves
	Worksheet 23:string waves2	M: October 28, 2013	Chapter 16:H23	Chapter 13:H23
	Worksheet 24 sound waves	W: October 30, 2013	Chapter 17:H24: wave superposition	Chapter 14:H24 :Superposition and Standing Waves
Lab 08: Standing Waves and Vibrations	Worksheet 25 beats, doppler	F: November 01, 2013	Chapter 17: H25	Chapter 14:H25
	Worksheet 26 archimedes (not on test 3)	M: November 04, 2013	Chapter 17:H26	Chapter 15: H26:Fluid Mechanics :Sections 15.1 – 15.4
	Untest#3:	**W: November 06, 2013**		
Lab09: Archimedes' Principle & Pressure	**Test 3: Coverage: ws17-ws25**	**F: November 08, 2013**	Chapter 12: Temperature and Heat	Chapter 16: Temperature and the kinetic theory of gasses
	Worksheet 27 thermo1	M: November 11, 2013	Chapter 13:H27: transfer of heat	Chapter 16:H27
	Worksheet 28 thermo2	W: November 13, 2013	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 15, 2013 **UQ7**	Chapter 15::H29: thermodynamics	Chapter 18: H29: Heat Engines, Entropy, and the 2nd law of thermo
	Worksheet 30 thermo4	M: November 18, 2013	Chapter 15: H30	Chapter 18:H30
	Worksheet 31 fluids1	W: November 20, 2013	Chapter 11: H31: Fluids	Chapter 16: H31:Fluid Mechanics: Sections 15.5-15.9
TBA	**Untest #4**	**F: November 22, 2013**		
	Test 4:Coverage ws26-ws31	**M: November 25, 2013**		
	Thanksgiving	**W: Nov 27- Sun:Dec 01**		
		M: December 02, 2013		
		W: December 04, 2013		
TBA	Course Review / last day	F: December 06, 2013		
	Final Exams	**December 09-13, 2013**		

Non-exhaustive Topical Guide to worksheet coverage: physics 240FA13

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. time-dependent acceleration.
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 240 FUNDAMENTALS OF PHYSICS I / 3 credits

Principles of Newtonian mechanics, sound propagation, heat transfer, and thermodynamics employing differential and integral calculus. Prerequisite: MTH 210 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 and functional vectors.
(c) Ability to describe 1-dimensional motion in the presence of uniform and non-uniform accelerations. Accelerations described include position-dependent, velocity dependent, time dependent and mass dependent accelerations.
(d) Ability to describe 2-dimensional motion in the presence of uniform and non-uniform accelerations. Accelerations described include position-dependent, velocity dependent, time dependent and mass dependent accelerations.
(e) Ability to use Newton’s laws of motion in algebraic and differential 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 systems undergoing simple harmonic oscillation and to understand the differential equation leading to simple harmonic oscillation and its connection to linear restoring forces.
(n) Ability to provide mathematical analysis necessary to describe pulses, waves, traveling harmonic waves, transverse and longitudinal oscillations. Perform basic differentials of the wave equation in limited circumstances[3].
(o) Ability to work with Archimedes' principle and Bernoulli's equation[4].
(p) Ability to model the non-leaky ideal gas thermodynamically[5] and to expand this theory to cover systems with more than one degree of freedom.
(q) Calorimetry and linear expansion.
(r) Ability to apply the four laws of thermodynamics.
(s) Ability to apply black body radiation[6], Newton's law of cooling and the greenhouse effect.

Physics 240:Fall 2013

Syllabus : **Assessable Learning Outcomes** : **Schedule** : **Topics**

Full Syllabus **(combined from above)**

Note: in order to properly view the documents you must have dejaVu fonts and MathType fonts

however the pdf files will display properly for you.

Announcements

Conversion of Units
Conversion of units
Conversion of Powers of Units

Vectors
VRML: Rotate a triangle for trig
Vector Addition
Vector Subtraction
Resolution of a vector into its components
Multiplication of a vector by a scalar
Vector dot product
Animation: projection of a vector onto a coordinate system
A vector java applet from uky
Additional vector notes : W : P and a spreadsheet

1-D Motion
Average Velocity
Constant Acceleration 1
Constant Acceleration 2
A spreadsheet for 1-D motion
Animation: 1d uniform acceleration
Animation: 2 balls in a reduced gravitational field

Animation: Gallileo's Demonstration (01,02)
Newton's Cannon
Everything Falls with the same acceleration

2-D Motion
2-D motion spreadsheet
Antartic Rescue Drop
45 Degrees gives the maximum range
2-D translational motion along perpendicular coordinates
Ball and cart in a (reduced) gravitaitonal field
Monkey Shoot
Station Train Vendor Ant
At the Intergalactic Dairy Bar

Newton's Laws
Free Body Diagram construction & use
Animation: Atwood's Machine
Animation: Mass on a plane, mass hanging over the side
Animation: Spooky inclined plane
Atwood's Machine gif animation
Inclined Plane #2: and the analysis : W : P

Energy Conservation
Energy conservation analysis for a simple system
Animation: A simple system conserving energy

Uniform Circular Motion
Spinning Ball
Animated Gif showing derivation of centripetal acceleration
Cylinders01

Momentum

Notes regarding conversation of translational momentum 240 : P

Newton's demonstration java applet

animation: successive collisions between smaller masses

Glancing Collision between two objects of equal mass

Completely Inelastic Collisions (01, 02)

Completely Elastic Collisions (01, 02)

Non Uniform Circular Motion and Torque

VRML: Right Handed Coordinate System

Right Hand Rule #1 :VRML3 VRML 2

Right Hand Rule #2 for Torque : VRML

Direction of Torque: Positive : VRML : Negative : VRML

Moments of Inertia (external from Science World)

Common Moments of Inertia

Non-uniform circular motion

SHO for a cylinder

Almost Stable

Rotational Kinetic Energy Derivation

Roll Without Slip

Right Hand Rule #2

Precession of a Bicycle Wheel

Precession of a Bicycle Wheel 03 Spooky version: VRML

Simple Harmonic Oscillation

Vibrating Mass animation

Cosine as a projection

Simple Harmonic Oscillation of a short chain

Physical Pendulum : VRML

SHO for a ring on a peg
SHO plotter spreadsheet
Bobbing Float
SHO for a cylinder
SHO for a simple pendulum : VRML
Multiple (out of phase, 100% coherent) : VRML
Multiple (out of phase, partially coherent) : VRML

Waves and Pulses
An animation of Gaussian traveling pulses
Transverse Pulse on a Slinky : VRML
Longitudinal Pulse on a Slinky : VRML
Collision between two transverse pulses on a slinky : VRML
Collision between two longitudinal pulses on a slinky
Harmonic Traveling Wave on an Infinite String : VRML
Spooky Harmonic Traveling Waves on a String
Spooky Harmonic Traveling Waves on a String 02
Excel spreadsheet showing the calculations and plots for the traveling pulses
An animation showing the formation of standing waves
Excel spreadsheet showing the calculations for the standing wave animation
Encore animation of formation of standing waves
Formation of second mode with fixed Boundary Conditions
Colliding Gaussians showing simulation of free boundary conditions
Spreading Gaussian Pulse on a Rope
>**Free Boundary Conditions 01and 04**
Fixed Boundary Condition 01

Pulse as seen by co moving observer
Piston Pushing Air
Beat Formation (01,02) Spreadsheets for Beats (01,02)
What a Beat sounds like
Doppler Shift for a car andThe Chromatics
Fourier Synthesis for Sound Java Applet(External to Lyon College)
What does a sonic boom look like?
Thrust SSC [Not Linked: movie : cnn report : sonic boom]

Thermodynamics
Joule's Experiment
Carnot Cycle Animation
Spreadsheet for Carnot Cycle
Spreadsheets:Isovolumeric Isothermal
Gas Molecules In A Cylinder 01
Gas Molecules In A Cylinder 02
Gas Molecules In A Cylinder 01: Running backwards : Kaon Particles
Diatomic Molecules in a Cylinder and Denser : VRML

Worksheet Number	Date
	W: August 21
ws01: doc : pdf	F: August 23
ws02: doc : pdf	M: August 26
ws03: doc : pdf	W: August 28
ws04: doc : pdf : UQ1	F: August 30
ws05: doc : pdf	M: September 02
ws05: doc : pdf	W: September 04
ws06: doc : pdf : UQ2	F: September 06
ws07: doc : pdf	M: September 09
Untest #1: pdf	**W: September 11**
Test #1 (covers ws01-ws07)	**F: September 13**

ws08 : doc : pdf	M: September 16
ws09: doc : pdf	W: September 18
ws10: doc : pdf : UQ3	F: September 20
ws11: doc : pdf	M: September 23
ws12: doc : pdf	W: September 25
ws13: doc : pdf : UQ4	F: September 27
ws14: doc : pdf	M: September 30
ws15: doc : pdf	W: October 02
ws16: doc : pdf	F: October 04
Untest #2: pdf	**M: October 08**
Test #2: (covers ws08-ws16)	**W: October 09**
Fall Break	**October 10-October 13**
ws17: doc : pdf	M: October 14
ws18: doc : pdf	W: October 16
ws19: doc : pdf : UQ5	F: October 18
ws20: doc : pdf	M: October 21
ws21: doc : pdf	W: October 23
ws22: doc : pdf : UQ6	F: October 25
ws23: doc : pdf	M: October 28
ws24: doc : pdf	W: October 30
ws25: doc : pdf	F: November 01
	M: November 04
Untest #3: pdf	**W: November 06**
Test #3 (covers ws17-ws25)	**F: November 08**
ws27: doc : pdf	M: November 11
ws28: doc : pdf	W: November 13
ws29: doc : pdf : UQ7	F: November 15
ws30: doc : pdf	M: November 18
ws30 (continued)	W: November 20
Untest #4: pdf	**F: November 22**
Test #4 (covers ws26 - ws30)	**M: November 25**
Thanksgiving Holiday	**November 27 - December 01**
*ws26: doc : pdf	M: December 02
*ws31: doc : pdf	W: December 04
Course Review	**F: December 07**
Final Exams	December 09 - December 13