Lyon College Course Syllabus

Course Number and Section: PHY382.01
Course Title: Selected Topics: Electricity and Magnetism
Course Meeting Days/Times: MW10-10:50: T11-11:50 Semester/Year: SP2016

Professor's Information

Name: Stuart Hutton
Office Location: Derby248 Office Hours: MW11-11:50 F10-10:50
E-mail Address: stuart.hutton@lyon.edu Phone Number: 307-7560

Standard Policies

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

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 Students who are administratively withdrawn from more than one course will be placed on probation or suspended.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
Students seeking reasonable accommodations based on documented learning disabilities must contact the Dean of the Faculty at (870) 307-7332.

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 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.

Withdrawal Deadlines

Last day to drop with no record of the course is 26 January 2016.

Last day to drop with a W is 21 March 2016

Tentative Syllabus for Physics 382: Spring 2016
Topic: Electricity and Magnetism
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://nmr.lyon.edu/~shutton

During tests: All networked devices are to be switched off and no communication between students is to occur.

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.

Tests (3 tests)=90%
Each test is worth 30% of your grade
Homework / in-class problems/class participation=10%

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.

Notice that the schedule specifies due dates and times for the three tests. You are expected to provide me with your tests by the time specified. **Late tests will automatically have a significant amount (at least 10%) deducted from the total score ... hand in your tests on time. When you prepare your test answers, neatness and readability is important. Please take the time to make sure that your problem answers are worthy presentations of yourself.**

Course Description

This course treats non-quantum Electricity and Magnetism. It introduces foundations, principles and basic approaches of classical Electricity and Magnetism to enable a deeper understanding of nature. Refer to Primary Learning Outcomes for a more complete presentation of topics.

.Course Objectives

As a consequence of this course, you will be able to apply the postulates of Electricity and Magnetism to important problems. In addition, you should come away from this course with an ability to solve fundamental and advanced problems involving Electricity and Magnetism.

Course Prerequisites

You are expected to be proficient with algebra, trigonometry, calculus and elementary differential operations. Prerequisite: MTH 220, and either PHY 220 or PHY 250 or permission of instructor.

Text

The textbook in this course is:

Introduction to Electrodynamics

Third Edition

By David J. Griffiths

ISBN:0-13-805326-x

You have many resources on the campus: the library, your colleagues and your instructor. Your prime learning resource, however, must be considered to be the classroom so class attendance is expected**. Excessive absences will negatively impact your final grade**. 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. 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. **Again: 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. Use of a networked device to communicate (aside from downloading class materials) during class will be considered equivalent to an unexcused absence. Tardiness is considered to be an unexcused absence and will negatively impact your final grade; in general you do not have permission to enter the classroom after class has started.

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. All questions during tests should be directed to the professor only and students are not permitted to communicate with each other (regarding course content) during tests. CELL PHONES AND ANY OTHER WIRELESS OR NETWORKED DEVICES (INCLUDING COMPUTERS, WATCHES, RINGS, etc.) MAY NOT BE USED DURING TESTS; they must be switched off and placed away. If you do use such devices during a test, it will automatically be considered to be a violation of the Lyon College Honor Code.

Tentative Schedule for Physics 382: Spring 2016
Topic: Electricity and Magnetism
Actual coverage may be less than that indicated.

Week of:	Text Reading / Coverage	Events of importance
Jan 11, 2015	Chapter 1	**Course Introduction**
Jan 18, 2015	Chapter 1	
Jan 25, 2015	Chapter 1-2	
	Chapter 2	
Feb 1, 2015	Chapter 2 – 3	
Feb 8, 2015	Chapter 3	**Test 01:Due Monday Feb 8**
Feb 22, 2015	Chapter 3 – 4	
Feb 29, 2015	Chapter 4	
Mar 14, 2015	Chapter 5	
Mar 17, 2015	Chapter 5-6	
Mar 21, 2015	Chapter 6	**Test 02: Due Monday March 21**
Mar 28, 2015	Chapter 7 – Impedance	
Apr 4, 2015		
Apr 11, 2015	Chapter 7- Chapter 8	
Apr 18, 2015	Chapter 8-Chapter 9	
Apr 25, 2015		
Apr 28, 2015	Last day of classes	Test 03: Due Friday April 29

CLASS SCHEDULE / OFFICE HOURS Spring 2016

Office		General Lab		Research Lab
Derby 248		Derby 148		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 phy382.01 Derby 015		10:10-10:50 phy382.01 Derby 015		10:10-10:50 Office Hours Derby 248
11:00-11:50 Office Hours Derby 248	11:00 - 11:50 phy382.01 Derby 015	11:00-11:50 Office Hours Derby 248	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 PHY251.01 Fund Physics II Lab Derby 148	1:00-3:50 PHY251.02 Fund Physics II 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

Physics Problem Solving Rubric Rev SP2016

	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:

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

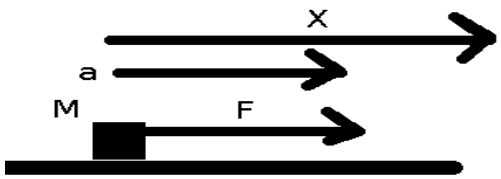
The test score is then determined by

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

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 Phy382 Spring 2016

Student Learning Outcomes for the Physics Program at Lyon College

Note that Phy382 is Selected Topics; it is always taught with Electricity and Magnetism as the topic.

1. Students who complete Selected Topics (as E&M) (Phy382) are able to quantitatively apply:

1a. differential and integral calculus to problems involving the physics of electrostatics.

1b. differential and integral calculus to problems involving the physics of magnetostatics.

1c. differential and integral calculus to problems involving the physics of electric and (**time permitting**) magnetic materials.

1d. [**Time permitting**] differential and integral calculus to the physics of boundary value problems including waveguides and TEM waves. As an alternative [again time permitting], the physics of transformation of Electric and Magnetic fields to moving frames including that of a moving point charge. As an additional alternative [again, time permitting], the physics of the interaction of TEM waves at dielectric interfaces.

The quantitative aspects (1a,1b,1c, [1d]) can be measured of portions of currently-used standard exams and exam problems graded according to the problem solving rubric. For each exam, data will be recorded for 1 problem.