

**PHYSICS 2415 - INTRODUCTORY PHYSICS FOR ENGINEERS II – Sections 001 and 003  
ELECTRICITY, MAGNETISM, WAVES AND LIGHT**

Course Information for Fall 2015

**Instructor and TA Information:**

**Instructor:** Bob Jones

OFFICE: Physics 167; PHONE: 924-3088; EMAIL: [bjones@virginia.edu](mailto:bjones@virginia.edu)

OFFICE HOURS: M 4-6 PM (My Office); W 4-6 PM (Dell 1 Room 103); Th 4-6 PM (Dell 1 Room 105);  
F 2-3 PM (Dell 1 Room 105); By Appointment; Other Times You Find Me in My Office

**Teaching Assistants:** Steven Boi (sb8es), Dave Keder (dak5nb), Matthew Roberts (mjr6mc), Aaron Wegner (amw3uv)

OFFICE HOUR LOCATION: Chemistry 305 (Sunday); Physics 220 (M, W, Th, F)

OFFICE HOURS: S 3-4 PM; M 8-10 PM; W 6-9 PM; Th 5-6 PM and 7-9 PM; F 2:30-3:30 PM

**Course Materials:**

**Text:** Giancoli, Physics for Scientists and Engineers, 4th Edition, Vols. 1 and 2

Similar text books by Serway and Jewett; Young and Freedman; Tipler and Mosca; Fishbane, Gasiorowicz, and Thornton; and Knight will be held at the Reserve Desk at the Science and Engineering Library in Clark Hall.

**MasteringPhysics Web-Based Learning Interface (online homework):**

*Note: If you purchased a MasteringPhysics subscription for PHYS 1425 in Spring 2015, that subscription should still be valid for PHYS 2415 in Fall 2015*

Alternatively, purchase access code directly from MP registration site or packaged with new textbook

Register online: <http://www.masteringphysics.com/site/register/new-students.html>

**iClicker2 (in-class polling):**

You must register your iClicker remote on *both* the iClicker Web page *and* on the PHYS 2415 Section 001/003 Collab Course Site. For the latter, use the “i<clicker” tab on the Collab Site.

iClicker Website Registration (use official UVa Email ID as Student ID):

<http://www1.iclicker.com/register-your-remote/register-clicker/>

Register iClicker on PHYS2415 Section 001/003 Collab Website:

<https://collab.ite.virginia.edu/portal/site/5c1a7700-9f14-4a4c-892e-46fce161b4cd/page/db542c22-6c0a-4a29-ace9-87639743a2fc>

**Course Information:**

**Lectures:** Physics 203, MWF 9:00-9:50 AM (Section 001) or 11:00-11:50 AM (Section 003)

**Pre-Requisites:** PHYS 1425 and APMA 1110 OR MATH 1320

**Course Structure:** 1) 3 lecture hours per week

2) In-class polling/quizzes with iClicker (Class Participation)

3) Textbook Reading and/or Video Tutorial viewing prior to each lecture

4) MasteringPhysics Homework Exercises assigned twice weekly

5) Written Homework Problems assigned weekly

6) 3 Midterm Exams

7) Final Exam

**Course Sections:**

There are three lecture sections for PHYS 2415. Students in all three sections will be given equivalent Final Exams as well as identical MasteringPhysics Exercises, Written Homework Assignments, and Midterm Exams. Grading of assignments/exams will be performed identically for all students in all sections. Class Participation exercises and scoring may differ slightly between sections.

**Grading:** Final course grades will be determined by student performance using the following formula:

**Final Grade = 5% Class Participation + 20% MP Exercises+ 15% Written Homework + 30% Midterm Exams + 30% Final Exam**

## Description of Course Components:

### **Class Participation:**

In-class polling (through iClickers) will aid student self-assessment of their understanding of relevant material and, hopefully will stimulate additional questions for in-class discussions. Students will receive credit (3 points) for participating in each poll. Students will receive additional credit (1 point) for providing the correct answer to each poll questions. Clicker polls will be conducted during most lectures, beginning on the second lecture. "Clicking" for another student is considered an honor offense. *You must attend the lecture section for which you are registered to participate in polls and receive iClicker credit.*

### **Homework:**

**Reading:** Read text sections noted in the syllabus *prior* to and *following* each lecture.

**Viewing:** View video tutorials posted on Collab that are assigned or suggested. Security settings in some browsers are known to block the video content from Collab. Techniques for allowing the content in different browsers are described in an Announcement on the course Collab site and under the Resources tab.

**MasteringPhysics Exercises:** MasteringPhysics is a Web-based learning and tutorial interface developed by physics teachers. It has an excellent record for improving student problem solving skills. Unlike written homework, the interface gives instant feedback on the correctness of a solution. It also gives students an opportunity to ask for hints and to resubmit solutions. You are encouraged to work on MP assignments with your classmates. However, *submission of solutions by groups or direct copying of solutions from other individuals is not acceptable and is in violation of the student honor code.* Typically, MP Exercises will be assigned on Friday and Monday, due on Monday night and Wednesday night, respectively. Late submissions will be accepted with an automatic score reduction of *2% per hour* on that assignment.

**Written Homework Problems:** Typically, three problems will be assigned for homework on Friday and solutions to these problems will be due, via electronic submission of pdf files on Collab, at 5 PM on the following Friday. Late written homework submissions will be accepted, *but will incur an automatic score reduction of 4% per hour*, unless you have made arrangements with the instructor in advance. Homework solutions will be posted on the class Web page. You are encouraged to work on homework assignments with your classmates. However, *submission of solutions by groups or direct copying of solutions from other individuals is not acceptable and is in violation of the student honor code.* To receive maximum credit on any HW problem, the grader must be able to **read** the pdf file and **follow** your work toward obtaining the correct solution.

Each student is responsible for submitting her/his own homework solutions. *Each problem must be submitted through the Collab interface as a separate pdf file.* Several techniques for converting your written solutions from paper to PDF are described in an Announcement on the course Collab site and under the Resources tab.

**Midterm Exams:** Three midterm examinations are scheduled on Wednesday evenings at 8:00 PM (see attached syllabus). *If you have a conflict during any of the scheduled exams please notify the instructor during the first week of class.* Exams will be closed book and problem oriented. Each student will be allowed to bring a single 3"x5" formula reference card to exams for their personal use. Students may not share a note card. If you miss an exam without a valid excuse, you will receive a score of zero. Valid excuses include university-sponsored travel, serious illness, personal crises, and other emergencies. Except in the case of emergencies, you must contact your instructor prior to the exam to approve your absence. Supporting documentation from your doctor or dean may be required. At the instructor's discretion, you will either be given a make-up exam or exempted from the exam (with the latter leading to a higher weighting of your other exam scores in determining your final grade).

**Final Exam:** The final exam will be closed book and comprehensive of the course. Students will be allowed to bring four 3"x5" formula reference cards to the final exam for their personal use. The final exam will be given at the scheduled time for each section. *Students must take the final exam at the time scheduled for their section.*

## Syllabus for Fall 2015

*(small adjustments to this plan may be made as the course progresses)*

<u>Lecture</u>	<u>DATE</u>	<u>TOPIC</u>	<u>TEXT SECTIONS</u>
<b>Topic 1: Electric Charges, Forces and Fields</b>			
1	W 8/26	Welcome to PHYS 2415; Electric Charge	21.1-21.4
2	F 8/28	Electric Force and Electric Field: Coulomb's Law	21.5, 21.6, 21.10
3	M 8/31	Computing Electric Fields and Charge of Extended Objects	21.7
4	W 9/2	Electric Fields and Field Lines	21.8
5	F 9/4	Electric Dipoles and Electric Fields In and Near Conductors	21.9, 21.11
6	M 9/7	Electric Flux and Gauss' Law	22.1-22.2
7	W 9/9	Applications of Gauss' Law	22.3
<b>Topic 2: Electric Energy</b>			
8	F 9/11	Electric Potential Energy and Electric Potential ("Voltage")	23.1-23.3, 23.7
9	M 9/14	Calculating Electric Potential and Potential Energy	23.4-23.8
10	W 9/16	Storing Charge: Capacitance and Capacitors	24.1-24.3
11	F 9/18	Energy Storage in Capacitors; Dielectrics	24.4-24.6
<b>Topic 3: Electric Circuits</b>			
12	M 9/21	Batteries, Electric Current, Resistance and Resistors	25.1-25.4, 25.8
13	W 9/23	Electric Power: Direct vs. Alternating Current	25.5-25.7
<b>**EXAM 1 W 9/23 (Evening-8:00 PM) Covering Lectures 1-11**</b>			
14	F 9/25	DC Circuits: EMF, Resistor Combinations	26.1-26.2
15	M 9/28	Kirchoff's Rules, EMF Combinations	26.3-26.4
16	W 9/30	RC Circuits	26.5
17	F 10/2	Electric Hazards; Voltage and Current Measurement	26.6-26.7
<b>Topic 4: Magnetic Forces and Fields</b>			
<b>M 10/5 Reading Holiday (Fall Break)</b>			
18	W 10/7	Magnetic Fields and Magnetic Forces on Currents	27.1-27.3
19	F 10/9	Magnetic Forces on Moving Charges	27.4
20	M 10/12	Magnetic Dipoles: Motors, Speakers, and Galvanometers	27.5, 27.6
21	W 10/14	Magnetic Fields from Arbitrary Currents: Biot-Savart Law	28.1-28.2, 28.6
22	F 10/16	Ampere's Law; Magnetic Materials	28.4, 28.5, 28.7, 28.9
<b>Topic 5: Time-Dependent Fields and Flux</b>			
23	M 10/19	Forces on Moving Conductors, Induced EMF, Faraday's Law	29.1-29.3
24	W 10/21	Eddy Currents, Magnetic Drag, Electric Power Generation	29.4-29.5, 29.8
<b>**EXAM 2 W 10/21 (Evening-8:00 PM) Covering Lectures 12-22**</b>			
25	F 10/23	Transformers; Electric Field from Changing Magnetic Flux	29.6, 29.7
26	M 10/26	Resisting Change: Inductance; Magnetic Energy	30.1-30.3
27	W 10/28	AC Circuits: LR and LC Circuits	30.4, 30.5
28	F 10/30	Driven AC Circuits	30.6-30.7
29	M 11/2	Driven AC Circuits: Power and Resonance	30.8-30.9
<b>Topic 6: Waves and Light</b>			
30	W 11/4	Traveling Waves	15.1-15.5
31	F 11/6	Superposition of Waves; Waves at Interfaces; Standing Waves	15.6-15.9
32	M 11/9	Displacement Current, Maxwell's Equations, and EM Waves	31.1-31.5
33	W 11/11	EM Wave Speed, Energy, and Polarization	31.6, 31.8, 35.11
<b>Topic 7: Optics and Interference</b>			
34	F 11/13	Reflection of Light; Image Formation with Mirrors	32.1-32.3
35	M 11/16	Refraction of Light Waves; Dispersion; Total Reflection	32.4-32.7
36	W 11/18	Thin Lenses; Ray Tracing	33.1-33.4
<b>**EXAM 3 W 11/18 (Evening-8:00 PM) Covering Lectures 23-33**</b>			
37	F 11/20	Optical Instruments	33.5-33.9
38	M 11/23	Two-Path Interference of Waves	34.1-34.4
<b>W 11/25 – F 11/27 Thanksgiving Holiday!!</b>			
39	M 11/30	Thin Film Interference	34.5
40	W 12/2	Diffraction	35.1-35.5
41	F 12/4	The Doppler Effect and "Beats"	16.6-16.7
42	M 12/7	Catch-up; Summary	
<b>**FINAL EXAM Tues. 12/15 2:00-5:00 pm (Section 001 only at this time!) **</b>			
<b>**FINAL EXAM Fri. 12/11 9:00 am-12:00 noon (Section 003 only at this time!) **</b>			

Other Important Dates: 9/8 (Last Day to Add)

9/9 (Last Day to Drop)

10/20 (Last Day to Withdraw)