Augusta University, PHYS 2212 – Principles of Physics II

Fall 2016

Course Overview and Objectives

Physics 2212 is a calculus based study of electricity, magnetism, and light. The objective of the course is to introduce the physical ideas and concepts which will enable you to understand the basic concepts of electromagnetism. In the first part of the course we will begin with a study of electric charge, electric force, and electrical energy. We will then study electric current and resistance in an electrical circuit. In the second part of the course we will study magnetism, magnetic field, and electromagnetic induction. Finally, I will discuss the concepts of wave and ray optics. You will also learn how to use Visual Python to simulate, compute, and analyze concepts in electromagnetism. *Prerequisite(s): PHYS 2211(C or better)*.

2. Course Instructor

Lecturer & Lab Instructor

Trinanjan Datta

Office: Science Hall, C3018 (in the Atrium), Phone: 706-667-4516, *Email*: tdatta@augusta.edu

Lecture hours and Room: Monday, Wednesday, and Friday. 9:00 – 9:50 AM, Room Science Hall W1002

Visual Python Lab: Tues., Allgood Hall

8:30 – 9:20 am (Section A), AH E365, 10:00 – 10:50 am (Section B), AH N132

Laboratory Session Hours and Room: Tues, Science Hall W3015

1:00 – 2:45 pm (Section A), 3:30 – 5:15 pm (Section B)

Office hours: Monday 2:30 – 5:00 PM or as arranged. Please do not leave any messages in my office phone voicemail. Email is the best way to get in touch with me.

Visual Python Office hours: Wednesday 1:00 – 2:00 PM.

3. Required Materials

Textbook - "Physics for scientists and engineers: a strategic approach", Randall Knight, 3rd edition (Pearson-Addison Wesley) and the accompanying student workbook. **Please bring your textbook and the accompanying student workbook for each and every lecture**. Mastering physics is not required.

Calculator – A scientific calculator capable of performing mathematical functions (addition, subtraction, division, multiplication, square root, sine, cosine, tangent, etc).

Lab handout/instruction – Details to be provided during the laboratory session.

Visual Python: Python and Visual Python will be available in computer labs - Science Hall (E1056) and Allgood Hall N132, N344, and E365. However, I strongly recommend downloading the software to your home PC/ laptop so that you may be able to work on your projects from home. The software can be downloaded (for free) from any of the sources below:

***** NOTE**: If you are unsure on how to install, come by during the Visual Python office hours. I can help. Note, the internet connection at school is really slow to download the installer. So, please download the installer (whether using Windows or Mac) ahead of time before visiting me during the office hours. ***

For Windows users

Download Python-XY from the following link: https://python-xy.github.io/

Follow the on screen prompts. During the installation process make sure to choose the VPython install option as follows:

a. Click on the installer.
b. Choose "anyone using this computer option", Click next.
c. Expand the root which is named Python (not the one which has a version # with it).
d. In this root you can choose the VPython version and click next.
e. The installer will complete the installation. Upon completion click next and then finish.

For MAC users

Python-XY is not available for MAC users. There is an Anaconda distribution of python (http://continuum.io/) available at
https://docs.continuum.io/anaconda/install.html#anaconda-for-os-x-graphical-install

Follow the instructions on the webpage to install. Once the package is installed you will need to install Visual Python separately in Anaconda using the command below at the python shell prompt:

>> conda install -c https://conda.binstar.org/mwcraig vpython

To open a python shell prompt you will have to open Anaconda first.

4. Syllabus

The plan is to cover twelve chapters from Randall Knight's, Physics for scientists and engineer's textbook spread out over forty-six lectures. For your convenience, attached with this course handout is the *tentative* schedule for the lectures. The schedule is not binding and subject to changes during the semester. The syllabus for the course is:

1. Chapter 22: Wave optics
2. Chapter 23: Ray optics
3. Chapter 24: Optical instruments
4. Chapter 25: Electric charges and forces
5. Chapter 26: The electric field
6. Chapter 27: Gauss's law
7. Chapter 28: The electric potential
8. Chapter 29: Potential and field
9. Chapter 30: Current and Resistance
10. Chapter 31: Fundamentals of circuits
11. Chapter 32: The magnetic field
12. Chapter 33: Electromagnetic induction

5. Course Components

This is a 4 credit-hour class.

A. Lecture – We will meet three days a week for an hour on Monday, Wednesday, and Friday from 9:00 – 9:50 am in Science Hall, Room W1002. During the lecture I will introduce new ideas and concepts. The emphasis will be to explain the basic concepts and ideas with the help of examples,

workbook problems, and questions that I will ask you during the class. Also at the beginning of every week I will hand out a weekly schedule which will include the list of reading assignments for that week, the homework problems, and the important announcements.

B. Reading Assignments – The weekly handout will have in it listed a set of reading assignments.

C. Homework – Several homework problems will be assigned every week from your textbook. I will not collect these homework problems and grade them for you. However, I ***strongly recommend*** that you try them. If you have difficulties solving the homework problems please consult with me during office hours and I will be glad to help you.

D. Quizzes – During the course I will give several quizzes (nine in total) which will be graded and returned to you. Each quiz will be ten minutes in duration and will carry 12.5 points. *Out of these nine quizzes I will drop the lowest quiz score.* In total the quizzes will be worth 8x12.5 = 100 grade points (14.3% of the total course points).

E. Review questions – The review question will be handed out during class. You will have a week to complete the assignment. Late submissions will NOT be accepted. There will be in total nine review questions. *Out of these nine review questions I will drop the lowest score*. The review question will be worth a total of 8x12.5 = 100 grade points (14.3% of the total course points). The review questions will be graded.

F. Exams - There will be three exams in total - **Exam 1**, **Exam 2**, and a **Final exam**. Each exam will be worth 100 grade points (each 14.3% of the total course points). The final exam will count as two exams. So you will have four exam grades - **Exam 1**, **Exam 2**, **Final Exam**, and **Final Exam**. Your exam average will be the average of the best three of these grades. The venue, date, and time for the examinations are tabulated below:

Exam	Venue, Date, Time	Points	% of Total Course points
Exam 1	During Class, 09/09	100	14.3
Exam 2	During Class, 10/17	100	14.3
Final	12/14/2016 8:00 AM – 10:00 AM W1002	100	14.3

You are required to bring a pencil, calculator, and your AU student ID card to all the exams. If you do not have your ID card, your exam may not be accepted.

G. Laboratory session – We will meet every week Tuesday in Science Hall, Room W3015 for laboratory sessions (check Section 2 of the syllabus for lab schedule). There will be ten labs in total. Each lab will be worth 8 grade points. The total points for the laboratory session will be 8x10=80 grade points. Lab reports are expected (due dates for the lab report submission will be announced in the weekly schedule). I will hand out materials to guide you on how to write a lab report. In addition there will be a *lab exam* worth 20 pts (Nov 29). So the total lab points will be 80 + 20 = 100 pts (14.3% of the total course points).

H. Visual Python Labs – We will meet every week Tuesday in Allgood Hall, Room for the Visual Python labs (check Section 2 of the syllabus for lab schedule). These computational physics based labs are meant to provide you with an exposure to scientific simulation and its ability to predict motion (*for e.g.: http://en.wikipedia.org/wiki/Curiosity_rover , landing simulation of Curiosity rover on planet Mars, http://www.youtube.com/watch?v=h2I8AoB1xqU*). Our goal will be to utilize Visual Python's capability to visualize and simulate motion in the presence of electric and

magnetic fields. There will be ten labs in total. Each VPython lab will be worth 5 points (for attendance and lab activity). There will be seven homework each worth 5 points. I will drop the lowest two homework scores. Submission and completion of each homework set is **mandatory**. No show homework submissions will not be considered as part of the lowest score drops. There will also be an exam worth 25 points (Dec 6, during VP lab). The total points for the VPython lab and exam will be worth 10x5 + 5x5 + 25 = 100 grade points (14.3 % of the total course points).

I. Materials Research Seminar Series (15 pts bonus) – *Fall 2016 Materials Science Research Seminar Series* will host invited talks from researchers and scientists across the nation to inform Augusta University faculty and students on the latest developments in condensed matter physics and materials science from cross-cutting areas related to physics, chemistry, and biomaterials. **You can earn 15 points in bonus credit by:**

i. Attending all three of these seminars (*Note*: In order to receive full credit you will have to attend all three of these lectures. There will be no partial credit for attending one/two/three talks).

ii. Answer a few questions related to the seminar talk in the review question assignment.

6. Grades

Your overall letter grade for the course will be determined on the basis of 700 points distributed as below

Course Components	Points	% of Total Course points
Quiz (Total)	100	14.3
Review Questions (Total)	100	14.3
Visual Python (Total)	100	14.3
Exam 1	100	14.3
Exam 2	100	14.3
Final	100	14.3
Laboratory	100	14.3
Total Course Points	700	100

A fixed grading scale will be used. This class isn't curved, and thus you are not competing with each other. I do not wish to give a certain percentage of D's, a certain percentage of C's, etc. I sincerely hope everybody does well! The cutoffs are as follows

A ≥ 90 % B ≥ 80 % C ≥ 70 % D ≥ 60 % F < 60 %

7. Absences, course withdrawal, desired course etiquettes and expectations

A. Absences - Missing class will result in receiving a zero grade on any corresponding activities (quiz, lab, exams, midterm etc.) unless the absence is excused. An absence is excused if there is a documented circumstance preventing you from attending class. Examples include personal injury or illness, severe family emergency, personal crisis, or required attendance at official school activities (athletic activity, band concert, etc.). Students who repeatedly miss class will be withdrawn from the course by the instructor after midterm. This will result in a grade of WF. It is the responsibility of the student to withdraw before midterm (October 12, 2016) to avoid this grade.

B. Course Etiquettes – First of all please be on time. Late comers to class are a distraction to both the lecturer and to the students who are trying to learn. Please do not disturb others during class. The list includes (and is not exhaustive) **TALKING DURING CLASS**, ringing cell phones (turn them off before you enter), whining or huffing in class. Please be courteous of other students in class. **ANY STUDENT MISBEHAVING IN CLASS OR DISTRACTING THE LECTURE WILL BE EXPELLED FROM THE COURSE IMMEDIATELY.**

C. Expectations – The most important criteria is to work hard (but do not stress yourself!). If you try to enjoy the course you will see your performance and your grades will automatically improve. Set aside some time every day for solving physics problems. Try to solve the examples in the book and try to connect them with the concepts you learned in class. The student workbook problems and the assigned homework problems are something that you should definitely try. Take advantage of the tutor center.

8. Academic Honesty

Any effort to represent somebody else's work as your own, or allowing your work to be represented as somebody else's, is *cheating*. If a student is found cheating or involved in conduct that is deemed unethical/inappropriate/dishonest by AU standards, he or she will receive an F for the course.

9. Additional Course Resources

PHYS 2212 D2L – Here you will find the course syllabus, handouts, weekly schedule handouts (which includes the reading and homework assignments), review questions, lecture notes, visual python labs, laboratory handouts and other materials as I find appropriate.

Office Hours/Physics help/ Physics Tutor Center

My *office hours* will be on Monday 2:30 – 5:00 PM or as arranged. My *Visual Python office hours* will be on Wednesday 1:00 – 2:00 PM.

I strongly recommend that you form study groups and get to know other people in the class. Working in groups is a great way to learn. The physics tutor center has friendly and knowledgeable tutors who will be glad to assist you with physics questions and problems. The physics tutor center is located in the third floor of the Science Hall in the atrium. *Take advantage of the tutor center!*

GOOD LUCK AND ENJOY!