

## Physics 276 Syllabus - Spring 2015

### Professor Steven Anlage

#### Official Course Description:

**PHYS276** (*Perm Req*) **Experimental Physics II: Electricity and Magnetism; (2 credits)** Grade Method: REG/P-F/AUD. *Prerequisite: PHYS272 and PHYS275.* Third course in the three semester introductory sequence. Methods and rationale of experimental physics. Experiments chosen from the fields of electricity and magnetism including electrostatics, magnetostatics, magnetic induction, AC circuits.

#### What the course is about:

Physics 276 is the third course in the introductory Physics lab sequence PHYS 174-275-276. The course is intended for physics majors and also for science and engineering students who desire a more rigorous introduction to experimental science. We concentrate on experimental methods and tools related to circuits. Topics include inductance, capacitance, AC circuits, diodes, transistors, and amplifiers. A major component of the course is to understand the theory and applications of error analysis. The Lab meets for four hours each week in **Room 3120** of the Toll Physics Building (NOT the Physical Sciences Complex). Roughly three hours of this time will be spent working on the lab and one hour in discussion during the lab.

**Prerequisites:** The prerequisites for the course are Physics 272 and Physics 275.

#### Lab sections:

Lab section	Day	Time	Instructors	Teaching Assistant	Lab Room
0101	Monday	1-4:50 PM	S. Eno	Rui Zhang	PHY 3120
0201	Tuesday	1-4:50 PM	S. Eno	Rui Zhang	PHY 3120
<b>0401</b>	Wednesday	2-5:50 PM	S. Anlage	Rui Zhang	PHY 3120
<b>0301</b>	Thursday	2-5:50 PM	S. Anlage	Iakov Boyko	PHY 3120

#### Instructors:

**Prof. Steven Anlage**  
 e-mail: anlage [at] umd.edu  
 Office: Room 1363 Physics Building  
 Phone: 301-405-7321

**Prof. Sarah Eno**  
 e-mail: eno [at] umd.edu  
 Office: Room PSC 3109  
 Phone: 301-405-7179

Prof. Eno and I will occasionally substitute for one another. You must be on time for class. If you are late, you will not be allowed to start the lab, but instead must do the lab during the make-up week.

**Please note that you cannot pass the class unless you complete all labs.**

#### Teaching Assistants

Rui Zhang  
 Iakov Boyko

#### e-mail:

ryez [at] umd.edu  
 iboyko [at] umd.edu

#### office:

3101 John S. Toll Physics Building, x5-6191  
 2231 Computer & Space Sciences Bldg., x5-1300

**Office Hours:** You can try stopping by my office at any time, but if you can't find me, make an appointment by e-mail. Check my schedule posted on the 'open' class web site.

**Required Texts:**

(1) Lab descriptions and lectures will be available on the ELMS and 'open' class web sites.

**Optional Texts:**

- (1) "*Introduction to Error Analysis*" by John R. Taylor.
- (2) "*Data Reduction and Error Analysis for the Physical Sciences*", by P. R. Bevington and D. K. Robinson.
- (3) "*A Practical Guide to Data Analysis for Physical Science Students*," Louis Lyons, Cambridge University Press

In addition, you should have purchased a general introductory physics textbook for your PHYS272 class. For example:

- *Physics for Scientists and Engineers*, by D. Giancoli, 4th Edition, Vol. 2, Pearson.
- You will need to refer to this or a similar textbook occasionally.

**Other Material:**

You will be provided with a radio on the first day of the semester. We do not have extras of most of the components, so please be careful not to break or lose them. You will be provided with a storage bin for your components and works in progress. Later in the semester we will have versions of the radio that will work with your low impedance iPod earbuds. You may elect to bring earbuds to class.

**Web Sites:**

Submission of work to be graded will be via ELMS.

ELMS: <http://www.elms.umd.edu/>

"Open" web site: <http://www.physics.umd.edu/courses/Phys276/AnlageSpring15/>

**Course policies:**

Students are required to do all of the assigned experiments. If you are not able to attend a scheduled lab section, make an arrangement in advance by writing to the instructor to see if there is a possibility to get permission to attend another lab session in the same week. Only those with a valid written excuse for missing a lab will be considered. Students are responsible for notifying the instructor within the first two weeks of the semester about projected absences due to religious observances during the semester. If a missed lab cannot be made up in the same week, it must be made up during the make-up week at the end of the semester. Late arrival or the making of phone calls during the lab is not allowed. Also you are not permitted to listen to ipods or any other electronic audio during the lab hours.

**Arriving late to class:** Classes at Maryland begin right on the hour. It is important that you arrive on time so that you can get instructions for the lab and have time to finish. If you arrive more than 10 minutes late, you may not be allowed into the lab and will have to make it up during another section.

**Course requirements:**

Experiments: You will work with a partner. Your partner will be assigned, and will change each week. Students are required to submit a spreadsheet record of all that was done in the lab. Experimental science requires careful, well-documented, accurate data. Your spreadsheet will serve as a poor-man's log book. You need to treat it as such. You must include all information you might possibly need if somebody has a question about your result, or wants to reproduce it, a year from now. This includes:

- Date
- Names of people working with you
- Drawings and pictures of apparatus (use your cell phone camera)

- All numbers must have neat accompanying text describing the number
- Your data, including uncertainties (both statistical and systematic)
- Analysis of data with propagation of errors
- Plots and histograms when appropriate, with intelligible labels

You will not get full credit if this information is missing. The spreadsheet must be uploaded before leaving class. You should seek as much advice as you need during the lab. To get a good grade, you should ask many questions of your instructor, TA, and other class mates. (Of course, direct copying of another student's spreadsheet will result in failure of the lab and possible disciplinary action in accordance with the University's academic integrity policy)

The in-class spreadsheets will be graded out of 40 points as follows:

- +5: turn in spreadsheet
- +10: all data taken
- +5: errors assigned to all measured numbers (no partial credit)
- +10: all fits, calculations based on measured numbers, etc. done (partial credit possible)
- +5: all errors on results of fits, calculations, etc. done (partial credit possible)
- +5: spreadsheet is neat and well labeled

Laboratory Report: You and your partner are required to submit a written report of your results for three of the experiments. The class schedule will indicate for which labs this is required. Lab reports should be submitted as a PDF file. The reports should be submitted electronically using the ELMS system (<http://elms.umd.edu/>), and will be due at the start of lab the following week. The lab report will automatically lose 5% of its maximum points per day for each day it is late. A missing lab report will cost one letter grade for the course. Missing a lab entirely and not making it up will result in failure of the course. A detailed rubric, describing the lab report requirements and how they will be graded will be linked to elms and provided in the first class.

Pre-lab Homework: Each week, you will be given a homework assignment designed to prepare you for the next lab. The homework will consist of questions or problems related to the upcoming lab and/or a short writing assignment regarding the lab. This is to be submitted online via elms and is due at least 1/2 hour prior to class.

Final exam: The final exam will be based on material covered during the semester. Students are expected to take data following appropriate experimental procedures and explain the underlying physics. Knowledge of the workings of the instruments used in the lab can also be tested. Please note that the use of google or any other external resource during the exam is expressly forbidden. If you have any questions either before or during the exam as to what resources can be used, please raise your hand and ask.

Discussion: Part of a class meeting will be devoted to discussions of the physics and data analysis for the experiments. Participation in these sessions is just as important as the experiments themselves. Attendance is mandatory. However, this is not a lecture course, and the main way that you will learn experimental physics is to by doing and discussing, rather than just listening.

Presentations: Each student will give a 15 minute oral presentation relevant to AM radio and telecommunications. A list of suggested topics will be linked to the class web site. Other topics may

also be chosen with permission of the instructor. The date for the presentations is given in the schedule on the class website.

The presentation should be accompanied by electronic slides in pdf format. Your slides should be uploaded on ELMS no later than 24 hours in advance. Topics are chosen first come, first serve, so pick a topic early for the best selection. Please email Professor Anlage with your top 3 in order of preference. A detailed grading rubric will be linked to the class web site and provided the first day of class.

**Grading:**      40% In-Class Spreadsheet Lab Reports  
                     10% Pre-lab Homework  
                     20% Full Lab Reports  
                     15% Presentation  
                     15% Final Exam

*Missing one Lab (and not making it up) will result in failing the course.* Final grades will be computed based upon the above weightings.

**General Comments:**

- You are expected to arrive in class having thoroughly read the write-up in the lab manual for the week's experiment. This is absolutely necessary for a fruitful lab experience.
- When you are working on your report, feel free to discuss with other students to try to figure out what is going on. However, do not use these discussions as an excuse to copy someone else's report or solution, or let someone else copy yours. That is cheating and is strictly forbidden. Of course, you can always ask one of your instructors.

**In case of Bad weather:** If the University is closed during a scheduled lab, class will be cancelled, and we will most likely reschedule the lab for the following week. Closing is announced over local radio and TV as well as on the [University's homepage](#).

**Academic Integrity:** The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.studenthonorcouncil.umd.edu/whatis.html>.

**Disabilities:**

Students with documented disability should contact the instructor at the beginning of the semester to discuss accommodations.

**Disclaimer:**

The instructor reserves the right to make changes to this syllabus to meet the specific needs of the class during the semester.