Syllabus for PHYS 230 (Section 1)
Modern Physics – Fall 2019

Class Location / Times: Tuesdays and Thursdays, 9:25-10:40 AM, RITA 363

Instructor Information: Dr. Mike Larsen
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Office Location: RITA 317
Larsen Research Lab Location: RITA 392

Office Hours: Mondays 4-5 PM, Wednesdays 10-11 AM, Thursdays 8-9 AM, or by appointment.

Prerequisite: PHYS 112 or HONS 158
Prerequisite or Corequisite: MATH 221 or permission of the instructor

Course Webpage: http://larsenml.people.cofc.edu/phys230_fall19.html
(Please see course page for full description of course, rationale, and supplementary information).

Official Course Description

> An introduction to atomic and nuclear physics. Topics include: relativity, atomic theory, x-rays, wave particle duality, and elements of quantum mechanics.

Attendance Policy
It is expected that you will attend class. I will. You are responsible for any material missed in class, including announcements about homework/test date changes, etc.

Students with Disabilities
The College will make reasonable accommodations for persons with documented disabilities. Students should apply at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying your professor as soon as possible and subsequently contacting your professor again at least one week before any specific accommodation is needed.

Honor Code / Code of Conduct
It is expected that you will adhere to the university's honor code and student code of conduct as can be found in your student handbook: https://tinyurl.com/cofc-handbook.

Textbook and References
The textbook for this course is:
Tipler, P.A. and R.A. Llewellyn (2008). *Modern Physics* (5th Ed.) W.H. Freeman.

I strongly recommend getting this book and reading it carefully. I know that your intro sequence may not have required you to use the text all that often, but one of the key indicators of maturing as a student is taking the time to read the textbooks associated with each course. It is a very powerful tool in learning this content.

We may ultimately end up skipping around a bit, but I plan/hope to get to most of the content in the first part of the text (Chapters 1-8); we may have to sacrifice Chapter 8 in order to cover a couple of topics in Part 2 of the text.

It is highly advisable and strongly recommended to read the text for the upcoming topics in the text before hearing about it in class lecture! [The idea of reading ahead of lecture is based on a sound learning strategy. Research suggests that new complicated ideas seldom make sense the first time you're hearing about them. By reading the text before the class, you'll come to class with the ideas sort of in your head but maybe jumbled up a bit or unclear. Then, through the lecture, you will hear the ideas again and hopefully clarify any confusions you have. Since you're not hearing it for the first time, a lot of the ideas will crystallize into place easier. This also has the added advantage of giving you a chance to formulate questions ahead of time on ideas that are particularly confusing.]

For many of you, this is going to be your first Physics course after the introductory sequence. It is very common once you get to this level to use other texts to help reinforce or explain ideas. On the course web-page and handed out on the first day is a list of other texts that you may very well want to consult from time to time. No text for this class is "required" (e.g. I will supply homework questions to you directly, so you won't necessarily need any text to complete classwork) but I think having several resources to go to could be quite useful, and – as mentioned above – you should read ahead if you can.

Classroom Policies
Please treat your classmates and professor with the respect due to them as fellow adults and human beings. Your professor always reserves the right to dismiss you from the room. Please do not text message, browse the internet, check email, or engage in other non-class-related communications during class.

Cell Phone Policy
Be considerate and turn your phone on vibrate or silent during lectures. Also, all cell phones must be turned off, put away, and remain invisible during all exams. You may be asked to leave your cell phone at the front desk during your midterms and/or final.

Final Exam Time Period:
Thursday, December 5th, 2019. 8-11 AM

Tentative Midterm Test Dates (Subject to Change):
Thursday, September 12th
Thursday, October 3rd
Thursday, October 31st
Thursday, November 21st

Campus Closure Statement
If the College of Charleston closes due to inclement weather, students are responsible for taking course materials with them and continuing to work on assigned homework as posted on the course webpage. In cases of extended periods of institution-wide closure where students have relocated, your professor will post a plan for proceeding with course content on the course webpage and/or communicate through your official CofC email accounts.

Grading

Grading Scale: The formal numerical scale might move around a little bit depending on the class performance, but the final grading scale will be *no more stringent* than:

A	≥91	B+	89	B-	80	C	71-78	D	60 - 69
A-	90	B	81-88	C+	79	C-	70	F	<60

Your course grade will be based on 3 components:

a) Homework and (potentially) Quizzes (25% of course grade). Homework will be assigned most weeks. Homework assignments are to be completed clearly and legibly and turned in on time. Homework solutions typeset using LaTeX (the scientific document preparation system) will earn a modest amount of extra credit. (If you are a Physics major, you will eventually have to learn LaTeX anyway, and here is a chance to practice it and get a little extra credit for using it). Resources to use LaTeX can be found by talking to your professor and/or by visiting http://larsenml.people.cofc.edu/latex.html.

You are encouraged to seek help from your instructor, your classmates, and anyone else who can help you with your homework. However, your answers should not be exact copies of a classmate's work. Cooperation is ok, but everyone should turn in their own solutions! At the end of the semester, I will drop the grade from your lowest homework score.

Quizzes may be announced, they may not be announced. We may have none, we may have 10. (We may also have something between none and 10). The best way to succeed on quizzes is to come to class prepared.

b) Midterm Exams (50% of course grade total, split evenly between 4 exams).

c) Final Exam (25% of course grade).

Note that your worst midterm exam score will be dropped so long as you perform better on your final than your lowest midterm (your final exam score counts for 25% of your course grade AND replaces your lowest midterm score if it is better than your lowest midterm score). Because of this, *no make-up tests will be given for any reason.* If you have a known conflict, approach your instructor *well in advance of the test* to arrange to take the exam *before* it is scheduled. If illness or other unexpected conflict develops, you will merely need to replace the score of "0" from the missed exam with your final exam score. (If you miss two exams, you are very unlikely to pass the class).

Specific Course Objectives
Throughout this course, we endeavor to discuss:

- The foundations and applications of Special Relativity (in particular Dynamics and Energetics)
- The failures of classical physics in the late 19th and early 20th century that lead to the development of Quantum Mechanics
- Basic atomic and quantum physics
- The use of computational software as a problem solving and data analysis tool

Student Learning Outcomes
At the conclusion of the course, the successful student will be able to:

- successfully solve basic canonical problems associated with Special Relativity, basic Atomic and Nuclear Physics, and introductory quantum mechanics.
- apply fundamental concepts in modern physics.
- apply physical principles to novel situations.
- effectively use MATLAB, Mathematica, IDL, Maple, C/C++, FORTRAN, and/or LabVIEW to analyze and manipulate data, solve equations, and/or plot relationships.