# PHYS270
## Electrodynamics, Light, Relativity and Modern Physics
### Spring 2019

**Dr. Matt Severson**
mseverso@umd.edu     (*no "n", not a typo*)
PHY 1330

*Lecture*
MWF 12:00 - 12:50     PHY 1412

*Office hours*
M 2:30 - 3:30, Th 2:00 - 3:00

| Sec | Discussion | TA | email | Office hours |
|-----|-----------|-----|-------|--------------|
| 0201 | M 9:00-9:50 PHY 1402 | Jonathan Kunjummen | jkunjumm@umd.edu | Th 3:15-4:15 PHY 0220 |
| 0202 | W 9-9:50 PHY 1402 | Majid Ekhterachian | ekhterachian.majid @gmail.com | W 1:30-2:30 PSC 3129 |
| 0203 | M 10-10:50 CHM 0119 | Jonathan Kunjummen | ↑ | ↑ |
| 0204 | M 11-11:50 MTH 0303 | Jonathan Kunjummen | ↑ | ↑ |
| 0205 | W 11-11:50 PHY 1204 | Jonathan Kunjummen | ↑ | ↑ |
| 0206 | W 10-10:50 PHY 0405 | Jonathan Kunjummen | ↑ | ↑ |
| 0207 | M 10-10:50 PHY 1219 | Majid Ekhterachian | ↑ | ↑ |
| 0208 | Tu 8-8:50 PHY 1204 | Majid Ekhterachian | ↑ | ↑ |

*NOTE: Details in this syllabus should be taken as tentative. I will notify you when changes are made.*

**Course Description**

The 161-260-270 course sequence gives an introduction to the concepts of classical and modern physics intended for students studying engineering or other similarly mathematical sciences. This third course in the sequence will cover magnetism, electromagnetism, optics, AC circuits, special relativity, and modern physics topics concerning quantum mechanics.

**Prerequisites:** MATH241, PHYS260, and PHYS261 (or equivalent credit)

**Co-requisite:** PHYS271

**Textbook: S&Z's UNIVERSITY PHYSICS**, 14th ed., H. Young and R. Freedman (Pearson, 2016). Electronic version is available. *\*\*\*No Mastering Physics\*\*\**.

## Assignments

**Homework:** I will assign homework roughly every week; the homework will be designed to develop your **ability** to ***set up and*** *solve* problems pertaining to the mathematical physical laws studied in each chapter; required exercises will be completed in **Expert TA** online (see more below). I will also assign some recommended exercises from the book to be worked out on paper; solutions to those will be provided after the fact.

A late assignment may incur a penalty, depending on the extent and circumstances. I will drop your lowest assignment score before computing your average.

**Quizzes:** You will have about 7-8 quizzes, which will take place in the first $\sim$10 minutes of most discussion sections. Quizzes will be closed book, but all formulae will be provided for you. The quiz problems will be largely straightforward and are intended to check your basic competency in topics from recent homework assignments. I will drop your lowest quiz score before computing your average.

**Exams:** You will also have 3 exams, consisting of a couple short-answer questions about basic concepts and several homework-like problems to solve. The third exam will likely be cumulative, despite my preferences, due to Engineering dept regulations.

Tentative exam dates are Mon, **Mar 11\***(*edited*); Mon, **Apr 22**; and Sat, **May 18** (final exam time). Any changes will be announced well in advance.

### Expert TA

You will need to purchase an ***Expert TA*** *account* in order to complete the required portion of the homework exercises through their online system.

The registration fee is inexpensive, and paid most cheaply directly through the system website *TheExpertTA.com* during registration. A code can also be purchased at the bookstore at some additional cost. Details about how to register will be posted on ELMS the week before classes begin.

The financial obligation involved here is an unfortunate aspect of extreme class sizes, but (a) the system is more affordable than corporate alternatives and (b) it provides state of the art (not just saying that) assignment feedback to make up for the cost.

### Discussion

Discussion sessions will consist of the short quizzes mentioned above followed by about 40 minutes of time to work with the TA or your peers on any problem or difficulty you have come across in the homework assignments.

## Grading Scheme

| | |
|---|---|
| Homework | 25% |
| Quizzes | 30% |
| Exams (3) | 45% |

### ELMS Posts and Communicating with Me

I will clearly post all announcements, assignments, due dates, and other important information on the course ELMS page. I will also use ELMS to send course-wide emails when necessary. *It is **your responsibility** to find such information on ELMS.* Please check the page regularly for updates. I will be rather inflexible in dealing with problems that arise due to your failure to know things that have been said on ELMS.

That said, the TA or I will be happy to answer any other questions about course material, trouble with assignments, etc as they arise. Please feel free to send me email at any time for such reasons.

### Attendance, Religious Observances, and University Closures

Your TA and I will be paying attention to who is here, who is participating, who comes to office hours, etc. Playing along in these ways will be beneficial to you in the event of borderline performance in the course. For instance, if you wind up at the cutoff between two letter grades at the end of the semester, the effort you put forth throughout the course may be pivotal in my decision as to where to draw the line.

All that said, if you already know this material well, and you're only taking the course to earn required credit, I will not be offended by your regular absence in the classroom, and you will not be penalized for it, as long as you are present for exams and quizzes, all of your assignments are turned in promptly, and your performance is satisfactory.

***If you need to miss a deadline or an exam*** *for a religious observance or other legitimate reason,* ***please notify me in advance****, and preferably ASAP.* If you miss

an exam due to illness or emergency, *please get in touch ASAP* after the fact. In all cases, a makeup exam will be arranged accordingly.

If the university is closed due to inclement weather or some emergency situation on or near an exam day or other important date, I will contact you on ELMS with further instructions.

## Academic Integrity

Learning to solve problems in physics can be a difficult and tedious process; often students find it beneficial to work with a partner on such problems. This sort of behavior is encouraged, although you should avoid larger groups to discourage stragglers.

That said, it is crucial that all students create and submit *their own* assignments. It will usually be easy to tell your assignments apart, and so also easy to see if you have copied someone else's work. Furthermore, Mastering Physics provides ample information with your submissions to detect use of "alternate methods" of assignment completion. Such behavior will not be tolerated and may result in an XF grade for the course and/or further action taken by the Student Honor Council.

## Students with Disabilities

Accommodations will be provided to enable students with disabilities to participate fully in the course. Please discuss any needs with me at the beginning of the semester, so that appropriate arrangements can be made. Students who are registered with DSS and plan to take exams at their facilities should provide the pertinent authorization forms (electronic format is fine) *at least* one week prior to each exam date.

# PHYS 270
# Tentative Schedule Outline
# Spring 2019

| Wk | Week of | Ch(s) | Content |
|----|---------|-------|---------|
| 1 | Jan 28 | 27,28 | magnetism, magnetic fields |
| 2 | Feb 4 | 27,28 | Ampere's law, magnetic forces |
| 3 | Feb 11 | 28,29 | induction, Lenz's law, Faraday's law |
| 4 | Feb 18 | 29,30 | motional EMF, inductance, RC/RL circuits |
| 5 | Feb 25 | 31 | AC circuits, filters, RLC circuits |
| 6 | Mar 4 | 31,32 | AC Power, transformers, Maxwell's eqns |
| 7 | Mar 11 | 32,33 | electromagnetism, EM waves, polarization<br>**Exam 1 - Mon, Mar 11, Ch 27-31** |
| 8 | Mar 18 | | *No class due to Spring Break holiday* |
| 9 | Mar 25 | 33,34 | light, ray model, reflection, refraction |
| 10 | Apr 1 | 34-36 | lenses, interference, diffraction |
| 11 | Apr 8 | 37 | relativity, simultaneity, time dilation,<br>length contraction, Lorentz transformations |
| 12 | Apr 15 | 37,38 | relativistic $\vec{p}$ and $E$, photon emission/absorption,<br>Photoelectric effect, duality |
| 13 | Apr 22 | 39 | probability, uncertainty principle, Bohr atom, lasers<br>**Exam 2 - Mon, Apr 22, Ch 32-37** |
| 14 | Apr 29 | 39,40 | Schrodinger eqn, wave functions, potential wells |
| 15 | May 6 | 40,41 | tunneling, harmonic oscillator, measurement, 3DQM |
| 16 | May 13 | 41-? | spin, exclusion principle, modern phys topics |
| 17 | May 20 | | **Exam 3 - Sat, May 18, 6:30pm**<br>- location TBA! |