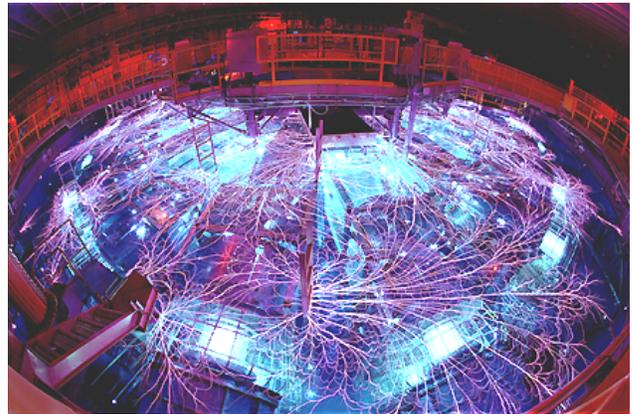


# Advanced Physics Lab: Version 5.0

## 2018 – 2019

Office Hours: Mon, Tues, Thurs  
2:20-3:45 and Wed 6:45-7:30 am



Left: the Parthenon, shown backlit by the sun. I picked this image to represent our foray into classical physics. Above: The Z machine firing an electromagnetic pulse represents more modern topics we will investigate spring semester

**Welcome to the Advanced Physics Lab.** You are a senior who has taken or is currently taking Calculus AB. If you are in Calc AB, will you be at a disadvantage compared to those folks who are in BC? Not necessarily, but you will have to work a bit harder to stay on top of the math. You have also taken the yearlong Honors Physics course at Tesla STEM. The big question is: How much physics do you remember from 3 years ago? Not much? Don't worry, it might come back to you. The challenge will be to develop problem solving ability and track details while still reserving part of our brains to ponder big, cosmic, mind expanding questions. Fortunately, we have the luxury of time with two physics periods.

**I. Advanced Physics C: Mechanics and Electromagnetism:** First and foremost our mission is to deepen your understanding of physics. All our physics content this year can be expressed as a few equations. You won't need to memorize much but you will need to develop advanced problem-solving skills. Physics is a cumulative subject and doesn't lend itself to short term cramming. This class requires thinking and becomes more abstract as we progress. In the fall semester we will focus primarily on **Mechanics**: motion, force, momentum, energy, rotation and Newtonian gravity. In the spring semester we will take up **Electromagnetism** including circuits and Maxwell's Equations. That said, we will integrate some E&M into Fall, and revisit Mechanics in the Spring.

**II. In the Lab:** We need to be able to put all this developing physics understanding to good use. Some of the labs will be fundamental physics work like measuring the acceleration due to gravity, the speed of sound, or figuring out the charge-to-mass ratio for the electron. You will get lots of hands-on time with a variety of equipment. Want to learn how to use an oscilloscope? You have come to the right place. Want to know what the heck an oscilloscope is? You are really in the right place. Lab work will include projects. I want to give you time to tinker in the lab. Projects allow you to express your creative side while learning new skills.

### III. Logistics and tips for success:

#### A. What to bring to class every day:

1. **Calculator**: problem solving is not a spectator sport.
2. **Colored** pens (ball point pens and gel markers work best) for notes
3. **Correction Tape**: we all make mistakes!
4. [Advanced Physics Journal](#).

**B. Discussion/ Lecture:** Be an active participant in class discussions. Speak up if you don't "get it," or if you think your teacher is wrong (a rare but satisfying occurrence.) **Be compassionate** with other students who are experiencing difficulty. You could be next!

C. **Note-taking:** You don't need to write down everything we discuss but you do need to keep your [Advanced Physics Journal](#) up to date.

D. **Daily Schedule:** Some days we will use both periods to work on physics content. Some days we will use both periods to do lab work. It is not possible to take either class as a single period by itself: our schedule will be flexible depending on what we need to do.

E. **Daily Homework:** In addition to the custom homework on the website, homework problems will be taken from **Fundamentals of Physics**, 10<sup>th</sup> Ed by Halliday, Resnick and Walker. This text has some of the best homework problems available in print. See [Homework](#).

F. **Tests:** These tend to be tough and character building. You will be solving problems you haven't necessarily seen before using your problem-solving skills and your deepening understanding of how things work. This might not sound very humane to you, but I don't know how else to help you develop the kind of "grace under pressure" skills you will need in college. If you don't miss any quizzes or tests you can replace your lowest score with the average of your other scores. Midterms and finals are not eligible for replacement.

G. **Grading:** Your overall grade is simply based on points, according to the standard 10-point scale. Points are not weighted: each homework/project point is worth as much as a test point. Roughly 55% of your grade is based on exams. Your transcript will show both AP Physics C: Mechanics, and AP Physics C: Electromagnetism for both semesters. **The semester grade for both courses is the same because they are integrated.** This is a good thing if you are doing well, and a hazard if you are not, so stay on top of things.

H. **Integrity:** For labs and exams, your own work is the best work for you. Don't sacrifice your integrity for a few points. In addition to risking loss of credit for the assignment, you risk losing self-confidence and will probably end up sacrificing your overall performance in the long run.

I. **Extra help:** I will have office hours after school from 2:20-3:45 Mon, Tues, Thurs and before school Wed 6:45-7:30. Some students learn best in the smaller, less formal sessions outside of class: you could be one of them! Just because physics is a hard science doesn't mean it can't be a social science too.

J. **Web based resources:** Course materials will be available online at [saxbyphysics.com](http://saxbyphysics.com). Check the calendar daily to find out what we did each day and to get homework assignments. You will need access to a printer to print the many custom assignments. If you have printer issues you can always print from my classroom printer after school. The best way to contact me electronically is through email: [psaxby@lwsd.org](mailto:psaxby@lwsd.org). Leaving me a voicemail is about as effective as talking into your shoe.

K. **Late work:** Late work doesn't work. The course is fast paced and every day counts. If you miss a day or two, you need to get back up to speed immediately. HW solutions are often posted the next day, making late HW obsolete. There are no make-up exams. You can drop one quiz or test each semester, not including midterms or finals. If you are absent on quiz or test day: that is the test you will drop.

IV. **The AP Physics C Mechanics and E&M exam:** This course is organized around the expectation that you will take the standardized AP Physics C Mechanics and E&M test on Monday, May 13 (pm session) allowing you the possibility to get college credit, and the chance to see how you stack up in an international setting.

V. In conclusion: **welcome! This course is challenging and a fair amount of work**, but I hope it will be one of the high points of your senior year. Let's get to it!

Sincerely,

Mr. Peter Saxby