

**Syllabus PHY 184 – Sections 4 and 5, Spring 2020**  
***Electricity and Magnetism Projects and Practices in Physics (EMP-Cubed)***

Class meetings:      *Sec. 4* Tuesdays & Thursdays 10:20am – 12:10pm in 1300 in the BPS Building  
                                 *Sec. 5* Tuesdays & Thursdays 12:40pm – 2:30pm in 1300 in the BPS Building

Instructors (sec 4): Prof. Johannes Pollanen, BPS 4216  
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Richard Hallstein, BPS 1253  
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Instructor (sec 5): Prof. Daryl McPadden, BPS 1310B  
[mcpadden@msu.edu](mailto:mcpadden@msu.edu)

Teaching Assistant: Julie Hartley

Learning Assistants:

Section 4: Brennan Arnold and Theo Bott

Section 5: Emma Curd, Abner Barbosa, Matt Schram, and Yash Anandakumar

Help session hours(1248 BPS):

    Mondays: noon-6PM

    Wednesdays: 2PM-5PM

    Fridays: noon-5PM

Course materials: <http://msuperl.org/wikis/pcubed/> & <https://loncapa.msu.edu>

We also have a piazza discussion room set-up for the class: <https://piazza.com/>

**Prerequisites:** MTH 132 or MTH 152H or LB 118 Not open to students with credit in: LB 273 or PHY 181B or PHY 183 or PHY 193H or PHY 231 or PHY 231B or PHY 231C

**Course Description:** *Electricity and Magnetism Projects and Practices in Physics is an introductory calculus-based electricity and magnetism course that uses a problem-based learning approach. A problem-based learning approach means that there will not be a lecture component to the class and instead you will work in groups to solve complex physics problems by creating models of these problems on whiteboards or by using a computer. Course instructors will facilitate your learning by asking questions, prompting discussions, and guiding your group. Pre-class readings and homework will introduce you to physics concepts and enable you to engage in discussion in the classroom. EMP-Cubed will focus on developing a deep understanding of concepts in electricity and magnetism while also encouraging the development of practices that are important to science and engineering.*

In EMP-Cubed, our aim is for you to develop a deep *conceptual understanding* of physics along with *problem solving* and *computational modeling* skills that will serve you well in your future studies. Throughout EMP-Cubed, you will learn that physics is about making simple models of systems and adding complexity to those models to make better predictions and to provide richer explanations.

### **Course activities**

- 1) **Pre-class Reading & Homework:** For you to succeed in this course, you must be prepared to work on problems in your group. This will rely on your reading course notes, watching video lectures, and completing pre-class homework problems so that you come to class primed to work with relevant physics concepts for the problem at hand. Pre-class homework will be posted on LonCapa and will consist of 6-10 conceptual physics problems. Pre-class homework will be due each Monday night at 11:59pm and are graded online.
- 2) **Class Meetings:** EMP-Cubed uses a problem-based approach. Rather than listening to lecture and answering clicker questions during class meetings, you and your group will work through complex physical problems and model the solutions to some of those problems using a computer. Computational modeling will make use of VPython, a Python-based programming language. Whiteboards and markers as well as laptop computers will be available to your group for every class meeting. Course instructors will not lecture, but will facilitate your learning by asking questions, prompting discussions, and, only when absolutely necessary, guiding your group.

**NOTE:** You and your group will be assessed on your understanding and group function each week (*see the “How will in-class group work be assessed?” document*). Your two lowest scores out of fourteen will be dropped. Class attendance will be essential to your success in this course.

- 3) **Post-class Homework:** You will be assigned post-class homework using LonCapa, which will generally focus on one or two specific topics that were addressed by the complex problems solved in class. The homework questions will consist of multiple-choice, numerical response, and graph-oriented questions. There will be a single post-class homework set (6-10 questions) each week. Post-class homework will be due on Sundays at 11:59pm.

**NOTE:** While we refer to this as “post-class” homework, it will be posted at the beginning of the week and can be completed any time before the due date.

- 4) **Individual & Collaborative Exams:** EMP-Cubed will have three 2-hour exams and one 2-hour final exam. Exams will be open-ended, not scantron graded. The regular exams will be given Wednesday evenings starting at 7:30pm and will cover up to the content that you worked with in the previous week (i.e., the material discussed through the Thursday prior to the exam). Each exam, while not explicitly cumulative, will require that you demonstrate your understanding of prior material in some way. Regular exams will consist of two parts: (1) an individual exam that must be completed in 75 minutes, and (2) a group exam that must be completed in the remaining 60 minutes. The final exam will have a similar structure. *You may not miss any exam* except for reasons beyond your control, approved by course instructors (usually a confirmed medical problem or University-sanctioned event).

**NOTE:** During the individual portion of class exams, no notes or books will be allowed, although you may bring a calculator (sharing of calculators and other electronic devices is not allowed). During the group portion of class exams, laptop computers and whiteboards will be made available. A mock individual exam will be made available at least one full week prior to the scheduled exam.

**NOTE:** If you miss more than 50% of the class periods prior to an exam, you will be required to take the group exam portion of the exam by yourself.

***Evening exams will be held on Feb. 12<sup>th</sup>, Mar. 18<sup>th</sup>, and Apr. 15<sup>th</sup>.*** Students must be available for these exams, which are held from 7:30pm to 9:45pm. Exams will be combined section (sections 4 and 5) and will be held in 132 Hubbard Hall.

## **Grading Information**

The course grade is determined by contributions from several sources: pre-class homework, group work in class, post-class homework, evening exams, and the final exam. Each of these contributes to the final grade in the following percentages:



This course is not "graded on a curve". The guaranteed scale below is based on the total percentage of points.

<b>Course Score</b>	<b>Earned Grade</b>
p > 92%	4.0
92% > p > 84%	3.5
84% > p > 76%	3.0
76% > p > 68%	2.5
68% > p > 60%	2.0
60% > p > 52%	1.5
52% > p > 44%	1.0
p < 44%	0

## **Other important information:**

**Class Hours:** The classroom component of this course meets twice a week, on Tuesday & Thursday in 1300 in the BPS building, from 12:40pm to 2:30pm. You will be working in groups to develop your understanding of the material needed for your exams, so *please do not attempt to attend sections in lieu of the one in which you are officially enrolled*. Please bring paper, pencil, and a calculator to class every day. *We also recommend that you take pictures (e.g., using your cellphone or digital camera) of your whiteboards at the end of each class day.*

You will have 3 evening exams, which have an individual portion (worth 75% of the exam grade) and a group portion (worth 25% of the exam grade). No exams will be dropped, so it is imperative that you make it to every exam. *You may not miss any exam* except for reasons beyond your control, approved by course instructors (usually a confirmed medical problem or University-sanctioned event).

**Help session hours:** Course staff have offices in the Biomedical and Physical Sciences (BPS) Building. In addition, we have four undergraduate learning

assistants. *We will hold help session hours on the times mentioned on the first page in the Strosacker Learning Center in BPS, which will be staffed by course instructors and learning assistants. Course instructors are also available by appointment to meet with you or your group; just send us an email.*

Note that there will be no help room hours on the MLK holiday, the week of Spring break and the week of final exams.

**Special Accommodations:** Please see any course instructor in the first 2 weeks of class, if you have any special needs, a VISA form, or an ongoing concern about your learning. We are happy to make accommodations as best we can to support your learning.

### **Campus Resources:**

College students often experience issues that may interfere with academic success such as academic stress, sleep problems, juggling responsibilities, life events, relationship concerns, or feelings of anxiety, hopelessness, or depression. If you or a friend is struggling, we strongly encourage you to seek support. Helpful, effective resources are available on campus, and most are free of charge.

- Drop by Counseling & Psychiatric Services (CAPS) main location (3rd floor of Olin Health Center) for a same day mental health screening.
- Visit <https://caps.msu.edu> for online health assessments, hours, and additional CAPS services.
- Call CAPS at 517-355-8270 any time, day or night.
- 24-Hour MSU Sexual Assault Crisis Line 517-372-6666 or visit <https://go.msu.edu/SAP>

Any information in this syllabus is as accurate as is possible at the time of writing. Announcements about changes of any kind will be made in class, and (usually) posted on the web (Loncapa), and will *take precedence over this syllabus*. You are responsible for what is said in class, whether or not you are in attendance.

### **The Spartan Code of Honor**

As part of a new initiative the following statement of a "code of honor" regarding academic ethics has been included to make you aware of the ethics expected of you as a MSU student:

***“As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.”***