

**PHY 4324 Electromagnetism 2**  
Spring 2020 course syllabus

Time and place:	M W F Period 7 (1:55 PM – 2:45 PM), NPB 1220
Prerequisites:	PHY 2049 or equivalent, and PHY 3323 or equivalent
Instructor:	Yasu Takano, NPB 2356, 392-9326, takano AT phy.ufl.edu
Office hours:	M W Period 8 (3:00 PM – 3:55 PM)
Textbook:	David J. Griffiths, <i>Introduction to Electrodynamics</i> , 4th edition (Cambridge Univ. Press, 2017). Do not use the paperback 4th edition (Pearson), whose content is inferior. To save money, you may use the hardcover 3rd edition (Pearson), but not the paperback 3rd edition, which is also inferior.

### Synopsis

The second part of the two-semester sequence on standard undergraduate-level electromagnetism, this course covers time-dependent aspects, with a main focus on Maxwell's equations in differential form and their applications. These are subjects of Chapters 7 – 11 of Griffiths. The course also covers much of Chapter 12, on special relativity and relativistic electrodynamics.

Some students find this course difficult. The difficulty does not come from the logical structure of the theory, like in thermodynamics, but from the mathematics. It is essential in this course to become fluent in vector calculus. However, mathematics should not obscure the physical reality represented by equations.

### How to Study

In physics, it is absolutely necessary to do problems, as you already know. The purpose of doing problems is to acquire conceptual understanding of the subject and to develop intuitive understanding of the behavior of physical systems. Accordingly, there is a correct way and wrong way of doing problems. The correct way entails five things: (1) to expect the result before embarking on calculation, (2) to keep track of information content as you manipulate equations, (3) to examine the result for correct dimensions and symmetry, and to check whether it agrees with known results for special cases (e.g. in the limits of an independent parameter going to infinity or zero), and (5) to compare the result with what you have expected and, if your expectation has turned out to be wrong, to correct a wrong intuition that has led to the wrong expectation. The incorrect way is what I call “black-box shaking”—putting equations in a box and keeping shaking it until a solution comes out.

You are expected to do all Examples in the book and all recommended problems, lists of which will be posted in e-Learning. Homework assignments and exams will assume that you have done them. Homework problems are intended to supplement recommended problems, not to replace them. Without doing recommended problems, you will not do well in the exams.

### Grading

Grades will be based 31% on homework and 69% on exams. There will be five or six homework assignments, each worth 50 points, typically containing four or five problems. The lowest homework score among the five or six will be dropped. There will be three exams, two midterms and a comprehensive final, each worth 23% of the grade. The grading scheme is as follows, with the lower threshold of each letter grade given.

A	85%
A-	80%

B+	75%
B	70%
B-	65%
C+	60%
C	55%
C-	50%
D+	45%
D	40%
D-	35%
E	less than 35%

For physics majors, the lowest passing grade is C.

### **Homework**

There will be 6 homework assignments, each roughly corresponding to each chapter of the book covered in this course. Homework must represent your own work. Collaboration with other students who are taking this course are strongly encouraged, but the work you turn in must not be a copy of solutions by your collaborators. Homework must be written neatly, with words and sentences provided to make your solutions understandable and the final results clearly marked as such. Points may be deducted if your solutions are hard to read or hard to understand. Points may be also taken away if your homework shows a sign of “black-box shaking”—such as circular arguments and undirected manipulation of equations—or your result lacks required symmetry or is dimensionally incorrect.

Homework will be collected at the beginning of class on the due date. If you are to miss the class on a due date for university sanctioned activities, documented illness under care of a doctor, or verifiable family emergency, you may scan or print your homework to a pdf file and email it to the instructor before the class begins—with a document such as a letter from a faculty advisor of your student organization, a physician, or an attorney. No other way of submitting homework is allowed, since it may get lost or misplaced. No late work is accepted, since solutions will be posted in e-Learning immediately after the class on the due date. No make-up assignment will be given for a missed homework.

### **Exams**

There will be 3 exams, closed book, with math formulae provided. You will not be allowed to bring your own formula sheets, nor a calculator (there will be no numerical questions). Exam 1 will cover Chapters 7 and 8, Exam 2 Chapters 9 and 10, and Exam 3 Chapters 11 and 12. The dates and times of Exams 1 and 2 given on the Course Schedule is tentative and may change, depending on classroom availability. The date and time of Exam 3 will not change. For an exam missed for an excusable reason with a verifiable supporting document (see the section above on Homework), a makeup exam will be provided.

### **Announcements**

All announcements will be made in class and in e-Learning, which in turn will automatically notify students.

### **How to Contact the Instructor**

To contact me, please always send email to takano AT phys.ufl.edu from your GatorNet account. Do not use e-Learning’s Help > Ask Your Instructor a Question and other functions to contact me. Those will send a notifying email to me, and I will have to open a web browser, allow it to accept cookies, and log into e-Learning to respond—extra work which will be totally unnecessary if you send an email directly to me.

### **Additional Information**

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu>) by providing appropriate documentation. Once registered, students will receive an accommodation letter, from the Center, which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Students who are registered with the DRC must submit Accommodated Testing Requests (ATR) for Exams 1 and 2 at least 4 business days in advance and for Exam 3 at least 7 business days in advance. Students are strongly advised to submit ATRs for the all three exams at the same time and as early as possible.

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/studentconduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

### **Campus Resources**

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit <https://umatter.ufl.edu> to refer or report a concern and a team member will reach out to the student.

*Counseling and Wellness Center:* <https://www.counseling.ufl.edu>, 352-392-1575.

*Student Health Care Center:* <https://shcc.ufl.edu>, 352-392-1161 (a 24/7 number).

*University Police Department:* 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands Emergency Room / Trauma Center:* <https://ufhealth.org/emergency-room-trauma-center>. For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608.

*Student Complaints On-Campus:* <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code>.

*On-Line Students Complaints:* <https://distance.ufl.edu/student-complaint-process>.

*Career Connections Center:* <https://career.ufl.edu>. Reitz Union Suite 1300, 352-392-1601.