

2014 Fall 10310PHYS531000 3 credits
Electrodynamics (I) by Prof. Chang, Tsun-Hsu (張存續)

Description: We have studied electromagnetism in two courses before: General Physics II (freshman) and Electromagnetism (sophomore). What is new in this course? Electrodynamics will deal with the “same” Maxwell equations but from a more in-depth perspective. We are going to introduce a powerful tool, the Green function, to solve the electrostatic, magnetostatic, and even electromagnetic problems. To do that, we unavoidably have to learn the mathematics in spherical and cylindrical coordinates.

Textbook: J. D. Jackson, *Classical Electrodynamics*, Third Edition

References:

- D.J. Griffiths, *Introduction to Electrodynamics*, 3rd.
- R. P. Feynman, R. B. Leighton, and M. Sands, *The Feynman Lectures on Physics*.

Time: Tuesdays (10:10-12:00) & Thursdays (10:10-12:00)
150 min will be used for lecture. Others may be used for Q&A, quiz, etc.

Classroom: General Building III (綜三館) 普實 203

Syllabus: See the table shown in the next page.

Homework: Doing homework is the best way to master the concepts of Electrodynamics. Some of the homework problems might be appeared in the exam.

Evaluation: 1st Midterm 25%, 2nd Midterm 25%, Final 30%, Quiz 20%, Participation 10%
The final score will be normalized to reflect an average consistency with other courses.

✧ Electrodynamics is one of the most important courses for graduate students. After class, you had better spend at least 12 hours per week on this course.

✧ Those who have good grades can be waived from the Ph.D. qualifying examination. Good grades means that the score is A- or better, and the overall ranking is in the top 30%.

Schedule

Week	Date	Content
一	09/15 (二)	Teacher will attend an international conference (make-up later).
	09/18 (四)	Teacher will attend an international conference (make-up later).
二	09/23 (二)	Introduction, evaluation etc. & Chap.1 <i>Introduction to Electrostatics</i>
	09/25 (四)	Chap.1
三	09/30 (二)	Chap.2 <i>Boundary-Value Problems in Electrostatics I</i>
	10/02 (四)	Chap.2 Quiz #1 Chap. 1
四	10/07 (二)	Chap.3 <i>Boundary-Value Problems in Electrostatics II</i>
	10/09 (四)	Chap.3
五	10/14 (二)	Chap.3
	10/16 (四)	Chap.3
六	10/21 (二)	Chap.4 <i>Multiples, Electrostatics of Macroscopic Media, Dielectrics</i>
	10/23 (四)	1st midterm Chs. 1 - 3
七	10/28 (二)	Chap.4
	10/30 (四)	Chap.4
八	11/04 (二)	Chap.4
	11/06 (四)	Chap.5 <i>Magnetostatics, Faraday's Law, Quasi-Static Fields</i>
九	11/11 (二)	Chap.5 Quiz #2 Chap. 4
	11/13 (四)	Chap.5
十	11/18 (二)	Chap.5
	11/20 (四)	Chap.5
十一	11/25 (二)	Chap.6
	11/27 (四)	2nd midterm Chs. 4 – 5
十二	12/02 (二)	Chap.6 <i>Maxwell Equations, Macroscopic Electromagnetism,</i>
	12/04 (四)	Chap.6 <i>Conservation Laws</i>
十三	12/09 (二)	Chap.6
	12/11 (四)	Chap.6
十四	12/16 (二)	Chap.6
	12/18 (四)	Chap.7 <i>Plane Electromagnetic Waves and Wave Propagation</i>
十五	12/23 (二)	Chap.7 Quiz #3 Chap. 6
	12/25 (四)	Chap.7
十六	12/30 (二)	Chap.7
	01/01 (四)	New Year's Day (a national holiday)
十七	01/06 (二)	Chap.7
	01/08 (四)	Final Chs. 6 – 7
十八	01/13 (二)	Make-up (if necessary)
	01/15 (四)	Make-up (if necessary)

* This table is for your reference only. The practical schedule will depend on the students' learning condition.