
PHY 331 - Principles of Modern Electromagnetism

Fall 2012

Instructor: Dr. Igor A. Shovkovy

Days: Monday, Wednesday, Friday

Time: 12:00 – 12:50 pm

Location: PRLTA 239 (Polytechnic)

Description: A study of the unified description of electromagnetic phenomena provided by Maxwell's equations in differential and integral form. The planned list of topics includes Maxwell's equations, electrostatic fields, Laplace's and Poisson's equations, dielectrics, magnetic fields and materials, electromagnetic induction and Faraday's law, displacement current and Ampere's law, electromagnetic waves, and, if time permits, the photon theory of light.

Objectives: Students develop a sound theoretical understanding of electromagnetism

Prerequisites: APM 270 (Mathematics of Change I), MAT 274 (Elementary Differential Equations) or MAT 275 (Modern Differential Equations). Students should have practical knowledge of using differential equations to solve physics problems.

Textbook: *Introduction to Electrodynamics* (3rd edition) by David J. Griffiths.

(ISBN-10: 013805326X)

Attendance policy: Attendance is expected. Students are responsible for all material presented in class, all homework, and for all changes to the schedule or plans announced in class.

My **office** is Wanner Hall **340J**

My office **telephone** number is **480-727-1953**

My **e-mail** address is Igor.Shovkovy@asu.edu

Office hours: Mon, Wed, Fri 10:00 – 11:00 a.m. and by appointment.

Grading policy:

Homework	35 points
Midterm exams	30 points
Quizzes	15 points
Final exam	20 points
TOTAL	100 points

The grades will be determined as follows:

A (90%-100%), **B** (78%-89.99%), **C** (66%-77.99%), **D** (54%-65.99%), **E** (less than 54%)

Homework. Homework is truly one of the most important components in this course. This is because doing homework is the only way to really learn the material and build a good intuition for physics. Solving physics problems effectively is a skill that students must develop. The only known way to achieve this is by practicing. The lectures will only cover the key concepts. The text will elaborate on these concepts and provide further explanation of their meaning and on how one uses them to solve problems. There is no way to do well in this course if you do not give the homework assignments the effort they require. (Allow about 4 hours per week for homework assignments.)

Your homework assignment should be neatly and clearly written. The front page should list your name, the date and the homework assignment number. Each problem should be clearly labeled. The problem solutions should contain detailed explanations. Late homework will not be accepted.

Midterm exams. There will be two midterm exams on the dates shown below in the tentative schedule. Each midterm exam covers the chapters covered since the beginning of the course, or since the last midterm exam. The use of textbook will **not** be permitted during the exams.

Quizzes. There will be 2 or 3 short quizzes during the semester. The use of textbook will **not** be permitted during quizzes. The tentative dates of quizzes are given in the schedule below, but the actual dates will be announced in class. Quizzes will test the conceptual understanding of topics discussed in the lectures and the textbook.

Final Exam. A **comprehensive** final exam is *tentatively* scheduled from **9:50 a.m. to 11:40 a.m.** on **December 17, 2012** (Monday). The use of textbook will **not** be permitted during the final exam.

Electronic devices. The use of cell phones, pagers, personal digital assistants (PDAs), iPods, iPads, laptops, and other similar electronic devices is **not** permitted during lectures, exams and quizzes.

Tentative schedule

The exact schedule for lectures, quizzes and examinations will depend on how long it takes to cover the material. The following is my best guess as of now. See also the tentative schedule below.

Dates	Tentative schedule
August 24	First class
September 3	Labor Day – No class
September 21	1 st quiz
September 28	1 st mid-term exam
October 15	Fall Break – No class
October 22	2 nd quiz
November 12	Veterans Day – No class
November 14	3 rd quiz
November 23	Thanksgiving Holiday – No class
December 3	2 nd mid-term exam
December 10	Last class
December 17	FINAL EXAM , see http://students.asu.edu/final-exam-schedule

Selected course materials, handouts, and grades can be obtained from [ASU Blackboard](#).

The course name is **PHY331: Prin Modern Electromagnetism (2012 Fall)**.

For student rights and responsibilities see the ASU web page: <http://campus.asu.edu/downtown/rights-and-responsibilities>

ADA policy: *ASU provides equal opportunity to qualified employees and students, and to members of the general public who have a disability and provides reasonable accommodation as appropriate in employment, the application for employment, services, programs, and activities. Individuals with a disability are those who have a physical or mental impairment that substantially limits one or more major life activity, have a record of such impairment, or are regarded as having such impairment. ADA coordinator must be contacted for assistance in all matters pertaining to compliance with this policy. The Disability Resource Center contact numbers are 480-965-1234 (Voice), 480-965-9000 (TTY).*

Last modified August 24, 2012

SCHEDULE of Lectures, Exams, and Homework assignments

PHY 331 - Principles of Modern Electromagnetism

Fall 2012

Instructor: Igor Shovkovy

Mon, Wed, Fri

12:00 p.m. – 12:50 p.m.

PRLTA 239 (Poly)

Lect.	Date	Description	Reading material	Homework	weekday
1	24-Aug-12	Class introduction, syllabus, etc.			F
2	27-Aug-12	Vectors	Sec. 1.1		M
3	29-Aug-12	Differential calculus	Sec. 1.2	(hw 1)	W
4	31-Aug-12	Integral calculus	Sec. 1.3		F
	3-Sep-12	Labor Day - No class			M
5	5-Sep-12	Curvilinear coordinates	Sec. 1.4	(hw 2)	W
6	7-Sep-12	The Dirac delta function	Sec. 1.5		F
7	10-Sep-12	Coulomb law (part 1)	Sec. 2.1.1 - 2		M
8	12-Sep-12	Coulomb law (part 2)	Sec. 2.1.3 - 4	(hw 3)	W
9	14-Sep-12	Gauss law (part 1)	Sec. 2.2.1 - 2		F
10	17-Sep-12	Gauss law (part 2)	Sec. 2.2.1 - 3		M
11	19-Sep-12	Applications of Gauss's law	Sec. 2.2.3 - 4	(hw 4)	W
	21-Sep-12	1st quiz (lectures 1-10)			F
12	24-Sep-12	Electric potential	Sec. 2.3.1 - 2		M
13	26-Sep-12	Poisson's equation	Sec. 2.3.3 - 4		W
	28-Sep-12	1st midterm exam (lectures 1-12)			F
14	1-Oct-12	Electrostatic boundary conditions	Sec. 2.3.5	(hw 5)	M
15	3-Oct-12	Work & energy in electrostatics (part 1)	Sec. 2.4.1 - 2		W
16	5-Oct-12	Work & energy in electrostatics (part 2)	Sec. 2.4.3 - 4		F
17	8-Oct-12	Conductors	Sec. 2.5.1 - 3		M
18	10-Oct-12	Capacitors	Sec. 2.5.4	(hw 6)	W
19	12-Oct-12	Laplace's equation (part 1)	Sec. 3.1.1 - 4		F
	15-Oct-12	Fall break - No class			M
20	17-Oct-12	Laplace's equation (part 2)	Sec. 3.1.5 - 6		W
21	19-Oct-12	The method of images	Sec. 3.2.1 - 2	(hw 7)	F
	22-Oct-12	2nd quiz (lectures 9-20)			M
22	24-Oct-12	Application of the method of images	Sec. 3.2.3 - 4		W
23	26-Oct-12	Separation of variables (part 1)	Sec. 3.3.1		F
24	29-Oct-12	Separation of variables (part 2)	Sec. 3.3.2	(hw 8)	M
25	31-Oct-12	Electric dipole	Sec. 3.4.1 - 2, 4		W
26	2-Nov-12	Polarization	Sec. 4.1		F
27	5-Nov-12	Field of a dielectric (part 1)	Sec. 4.2.1		M
28	7-Nov-12	Field of a dielectric (part 2)	Sec. 4.2.2 - 3	(hw 9)	W
29	9-Nov-12	Electric currents and magnetic fields	Sec. 5.1.1 - 2		F
	12-Nov-12	Veterans Day - No class			M
	14-Nov-12	3rd quiz (lectures 19-28)			W
30	16-Nov-12	Lorentz force, continuity equation	Sec. 5.1.2 - 3		F
31	19-Nov-12	The Biot-Savart law	Sec. 5.2	(hw 10)	M
32	21-Nov-12	Applications of Biot-Savart law	Sec. 5.2		W
	23-Nov-12	Thanksgiving - No class			F
33	26-Nov-12	Ampere's law	Sec. 5.3.1-2		M
34	28-Nov-12	Application of Ampere's law	Sec. 5.3.3	(hw 11)*	W
35	30-Nov-12	The vector potential	Sec. 5.4		F
	3-Dec-12	2nd midterm exam (lectures 19-34)			M
36	5-Dec-12	Ohm's Law	Sec. 7.1		W
37	7-Dec-12	Faraday's Law	Sec. 7.2	(hw 12)*	F
38	10-Dec-12	The full set of Maxwell's equations	Sec. 7.3.1 - 3		M
	17-Dec-12	Final Exam (9:50 a.m. - 11:40 a.m.)	Date & Time are TENTATIVE		M