

PHYS 4230/5230 Electricity & Magnetism – Fall 2019

(Revised 9/16/2019)

Instructor: Dr. Xunming Deng
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 Email for HW submission and for missed class: phys4230fall2019@yahoo.com
 Office hours: Mon & Wed 2:30-3:30pm, Fri 9:40-10:40am, MH5002

Class time: MWF: 8:25 – 9:25am
 Classroom: MH1002
 Textbook: Introduction to Electrodynamics, 4th Edition, David J. Griffiths. By Cambridge Press.

Month	Mon		Wed		Fri	
Aug	26	Ch. 1	28	Ch. 1	30	Ch. 1
Sept	2	Labor Day	4	Ch. 1	6	Ch. 1
	9	Ch. 1	11	Ch. 1	13	Ch. 2
	16	Ch. 2	18	Ch. 2	20	Ch. 2
	23	Ch. 2	25	Self Review	27	Self Review
	30	Midterm 1	2	Ch. 3	4	Ch. 3
Oct	7	Ch. 3	9	Ch. 3	11	Fall Break
	14	Ch. 3	16	Ch. 3	18	Ch. 4
	21	Ch. 4	23	Ch. 4	25	Ch. 4
	28	Ch. 4	30	Ch. 4	1	Self Review
Nov	4	Midterm 2	6	Ch. 5	8	Ch. 5
	11	Veterans Day	13	Ch. 5	15	Ch. 5
	18	Ch. 5	20	Ch. 5	22	Ch. 6
	25	Ch. 6	27	Thanksgiving	29	Thanksgiving
Dec	2	Ch. 6	4	Ch. 6	6	Catchup/Summary
	9	Final Exam (8:00am-10:00am) on Monday, Dec. 9				

	PHYS 4230	PHYS 4230 Honors
Grades:		
	Midterm 1 (Ch. 1-2):	20%
	Midterm 2 (Ch. 3-4):	20%
	Final Exam (Ch. 1-6):	30%
	Quizzes:	15%
	Homework:	5%
	Extra credit for previews:	6%
	Special Project for Honors:	10%
	Total:	106%

Chapters 7-12 will be covered in 4240/5240 during Spring 2018. If time and schedule allow, we will move beyond Chapter 6 and cover part of Chapter 7 (Maxwell's Equations) during this semester.

Homework Assignments PHYS 4230

Ch1: 29, 33, 34, 38, 44; Ch2: 7, 9, 15, 23, 27, 34, 38, 44.
Ch 3: 1, 7, 21, 30, 32, 34 Ch 4: 4, 5, 10, 15, 19, 21, 26, 28.
Ch 5: 1, 3, 4, 8, 11, 14, 16, 24, 35 Ch 6: 1, 6, 7, 8, 12, 16, 17.

Homework submission:

Homework will be submitted electronically. Write your homework in dark black pen so that it can be easily scanned. You will email me a scanned version (e.g., PDF version), in black and white, not colored or grey. It needs to be clear and readable. Put each homework submission in one file, not multiple files. The size of total files needs to be less than 2MB (better to be less than 1MB). No need to scan in ultrahigh resolution. Homework is due in my email box PHYS4230Fall2019@yahoo.com, by 9pm on Sundays, with subject line "John DOE PHYS4230 mm-dd-yyyy HW completed X of Y". Homework problems on the sections we covered during the week are due on Sunday evening at 9pm of the same week.

I will not grade the homework, but will count those homework problems that will be completed with demonstrated full effort to calculate homework credit.

Quizzes:

There will be 4 to 6 quizzes, without pre-announcement. Each will last 10min.

Extra Credit for Previews:

I strongly encourage you to spend at least 20min to preview the textbook prior to each lecture. This will make your classroom experience very fruitful. You will easily put your attention on the areas you find difficult to understand. One of the efficient ways is to come to class 20min earlier, and do a quick reading on what is to be covered during the lecture of the day. I will give 6 point extra credit to check your effort for the previews. I will conduct about 3 to 5 "preview check" in some selected classes, without pre-announcement. Details will be explained in the class.

Class attendance:

Class attendance is required. If you need to skip a class, you need to send me an email to PHYS4230Fall2019@yahoo.com, with subject line "John DOE to miss PHYS4230 class mm-dd-yyyy", before the class begins and provide reasonable and sufficient reason why you need to skip this class. If we conduct a quiz or a preview check while you skipped this class with an accepted excuse, this quiz or preview-check will not be counted for you, and your score on the quiz and preview check will be calculated based on your performance in the rest of quizzes and preview checks.

Textbook: Introduction to Electrodynamics, 4th Ed, David J. Griffiths. By Pearson.
PHYS 4230/5230 Chapters 1-6; PHYS 4240/5240 Chapters 7-12

Chapter 1. Vector Analysis.

Vector Algebra. Differential Calculus. Integral Calculus. Curvilinear Coordinates. The Dirac Delta Function. The Theory of Vector Fields.

Chapter 2. Electrostatics.

The Electrostatic Field. Divergence and Curl of Electrostatic Fields. Electric Potential. Work and Energy in Electrostatics. Conductors.

Chapter 3. Potentials.

Laplace's Equation and Uniqueness Theorems. The Method of Images. Separation of Variables. Multipole Expansion.

Chapter 4. Electrostatic Fields in Matter.

Polarization. The Field of a Polarized Object. The Electric Displacement. Linear Dielectrics.

Chapter 5. Magnetostatics.

The Lorentz Force Law. The Biot-Savart Law. The Divergence and Curl of B . Magnetic Vector Potential.

Chapter 6. Magnetic Fields in Matter.

Magnetization. The Field of a Magnetized Object. The Auxiliary Field H . Linear and Nonlinear Media.

Chapter 7. Electrodynamics.

Electromotive Force. Electromagnetic Induction. Maxwell's Equations.

Chapter 8. Conservation Laws.

Charge and Energy. Momentum.

Chapter 9. Electromagnetic Waves.

Waves in One Dimension. Electromagnetic Waves in Vacuum. Electromagnetic Waves in Matter. Absorption and Dispersion. Guided Waves.

Chapter 10. Potentials and Fields.

The Potential Formulation. Continuous Distributions. Point Charges.

Chapter 11. Radiation.

Dipole Radiation. Point Charges.

Chapter 12. Electrodynamics and Relativity.

The Special Theory of Relativity. Relativistic Mechanics. Relativistic Electrodynamics.