## Physics 4321

Fall 2014 - section 17778

## Introduction to Classical Electrodynamics - Part 1

Text - Introduction to Electrodynamics 3rd Edition; - David Griffiths Publisher - Prentice Hall

Supplementary Material - Feynman Lectures on Physics - R. Feynman (Addison-Wesley, 1965 - use library editions); Electrodynamics (Chicago Lectures in Physics) - T. Tsang; Student's Guide to maxwell's Equations - D. Fleish; Div, Grad, Curl, and all That - H. M. Schey; Numerical Methods for Physics - A. Garcia

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10:00 - 11:30 TTh		http://mep.phys.uh.edu	
S&R 1, Room AH 301			
Week Beginning	Lecture	Homework	Due Date
Aug 24	Ch 1	1.6, 1.9, 1.13, 1.26	Sept 3
Aug 31	Ch 1	1.30, 1.37, 1.44, 1.45	Sept $10$
*****Labor Day Sep 1*****			
Sep 7	Ch 1	1.49, 1.53, 1.56, 1.62	Sept $17$
$*****1^{st}$ Exam Sept $9^{******}$			
Sep $14$	Ch 2	2.7, 2.10, 2.17, 2.20	Sept $24$
Sep 21	Ch 2	2.22, 2.34, 2.35, 2.38	Oct $1$
Sep 28	Ch $2,3$	2.46, 2.47, 3.1, 3.4	Oct 8
**** $2^{nd}$ Exam Oct 6*****			
Oct 5	Ch 3	3.7, 3.9, 3.14, 3.19	Oct $15$
Oct $12$	Ch 3	3.23,3.28,3.33,3.36	Oct $22$
Oct 19	Ch 4	4.2, 4.4, 4.11, 4.13	Oct $29$
Oct 26	Ch 4	4.17, 4.21, 4.26, 4.36	Nov $5$
$****3^{rd}$ Exam Nov $4^{******}$			
Nov 2	Ch 5	5.1, 5.4, 5.9, 5.13	Nov $12$
Nov 9	Ch 5	5.16, 5.20, 5.22, 5.29	Nov $19$
Nov 22	ch 6	6.2, 6.5, 6.7, 6.9	Nov $26$
*****Thanksgiving Holiday Nov 26-29*****			
Nov 30	Ch 6	6.13, 6.15, 6.17, 6.25	Dec 3

Last Date to Drop — Oct 31 1

last Day of Class — Dec 6

Final Exam — Tues Dec 16 - 11:00 - 2:00

The course will cover the topics of;

- 1. Vector Calculus
  - (a) Vector Operations
  - (b) Invarients
  - (c) Gradient, Divergence, Curl
  - (d) General Coordinate Systems
  - (e) Differential Forms
  - (f) Integral Relations
  - (g) The Delta Function
  - (h) Fields
- 2. The Electric Field
  - (a) Coulomb's law
  - (b) Continuous Charge Distributions
  - (c) Differential Operations
  - (d) The Electric Potential
  - (e) Poisson's Equation
- 3. Energy
  - (a) Potential Energy
  - (b) Point and Distributed Charge
- 4. Fields and Conductors
  - (a) Static Charge and Conductors
  - (b) Induced Charge
  - (c) Forces on Conductors
  - (d) Capacitance
- 5. Solution of Laplace's Equation
  - (a) The Boundry Value Problem
  - (b) Uniqueness Theorem
  - (c) Separation of variables
  - (d) Eigenfunctions and Fourier Series
  - (e) Legendre Polynomials
  - (f) Energy

- (g) Images
- (h) Multipole Expansions
- 6. The Electric Field in Matter
  - (a) Polarization and Dipoles
  - (b) Bound Charge
  - (c) Dielectrics
  - (d) Electric Displacement
  - (e) Susceptibility
  - (f) Energy and Force
- 7. Magnetic Field
  - (a) Force
  - (b) Currents
  - (c) Motion in a Magnetic Field
  - (d) Biot-Savart Law
  - (e) Differential Operators
  - (f) Electrostatic and Magnetostatic Equations
  - (g) The Vector Potential
  - (h) Multipole Expansions
- 8. The Magnetic Field in Matter
  - (a) Torques and Forces
  - (b) Magnetization
  - (c) Bound Currents
  - (d) Magnetic Field in Matter
  - (e) Susceptibility
  - (f) Ferromagnetism

Your grade will be determined by: 3 in class exams 18% each Homework 20% Final Exam 26%

It is expected that the student has some knowledge of electromagnetism as taught in 2312 and mathematics through the level of partial differential equations. While these subjects will be reviewed, it will be impossible to cover these subjects in depth and they are needed as a foundation for the course.

The suggested references can be used to supplement the book where needed. The book itself has many references and is widely used as a text in the better universities. It is probably the best text now available on this subject at the undergraduate level.

**Do the homework** and turn it in on the date assigned in class. Late homework is **not** accepted. Homework solutions will be posted on the class website. There will be 3 in-class exams and a 3hr final. All exams are closed book. Grades are determined based of the performance percentages as outlined above.

All your submitted class work must be completed independently by you, although you may discuss the homework problems with others or use any other resources. What you turn in, however should be your own work