

PHSI425 - Advanced ElectroMagnetism

Course Structure

The general structure of a 4th year module is:

15 one hour lectures

6 one hour tutorials

3 assignments

2 hour final exam worth 70% of your final grade. Answer 2 out of 3 long answer questions

Lectures

- Tuesday in room 314 from 1:00 – 1:50 pm
- Thursday in room G400 from 10:00 – 11:50 am.

Homework

Homework 1 Griffiths Questions 3.41, 3.45, 5.57, 5.58

Homework 2 Griffiths Questions 8.11, 8.12, 10.9, 10.10

Homework 3 Griffiths Questions 11.10, 11.13, 11.14, 11.31

Textbooks

The required text is:

Introduction to Electrodynamics, (3rd or 4th Edition), by Griffiths

This book is essential, and all of the assigned reading is in this book

Other books that may be referred to are:

1. Classical Electricity and Magnetism, (2nd Edition), by Panofsky and Phillips.
2. Classical Electrodynamics, (3rd Edition) by J. D. Jackson.
3. Electricity and Magnetism, Nayfeh and Brussel.
4. The Theory of Electromagnetism, Jones.

Schedule of Assigned Reading

The page numbers refer to the third edition of Griffiths.

PART I: STATICS				
Topic	Section	Pages	Lecture	Suggested Questions
Theory of Vector Fields	1.6	52-54	1	
Helmholtz Theorem	Appendix B	555-557		
Electrostatic Multipole Expansion	3.4	146-154	2	3.26, 3.28
Magnetic Vector Potential	5.4	234-242	3	5.27, 5.25, 5.22
Magnetostatic Multipole Expansion	5.4.3	242-246,	4	5.60, 5.33 (1.60,1.61)
Conservation Laws	Ch 8	345-357	5,6	8.2, 8.3, 8.4, 8.5, 8.6
PART II: RADIATION				
Topic	Section	Pages	Lecture	
Potentials and Fields	10.1	416-422	7	10.3, 10.4, 10.5
Retarded potentials	10.2	422-426	8	10.8
Lienard-Wiechert potentials	10.3	429-434	9	10.13, 10.14
E and B fields from L-W potentials	10.3.2	435-440	10,11	10.18, 10.20
Dipole Radiation	11.1	443-454	12	11.3, 11.6
Arbitrary source, Point charges	11.1.4, 11.2	454-465	13,14	11.12, 11.16
Radiation Reaction	11.2.2,11.2.3	465-473	15	