

KOÇ UNIVERSITY
College of Arts and Sciences
Department of Physics

Course: PHYS 312 Advanced Electromagnetism

Credits: 3

Semester: Spring 2004

Instructor: Professor **Tekin Dereli**

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Office hours: By appointment

Lecture hours: Tuesdays and Thursdays, 9.30-10.45, Scie 129

Course Description: Review of Maxwell's equations; conservation laws; electromagnetic waves; propagation of electromagnetic waves in conductors and dielectrics; transmission lines; waveguides; potentials and fields; radiation theory; electrodynamics and special theory of relativity.

Textbook: *Introduction to Electrodynamics* D. J. Griffiths (Prentice Hall, 3rd edition, 1999)

Grading: Homework 20%

1. Midterm 25%, March 29, 2004 (Time and place to be fixed)
2. Midterm 25%, May 3, 2004 (Time and place to be fixed)
- Final Exam 30%, June 2004. (Date to be announced later)

Remember:

1. Attendance will be taken in the classes. Any student who misses more than 9 lectures with or without excuse automatically fails.
2. In the exams no exchange of information among students should take place. You are expected to hand in your own work in all the exams and HW assignments.
3. For the homework you may discuss the problems, consult your teachers and use the library and internet. However, the submitted work must be totally yours. You must not submit work done in groups, transfer files or copy from a book.
4. Late homework is going to be accepted but you loose half the grade.

Course plan:

Week:1 Maxwell equations

Week:2 Conservation laws. Poynting's theorem. Electromagnetic stress-energy-momentum tensor. HW1

Week:3 Waves in one-dimension. Polarisation.

Week:4 Electromagnetic waves in vacuum. Monochromatic plane waves.

Week:5 Electromagnetic waves in matter. Reflection and transmission. HW2

Week:6 Absorption and dispersion of electromagnetic waves.

(1. Midterm)

Week:7 Guided waves. Transmission lines. HW3

Week:8 Electromagnetic potentials. Gauge transformations.

Week:9 Electric and magnetic dipole radiations.

Week:10 Spring Break

Week:11 Radiation by accelerated point charges. Lienard-Wiechert potentials. HW4

(2. Midterm)

Week:12 Special relativity. Lorentz transformations.

Week:13 Space-time. Relativistic mechanics.

Week:14 Relativistic electrodynamics. HW5