Electromagnetic Theory - Course Syllabus

Course Number: EE 221

Course Title: Electromagnetic Theory

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan 24, 2016	**Semester End Date:**	May 19, 2016

Class Schedule: Monday/Wednesday, 1-2:30pm

Classroom Number:

Instructor(s) Name(s): Hakan Bagci
Email: hakan.bagci@kaust.edu.sa

Office Location: B-3, R-3222
Office Hours: Sunday, 3:30-5pm

COURSE DESCRIPTION FROM PROGRAM GUIDE

Review of vector algebra and calculus, coordinate transformations. Fundamental electromagnetic concepts: Maxwell's equations, Lorentz force relation, electric and magnetic polarizations, constitutive relations, boundary conditions, Poynting theorem in real and complex forms, energy relations. Solution of the Helmholtz equation: plane, cylindrical, and spherical waves, potentials. Electromagnetic theorems: uniqueness, duality, reciprocity, equivalence and induction theorems, Huygen's and Babinet's principles. Guided fields: waveguides, dispersion, phase and group velocities, attenuation, inhomogeneous waveguides, resonant cavities. Antennas: elementary antennas, radiation patterns.

COMPREHENSIVE COURSE DESCRIPTION

Fundamental concepts of electromagnetics: Maxwell equations, Lorentz force relation, electric and magnetic polarizations, constitutive relations, boundary conditions, Poynting theorem in real and complex forms, energy relations.

Solution of Helmholtz equation: plane, cylindrical, and spherical waves, dispersion, phase and group velocities, attenuation, wave propagation in anisotropic media.

Electromagnetic theorems: uniqueness, duality, reciprocity, equivalence, and induction theorems, Huygen and Babinet principles.

Guided wave propagation: mode expansions, metallic and dielectric waveguides, resonant cavities.

Antennas: potentials, radiation, elementary antennas.

GOALS AND OBJECTIVES

Develop a strong background in electromagnetic theory and understand and use various mathematical tools to solve Maxwell equations in problems of wave propagation and radiation.

REQUIRED KNOWLEDGE

EE 122 or equivalent undergraduate-level course on Electromagnetics

REFERENCE TEXTS

Theory and Computation of Electromagnetic Fields, J-M. Jin, 2010 (Required)

Time Harmonic Electromagnetic Fields, R. F. Harrington, 2001 (Reference)

Advanced Engineering Electromagnetics, C. A. Balanis, 1989 (Reference)

METHOD OF EVALUATION

Graded content
Homework: 10%, 7 assignments (lowest two grades will be dropped) Exams: Midterm 1: 25%, Midterm 2: 25%, Final: 40%

COURSE REQUIREMENTS

Assignments

Each homework assignment requires students to solve several problems relevant to the topics discussed in class.

Course Policies

Attendance at lectures is strongly encouraged, but is not considered compulsory. Attending students are expected to be on time.
Late homework solutions are not accepted without a valid excuse.

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.