EENG 534 NUMERICAL METHODS IN ELECTROMAGNETICS

Department: Electrical and Electronic Engineering

Program Name: Electrical and Electronic Engineering

Course Number: EE 534

Credits: 3

Required Course ☑ Graduate Course

Prerequisite(s): -

Catalog Description:

Course Web Page:

Textbook(s):

Indicative Basic Reading List:

Weekly Teaching Plan:

Week 1
Registration.

Week 2-3
Course objectives, course description.
Review of Electromagnetic Theory (6 Classes)

Week 4
A review of basic numerical methods in electrodynamics. (3 Classes)

Week 5-6
Finite Difference Method (FD) (6 Classes)

Week 7-9
Finite Difference Time Domain Method (FDTD) (9 Classes)

Week 10-11
Method of Moments (MoM) (6 Classes)
Introduction, Integral Equations
Green’s Functions, Applications, Quasi Static Problems, Scattering Problems
Week 12-13  **Finite Element Method (6 Classes)**
Introduction, Solution of Laplace’s Equation, Solution of Wave Equation.

Week 14-15  **Other Techniques (6 Classes)**
Calculus of Variation, Spectral Analysis

**Course Objectives:**
- Familiarize with the numerical techniques used in electromagnetics.
- Solve simple electromagnetic problems by using numerical techniques.

**Course Learning Outcomes:**
On successful completion of this course, the students will be able to:
- understand the classification of EM problems,
- list and understand basic numerical methods in electrodynamics
- understand and apply the Finite Difference Method to closed region problems,
- understand and apply the Finite Difference Time Domain Method to open/closed region problems ,
- understand and apply the MoM ,
- understand and apply the Finite Element Method.

**Class Schedule:**
3 hrs of lectures per week

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<th>Assessment</th>
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**Contribution of Course to Criterion 5**

Credit Hours for:

Mathematics & Basic Science : 0
Engineering Design : 3
General Education : 0

**Relationship of Course to Program Outcomes**
The course has been designed to contribute to the following program outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering
(b) An ability to design and conduct experiments, as well as to analyze and interpret data
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints
(e) An ability to identify, formulate, and solve engineering problems
(i) A recognition of the need for, and an ability to engage in life-long learning
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Prepared by:** Rasime Uyguroğlu  **Date Prepared:** 09 February 2015