

EEE361 Electromagnetic Waves (4-0)4
2026-2027 Fall Semester

Main Reference

David K. Cheng, Fundamentals of Engineering Electromagnetics, Pearson

Lecturers: Prof. Dr. Uğur Cem HASAR

Major Aims: Students will learn basic physical laws of time-varying electromagnetics and transmissions lines and will gain experience in applying these theories to the solution of problems.

Course Content: Maxwell's equations and boundary conditions. Electromagnetic energy and power; Poynting's vector. General plane wave solution of Maxwell's equations. Polarization. Reflection and transmission of plane waves. Transmission lines. Impedance matching. Waveguides and cavities. Radiation. Prerequisite : EEE 262.

Supplementary References:

1. M. Sadiku, Elements of Electromagnetics, 3rd Edition, Oxford Univ. Press
2. S.V. Marshall, R. E. DuBroff, Electromagnetic Concepts and Applications, 4th Edition, Prentice Hall
3. J. D. Krauss, Electromagnetics, 4th Edition, McGraw Hill
4. P. Lorrain and D. Corson, Electromagnetic Fields and Waves, 2nd Edition, Freeman

Exams and Grading:

Two Midterm Exams (30% for each), No Laboratory, and Final Exam (40%).

Course Outline:

Week	Subject
1.	(Chapter 6) Faraday's Law of Electromagnetic Induction
2.	Maxwell's Equations, Electromagnetic Boundary Conditions, Potential Functions, Time-Harmonics Fields, The Electromagnetic Spectrum
3.	(Chapter 7) Plane Waves in Lossless Media, Doppler Effect, Transverse Electromagnetic Waves
4.	Polarization, Plane Waves in Lossy Media
5.	Group Velocity, Flow of Electromagnetic Power; Poynting's Vector
6.	Normal Incidence of Plane Waves at Plane Boundaries, Oblique Incidence of Plane Waves at Plane Boundaries-1
7.	Oblique Incidence of Plane Waves at Plane Boundaries-2, Brester and Critical Angles
8.	(Chapter 8) General Transmission-Line Equations, Transmission-Line Parameters
9.	Wave Characteristics on a Finite Transmission-Line, Wave Characteristics on an Infinite Transmission-Line-1
10.	Wave Characteristics on an Infinite Transmission-Line-2, The Smith Chart-1
11.	The Smith Chart-2 and Impedance Matching
12.	(Chapter 9) General Wave Behaviors Along Uniform Guiding Structures
13.	Rectangular Waveguides, Other Waveguide Types, Cavity Resonators, (Chapter 10) The Elemental Electric Dipole
14.	(Chapter 10) Antenna Patterns and Directivity, Thin Linear Antennas, Antenna Arrays, Effective Area and Backscatter Cross Section, Friss Transmission Formula and Radar Equation

Schedule for Lectures: (1st cycle) Monday 10:20-12:00 (D1) & Wednesday 10:20-12:00 (D1)
(2nd cycle) Monday 17:00-18:50 (D1) & Wednesday 18:50-19:45 (D1)