TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Electrıcal And Electronıcs Engıneerıng (Englısh)

Course Information

ELECTROMAGNETIC WAVES					
Code	**Semester**	**Theoretical**	**Practice**	**National Credit**	**ECTS Credit**
		Hour / Week			
EEE307	Fall	3	0	3	5

Prerequisites and co-requisites	
Language of instruction	English
Type	Required
Level of Course	Bachelor's
Lecturer	Asst. Prof. Dr. Cevher AK
Mode of Delivery	Face to Face
Suggested Subject	
Professional practise (internship)	None
Objectives of the Course	Analysis of all electrical or electronics systems, Understanding the operation frequency considering the propagation of energy either in current and voltage pair or electric field and magnetic field pair. Ability to analyze high-frequency electromagnetic problems mathematically will enable the students to understand the analytical behavior of the systems in higher classes.
Contents of the Course	Maxwell’s Equations, Constitutive Equations, Comparison of Field Theory and Circuit Theory, Wave Equation, D’Alembert’s Solution, Time-Harmonic Electromagnetic Waves, Distributions, Boundary Conditions, Power and Energy Relations, Phase Velocity and Group Velocity, Vector and Scalar Potentials, Plane Waves, Reflection and Refraction, Polarization, Traveling Waves and Standing Waves, Transmission Lines, Terminated Uniform Transmission Line, Directional Couplers and Quarter Wave Transformers, Waveguides and Resonators, Hollow Rectangular Waveguide, Cavity Resonators, Fiber Optics, Basic Antenna Parameters, Simple Radiators, Radar Equation : Friss Formula.

Learning Outcomes of Course

#	Learning Outcomes
1	Getting knowledge about the Faraday’s law of electromagnetic induction, induction law, a stationary circuit in a time-varying magnetic field, transformers and a moving conductor in a static magnetic field.
2	Getting knowledge about a moving circuit in a time-varying magnetic field, Maxwell’s equations, integral form of Maxwell’s equations and electromagnetic boundary conditions.
3	Getting knowledge about the wave equations and their solutions, time-harmonic fields and phasors, time-harmonic electromagnetics and electromagnetic spectrum.
4	Getting knowledge about the plane waves in lossless media, Doppler effect and transverse electromagnetic waves.
5	Getting knowledge about the transverse electromagnetic waves and polarization of plane waves.
6	Getting knowledge about the plane waves in conducting media, plane waves in low-loss dielectric media and plane waves in good conductor.
7	Getting knowledge about the group velocity, flow of electromagnetic power and the poynting vector, instantaneous and average power densities.
8	Getting knowledge about the perpendicular incidence at a plane boundary, normal incidence at a plane conducting boundary and transmission lines.

Course Syllabus

#	Subjects	Teaching Methods and Technics

1	Maxwell’s Equations	lecture
2	Constitutive Equations	lecture
3	Comparison of Field Theory and Circuit Theory	lecture
4	Wave Equation	lecture
5	D’Alembert’s Solution	lecture
6	Time-Harmonic Electromagnetic Waves	lecture
7	Midterm Examaination	exam
8	Boundary Conditions, Power and Energy Relations	lecture
9	Phase Velocity and Group Velocity	lecture
10	Vector and Scalar Potentials	lecture
11	Plane Waves, Reflection and Refraction	lecture
12	Polarization, Traveling Waves and Standing Waves, Transmission Lines, Terminated Uniform Transmission Line	lecture
13	Directional Couplers and Quarter Wave Transformers, Waveguides and Resonators, Hollow Rectangular Waveguide, Cavity Resonators, Fiber Optics	lecture
14	Basic Antenna Parameters, Simple Radiators, Radar Equation : Friss Formula	lecture
15		
16	Final Exam	exam

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	Field and Wave Electromagnetics, David K. Cheng, Addison-Wesley		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	60%	Final Exam	Final Exam

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	Getting knowledge about the Faraday’s law of electromagnetic induction, induction law, a stationary circuit in a time-varying magnetic field, transformers and a moving conductor in a static magnetic field.	1	1,2
2	Getting knowledge about a moving circuit in a time-varying magnetic field, Maxwell’s equations, integral form of Maxwell’s equations and electromagnetic boundary conditions.	1	1,2
3	Getting knowledge about the wave equations and their solutions, time-harmonic fields and phasors, time-harmonic electromagnetics and electromagnetic spectrum.	2	1,2
4	Getting knowledge about the plane waves in lossless media, Doppler effect and transverse electromagnetic waves.	2	1,2
5	Getting knowledge about the transverse electromagnetic waves and polarization of plane waves.	3	1,2
6	Getting knowledge about the plane waves in conducting media, plane waves in low-loss dielectric media and plane waves in good conductor.	4	1,2
7	Getting knowledge about the group velocity, flow of electromagnetic power and the poynting vector, instantaneous and average power densities.	4	1,2
8	Getting knowledge about the perpendicular incidence at a plane boundary, normal incidence at a plane conducting boundary and transmission lines.	5	1,2

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	3	42
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	3	42
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0
7	Preparation for Midterm Exam	1	12	12
8	Midterm Exam	1	1	1
9	Quiz	0	0	0
10	Homework	0	0	0
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	23	23
16	Final Exam	1	30	30
				150