OSTIM TECHNICAL UNIVERSITY
FACULTY OF ENGINEERING
COURSE SYLLABUS FORM
2022-2023

Course Name	Course Code	Period	Hour	Apllication Hour	Lab Hour	Credit	ECTS
Electromagnetic Waves	EEE305	Fall	3	0	0	3	4

Prerequisite	Calculus, algebra, vectors, trigonometry, complex numbers
Language of Instruction	English
Course Status	Compulsory
Course Level	Undergraduate
Method of Teaching	In class lectures, Home textbook reading
Learning and Teaching Techniques of the Course	Lectures, Homeworks, Quizzes, Textbooks Reading

Course Objective

The aim of the course is to introduce the students to the electromagnetic waves based on the Maxwell equations for develop conceptual understanding of waves, learning the relevant mathematics, pursuing advanced studies in engineering, the ability to reason, and gain skills for problem solving.

Learning Outcomes

Upon successful completion, students will have the knowledge and skills to:

1	Understand and analyze basic wave propagation problems
2	Understand basic mathematical tools used for the analysis of electromagnetic waves
3	Analyze wave propagation in lossless and lossy media, and the wave transmission and reflection at the planar interfaces between media
4	Analyze electromagnetic waves in transmission lines, hollow waveguides, and similar structures

Course Outline

This course is an introduction to the electromagnetic waves based on the Maxwell equations, wave and Helmholtz equations, complex-valued presentation of waves, and relevant mathematics. The course provides necessary practice in vector calculus, solving basic wave propagation problems, use of the complex-valued phasor presentation of time-harmonic foilds, formulation and the analysis of basic boundary-value problems, and related issues.

Weekly Topics and Related Preparation Studies		
Weeks	**Topics**	**Preparation Studies**
1	Faraday's Law of Induction	[1], Ch. 6.1, 6.2
2	Maxwell's Equations	[1], Ch. 6.3
3	Wave Equation. Time-Harmonic Fields	[1], Ch. 6.4, 6.5
4	Plane Waves in Lossless and Lossy Media	[1], Ch. 7.1, 7.2, 7.3
5	Flow of Electromagnetic Energy and Poynting Vector	[1], Ch. 7.4, 7.5
6	Normal Incidence of Plane Waves at Plane Boundaries	[1], Ch. 7.6
7	Oblique Incidence of Plane Waves at Plane Boundaries	[1], Ch. 7.7
8	Midterm	
9	Transmission Line Equations	[1], Ch. 8.1, 8.2
10	Transmission Line Parameters	[1], Ch. 8.3
11	Waves in Transmission Lines	[1], Ch. 8.4, 8.5
12	The Smith Chart	[1], Ch. 8.6
13	Transmission-Line Impedance Matching	[1], Ch. 8.7
14	Waveguides	[1], Ch. 9.1-9.4
15	Cavity Resonators	[1], Ch. 9.5
16	Final Exam	

Textbook(s)/References/Materials:

Textbook:

[1] D. K. Cheng, *Fundamentals of Engineering Electromagnetics*, Pearson New International Edition, 2014

References:

[2] J. A. Kong, *Electromagnetic Wave Theory*, EMW Publishing, 2008

[3] C. A. Balanis, *Advanced Engineering Electromagnetics,* John Wiley and Sons, N.Y., 1989

Assessment		
Studies	**Number**	**Contribution margin (%)**
Active Participation		5
Lab		
Application		
Field Study		
Course-Specific Internship (if any)		
Quizzes / Studio / Critical	8	15
Homework	5	25
Presentation		
Projects		
Report		

Seminar		
Midterm Exams / Midterm Jury	1	25
General Exam / Final Jury	1	30
	Total	**100**
Success Grade Contribution of Semester Studies		70
Success Grade Contribution of End of Term		30
	Total	**100**

Course Category	
Basic Vocational Courses	x
Specialization/Field Courses	
Support Courses	
Communication and Management Skills Courses	
Transferable Skills Courses	

Relationship Between Course Learning Outcomes and Program Competencies

No	Learning Outcomes	Contribution Level				
		1	2	3	4	5
1	Ability to apply knowledge of mathematics, science, and engineering					x
2	Ability to design and conduct experiments and to analyze and interpret experimental results.					
3	Ability to design a system, component, and process according to specified requirements.				x	
4	Ability to work in teams in interdisciplinary areas.					
5	Ability to identify, formulate and solve engineering problems.				x	
6	Identifies, defines, formulates and solves basic wave propagation problems; chooses and applies analysis and modeling methods suitable for this purpose.					x
7	Develops, selects and uses appropriate techniques and tools necessary for the analysis and solution of wave problems encountered in Electrical and Electronics Engineering applications; uses required technologies effectively.					x

ECTS / Workload Table

Activities	Number	Duration (Hours)	Total Workload
Course hours (Including the exam week: 16 x total course hours)	16	3	48
Laboratory			
Application			
Course-Specific Internship			
Field Study			
Study Time Out of Class	14	2	28
Presentation / Seminar Preparation			
Projects			
Reports			
Homeworks	5	2	10
Quizzes / Studio Review (during the lectures)	8	-	-
Preparation Time for Midterm Exams / Midterm Jury	1	7	7
Preparation Period for the Final Exam / General Jury	1	7	7
Total Workload	**ECTS 100/25 = 4.00**		