ESOGÜ Electrical-Electronics Engineering Department

COURSE CODE: 151227633-151247633 **COURSE TITLE:** Microwave Techniques

Semester	Weekly Hours		COURSE			
	Theoretical	**Practical**	**Credits**	**ECTS**	**Type**	**Language**
7	3	2	4	7	Compulsory ( ) Elective (x)	Turkish ( ) English (x)

Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).

Math and Basic Science	Electrical Engineering [mark (√) if there is high design content]	General Education	Humanities
0	4 ( )	0	0

Assessment		THEORETICAL-PRACTICAL COURSES			LABORATORY COURSES		
Midterm		**Type**	**Number**	**%**	**Activity Type**	**Number**	**%**
		Midterm	1	25	Quiz		
		Quiz	2	5	Lab performance	1	5
		Homework	2	5	Report	1	10
		Project	1	10	Oral exam		
		Other (………)			Other (………)		
Final				40			
Makeup exam (Oral/Written)							

Prerequisites	
Brief content of the course	Lumped-element model for transmission lines, analysis of fields in transmission lines, terminated transmission lines, Smith chart, generator and load mismatches, lossy transmission lines, transient analysis in transmission lines, impedance matching techmiques (L networks, single stub and double stub elements, quarter-wave transformators), microwave network analysis, impedance and equivalent voltages and currents, impedance and admittance matrices, scattering matrix, ABCD matrix.
Objectives of the course	Teaching fundamental concepts and different analysis methods for transmission lines, impedance matching techniques and realizing microwave network analysis.
Contribution of the course towards professional education	Providing knowledge and ability on microwave circuits and related engineering applications.
Outcomes of the course	1. Define transmission lines, their fundamental properties and certain analysis methods. 2. Distinguish impedance matching techniques. 3. Realizing microwave network analysis.
Textbook of the course	David M. Pozar, Microwave Engineering, 4th edition, John Wiley and Sons Inc., 2011.
Other reference books	- Robert E. Collin, Field Theory of Guided Waves, 2nd edition, John Wiley and Sons Inc., 1991. - Serkan Şimşek, Cevdet Işık ve Ercan Topuz, Mikrodalga Tekniği: Pasif Devreler ve Çözümlü Problemler, Papatya Yayıncılık, 2. baskı, 2015.
Required material for the course	

	WEEKLY PLAN OF THE COURSE	
Week	**Topics**
1	Plane electromagnetic waves. Parallel-plate waveguides. TE, TM and TEM modes.
2	Waveguides with rectangular and circular cross-sections. Coaxial waveguides.
3	Lumped-element circuit model for transmission lines. Analysis of fields in transmission lines.
4	Terminated transmission lines. Smith chart.
5	Generator and load mismatches.
6	Lossy transmission lines.
7	Transient analysis on transmission lines.
8	Midterm
9	Midterm
10	Impedance matching with L networks.
11	Impedance matching with single stub elements.
12	Impedance matching with double stub elements. Quarter-wave transformators.
13	Microwave network analysis: Impedance and equivalent voltages and currents. Impedance and admittance matrices. ABCD matrices.
14	Microwave network analysis: Scattering matrix.
15,16	Final

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronic Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronic Engineering	X			
2	Ability to identify complex engineering problems in Electrical and Electronic Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.	X			
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronic Engineering.		X		
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronic Engineering, skills to use information technology effectively.			X	
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronic Engineering				X
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.				X
7	Communicating effectively in oral and written form both in Turkish and English. Effective report writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.				X
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing				X
9	Understanding of professional and ethical responsibility				X
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				X
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				X

Scale for assessing the contribution of the course to the program outcomes:

    4: High   **3: Medium**   **2: Low**   **1:None**

Name of Instructor(s): Prof. Dr. Gökhan ÇINAR

Signature(s):

                                                            Date: