

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
APPLIED MICROWAVE ENGINEERING	EEE4167970	Fall Semester	3+0	3	6
Prerequisites Courses	ELEKTROMANYETİK				
Recommended Elective Courses	An Introduction to RF and Microwave Engineering				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Assoc.Prof. Hüseyin Şerif SAVCI				
Name of Lecturer(s)	Assoc.Prof. Hüseyin Şerif SAVCI				
Assistant(s)					
Aim	This course is tailored towards both fourth year undergraduate and graduate students. The course introduces hand on experience on RF circuit and systems. It is designed to provide students with a strong foundation in-Transmission line theory and its application to RF and microwave device characterisation.-Operational principles of many types of RF and microwave components and their experimental characterisation.-The interaction between microwave circuit components and wireless receiver systems through series of simulation and measurement experiences at circuit and sub-system level.-Using modern RF and microwave characterisation instrumentation with an understanding of their operational principles.				
Course Content	This course contains; Course Introduction & Getting Started Tutorials Frequency and Time Representations & Intro to CAD software, T-Line Basics, Freq. & Time Domain, Part II Transmission Line Reflections & VSWR Modelling and Simulation of Wireless System and Introduction to ADS, RF Subsystems. Impedance and the Smith Chart, Circuit Characterization. Smith Chart Revisited, Lumped Lowpass Filter. Scattering Parameters, Impedance Matching Circuits. TL Theory and Smith Chart Review, Distributed Lowpass Filter. T-Lines as Reactive Elements, Directional Couplers, Single Ended Mixer, Frequency Conversion and Mixer, Digital Systems and Basics of Modulation Schemes, Dipole and Patch Antennas, Receiver System Integration, System Integration Part II, Characterization and Simulation				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
3 Able to comment on the interactions between sub-circuits and systems. Able to verify these comments using measurement and simulations. Able to design and construct experiments on wireless circuits and systems. Able to make conclusive comments and write generate well-explained, clear and concise reports from the experiment results.			13, 17, 2, 21, 9	A, D, F, G	
2 Design and assemble simple RF and microwave circuit components using CAD/CAM tools and construct a bigger system using the smaller ones. Able to characterize different types of RF and microwave circuits in a simulation environment.			11, 16, 17, 19, 2, 21, 5, 6, 9	A, E, F, G	
1 Able to understand the behavioral and operational characteristics of RF and uW circuits and systems. Able to utilize transmission line theory for analyzing such circuits and systems.			12, 16, 19, 6, 9	A, D, E, F, G	
4 Able to operate modern RF and microwave lab instruments. Have an understanding of operational principles and internal architectures of these lab instruments.			11, 17, 2, 21, 5	D, G	
5 Able to do different types of measurements on wireless circuit and system using these instruments and test the operational and functional behaviors of these circuits and systems.			11, 17, 19, 2, 21, 5, 6	D	
Teaching Methods	11: Demonstration Method, 12: Problem Solving Method, 13: Case Study Method, 16: Question - Answer Technique, 17: Experimental Technique, 19: Brainstorming Technique, 2: Project Based Learning Model, 21: Simulation Technique, 5: Cooperative Learning, 6: Experiential Learning, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, D: Oral Exam, E: Homework, F: Project Task, G: Quiz				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Course Introduction & Getting Started Tutorials Frequency and Time Representations & Intro to CAD software, T-Line Basics □□□□	Pozar Chap 1 & 2			
2	Freq. & Time Domain, Part II Transmission Line Reflections & VSWR Modelling and Simulation of Wireless System and Introduction to ADS	Pozar Chap 3 & 4			
3	RF Subsystems. Impedance and the Smith Chart □□□□	Pozar Chap 1			
4	Circuit Characterization. Smith Chart Revisited	Pozar Chap 3 & 4			
5	Lumped Lowpass Filter. Scattering Parameters.	Pozar Chap 8			
6	Impedance Matching Circuits. TL Theory and Smith Chart Review	Pozar Chap 5			
7	Distributed Lowpass Filter. T-Lines as Reactive Elements	Pozar Chap 8			
8	Directional Couplers	Pozar Chap 7			
9	Single Ended Mixer	Pozar Chap 13			
10	Frequency Conversion and Mixer	Pozar Chap 13			
11	Digital Systems and Basics of Modulation Schemes	Pozar Chap 14			
12	Dipole and Patch Antennas	Pozar Chap 14			
13	Receiver System Integration	Pozar Chap 14			
14	System Integration Part II, Characterization and Simulation □□□□□	Pozar Chap 14			
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
"Microwave Engineering", David M. Pozar, 4th Ed., Wiley RF and Microwave Circuit Design: A Design Approach Using (ADS)", Ali Behagi, 2012, Techno Search "Fundamentals of Applied Electromagnetics", Fawwaz T. Ulaby, 7th Edition, Prentice Hall