COURSE INFORMATON					
Course Title	*Code*	*Semester*	*C +P + L Hour*	*Credits*	*ECTS*
RF Circuit Design	EE533	Fall/Spring	3 + 0 + 0	3	10

Prerequisites	

Language of Instruction	English
Course Level	Master's
Course Type	Elective
Course Coordinator	Assoc. Prof. Serkan TOPALOGLU
Instructors	Assoc. Prof. Serkan TOPALOGLU
Assistants	None
Goals	Explaining basic circuit elements and the design methods of high frequency electronics and circuit simulation.
Content	Basic principles of amplifier design, s-parameters and their usage in amplifier design, high frequency transistors and passive components, broadband impedance design techniques, high frequency oscillator design, RF and microwave mixers.

Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Ability to recognize RF circuit components	1, 2	1	A, D
2) Ability to characterize the RF components and circuits	2, 3	1	A, D, E
3) Ability to analyze RF circuits	4, 6	1	A, D, E
4) Ability to design RF circuits	3, 4, 6, 11	1, 3	A, D, E
5) Ability to simulate RF circuits	1,2, 11	1, 3	A, D, E

Teaching Methods:	1: Lecture, 2: Problem Solving, 3: Simulation, 4: Seminar, 5: Laboratory, 6: Term Research Paper
Assessment Methods:	A: Exam, B: Quiz, C: Experiment, D: Homework, E: Project

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction, importance of high frequency circuit design, units and symbols used in high frequency electronics, frequency spectrum.	Course Textbook
2	Behavior of the passive components (resistor, inductor, capacitor) at high frequency	Course Textbook
3	Investigation of transmission lines.	Course Textbook
4	Microstrip transmission lines.	Course Textbook
5	Smith Chart	Course Textbook
6	Impedance matching techniques.	Course Textbook
7	Amplifier basics	Course Textbook
8	LNA design	Course Textbook
9	High frequency oscillators.	Course Textbook
10	High frequency oscillators. (cont.)	Course Textbook
11	RF Amplifier design.	Course Textbook
12	RF mixer design.	Course Textbook
13	Circuit design using simulator.	Course Textbook
14	Circuit design using simulator (cont)	Course Textbook

RECOMMENDED SOURCES	
Textbook	Reinhold Ludwig, Pavel Bretchko, RF Circuit Design, Pearson Education.
Additional Resources	

MATERIAL SHARING	
Documents	Notes and papers on the web
Project	Project topics and contents
Exams	Midterm Exam Questions and Solutions

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Assignments	3-5	40
Project	1	60
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE	1	60
Total		**100**

COURSE CATEGORY	Field Course

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	Can reach information in breadth and depth, and can evaluate, interpret and apply this information to scientific research in the area of Electrical and Electronics Engineering.				x		
2	Can complete and apply information with scientific methods using limited or missing data; can integrate information from different disciplines.					x	
3	Sets up Electrical and Electronics Engineering problems, develops and implements innovative methods for their solutions.				x		
4	Develops new and/or original ideas and methods; finds innovative solutions to the system, component, or process design.				x		
5	Has comprehensive knowledge about the state-of-the-art techniques and methods in Electrical and Electronics Engineering and their limitations.						
6	Can design and conduct research of analytical, modeling or experimental orientation; can solve and interpret complex cases that come up during this process.				x		
7	Can communicate verbally and in writing in one foreign language (English) at the General Level B2 of the European Language Portfolio.						
8	Can assume leadership in multi-disciplinary teams; can develop solutions in complex situations, and take responsibility.						
9	Can systematically and openly communicate in national and international venues the proceedings and conclusions of the work he/she performs in Electrical and Electronics Engineering.						
10	Respects social, scientific and ethical values in all professional activities performed during the collection, interpretation and announcement phases of data.						

11	Is aware of new and emerging applications in Electrical and Electronics Engineering; investigates and learns them, whenever necessary.				x	
12	Can identify the social and environmental aspects of Electrical and Electronics Engineering applications.					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (including 2 midterms: 14xtotal lecture hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Assignments	5	10	50
Project	1	60	60
Final examination	1	20	20
Total Work Load			242
Total Work Load / 25 (h)			9.68
ECTS Credit of the Course			10