

**School of Engineering and Natural Sciences / Computer Engineering (English)**

**2023 - 2024 Academic Year**

**ELECTRONICS I**

**Syllabus**

<b>Course Description</b>					
<b>Name</b>	<b>Code</b>	<b>Semester</b>	<b>T+A Hour</b>	<b>Credit</b>	<b>ECTS</b>
ELECTRONICS I	COE3133980	Fall Semester	3+2	4	8
<b>Prerequisites Courses</b>	ELEKTRİK DEVRELERİ				
<b>Recommended Elective Courses</b>					
<b>Language of Instruction</b>	English				
<b>Course Level</b>	First Cycle (Bachelor's Degree)				
<b>Course Type</b>	Elective				
<b>Course Coordinator</b>	Assist.Prof. Mustafa AKTAN				
<b>Name of Lecturer(s)</b>	Assist.Prof. Mustafa AKTAN				
<b>Assistant(s)</b>					
<b>Aim</b>					
<b>Course Content</b>	This course contains; Introduction.Introduction of amplifiers.Review of PN junctions.,DiodesCircuits with diodes: Rectifier, Limiter, Voltage Doubler,Review of BJT and MOSFET Physics,BJT and MOSFET Small Signal Model,Biasing,Resistive degeneration and current mirrors.,1 transistor stages,Current mirrors, cascodes,Differential amplifiers.,Active loads and OPAMPs.,Telescopic and Folded Cascode Opamps.,Continue with Opamps.,Introduction to frequency response.,Frequency response and finals review..				
<b>Course Learning Outcomes</b>			<b>Teaching Methods</b>	<b>Assessment Methods</b>	
Has a basic understanding of semiconductor physics and the structure of a pn junction.			10, 12, 13, 14, 16, 19, 21, 6, 9		
Understands the operating principles of diodes.Knows how to analyze and design regulators, rectifiers, limiters and clampers.			10, 12, 14, 16, 17, 19, 20, 21, 5, 6, 9	A, E	
Analyzes and designs 1 and 2 transistor amplifier circuits with MOS devices.			10, 12, 13, 14, 16, 17, 19, 20, 23, 4, 5, 6, 9	A, E	
Analyzes and designs of current sources, current mirrors, and active loads.			10, 12, 13, 14, 17, 19, 23, 6, 9	A, E	
Analyzes and designs differential amplifier circuits.			10, 12, 14, 16, 19, 21, 5, 6, 9	A, E	
Understands the physical structure of the MOS transistor, its operating principles, and knows how to dc bias it in a circuit.			10, 12, 14, 16, 17, 19, 20, 21, 5, 6, 9	A, E	
<b>Teaching Methods</b>	10: Discussion Method, 12: Problem Solving Method, 13: Case Study Method, 14: Self Study Method, 16: Question - Answer Technique, 17: Experimental Technique, 19: Brainstorming Technique, 20: Reverse Brainstorming Technique, 21: Simulation Technique, 23: Concept Map Technique, 4: Inquiry-Based Learning, 5: Cooperative Learning, 6: Experiential Learning, 9: Lecture Method				
<b>Assessment Methods</b>	A: Traditional Written Exam, E: Homework				
<b>Lecture Schedule</b>					
<b>Sequence</b>	<b>Topics</b>	<b>Preliminary Preparation</b>			
1	Introduction.Introduction of amplifiers.Review of PN junctions.	Read the book chapter.			
2	DiodesCircuits with diodes: Rectifier, Limiter, Voltage Doubler	Read the book chapter.			
3	Review of BJT and MOSFET Physics	Read the book chapter			
4	BJT and MOSFET Small Signal Model	Read the book chapter			
5	Biasing	Read the book chapter			
6	Resistive degeneration and current mirrors.	Read the book chapter.			
7	1 transistor stages	Read the book chapter			
8	Current mirrors, cascodes	Read the book chapter.			
9	Differential amplifiers.	Read the book chapter.			
10	Active loads and OPAMPs.	Read the book.			
11	Telescopic and Folded Cascode Opamps.	Read the book.			
12	Continue with Opamps.	Read the book.			
13	Introduction to frequency response.	Read the book chapter.			
14	Frequency response and finals review.	Read the book chapter.			
<b>Evaluation Methods</b>		<b>Weight(%)</b>			
Midterm Exam		30			
General Exam		70			

<b>Resources</b>
Sedra/Smith: Microelectronic Circuits, 8ERazavi: "Fundamentals of Microelectronics", 2nd or 3rd edition