

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

2023 - 2024 Academic Year

ELECTRICAL CIRCUITS

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
ELECTRICAL CIRCUITS	COE3146020	Fall Semester	3+2	4	8
Prerequisites Courses	FİZİK II; FİZİK II LAB				
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Required				
Course Coordinator	Assoc.Prof. Muhammed Fatih TOY				
Name of Lecturer(s)	Assoc.Prof. Muhammed Fatih TOY				
Assistant(s)	Teaching Assistants				
Aim	To analyze and design linear electric circuits made of resistors, capacitors, inductors, and operational amplifiers.				
Course Content	This course contains; Basic circuit concepts (Charge, DC/AC current, voltage, power, energy, circuit elements),Basic laws (Ohm's law, Kirchof's laws, series/parallel resistor connections),Methods of analysis (Nodal analysis, mesh analysis),Circuit theorems 1 (Superposition, Thevenin, Norton theorems),Circuit theorems 2 (Superposition, Thevenin, Norton theorems),Operational amplifiers 1 (Ideal op-amp, inverting amplifier, noninverting amplifier, summing amplifier, difference amplifier),Operational amplifiers 2 (Ideal op-amp, inverting amplifier, noninverting amplifier, summing amplifier, difference amplifier),Capacitors and inductors 1 (Series and parallel connections, integrator, differentiator) ,Capacitors and inductors 2 (Series and parallel connections, integrator, differentiator),First order circuits 1 (Source free R-C and R-L circuits, step response of R-C and R-L circuits, first order op-amp circuits),First order circuits 2 (Source free R-C and R-L circuits, step response of R-C and R-L circuits, first order op-amp circuits),Second order circuits 1 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits),Second order circuits 2 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits),Second order circuits 3 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits).				
Course Learning Outcomes		Teaching Methods		Assessment Methods	
1. Students can apply basic laws of electric circuits.		17, 9		A, E	
2. Students can analyze DC electric circuits.		17, 9		A, E	
3. Students can explain the behavior of DC Op-Amp circuits.		17, 9		A, E	
4. Students can formulate the behavior of inductor and capacitor circuits.		17, 9		A, E	
5. Students can analyze first and second order circuits.		17, 9		A, E	
6. Students can design first and second order circuits.		17, 9		A, E	
Teaching Methods	17: Experimental Technique, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, E: Homework				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Basic circuit concepts (Charge, DC/AC current, voltage, power, energy, circuit elements)	Read the lecture notes: Chapter One			
2	Basic laws (Ohm's law, Kirchof's laws, series/parallel resistor connections)	Read the lecture notes: Chapter Two			
3	Methods of analysis (Nodal analysis, mesh analysis)	Read the lecture notes: Chapter Three			
4	Circuit theorems 1 (Superposition, Thevenin, Norton theorems)	Read the lecture notes: Chapter Four			
5	Circuit theorems 2 (Superposition, Thevenin, Norton theorems)	Read the lecture notes: Chapter Four			
6	Operational amplifiers 1 (Ideal op-amp, inverting amplifier, noninverting amplifier, summing amplifier, difference amplifier)	Read the lecture notes: Chapter Five			
7	Operational amplifiers 2 (Ideal op-amp, inverting amplifier, noninverting amplifier, summing amplifier, difference amplifier)	Read the lecture notes: Chapter Five			
8	Capacitors and inductors 1 (Series and parallel connections, integrator, differentiator)	Read the lecture notes: Chapter Six			
9	Capacitors and inductors 2 (Series and parallel connections, integrator, differentiator)	Read the lecture notes: Chapter Six			
10	First order circuits 1 (Source free R-C and R-L circuits, step response of R-C and R-L circuits, first order op-amp circuits)	Read the lecture notes: Chapter Seven			
11	First order circuits 2 (Source free R-C and R-L circuits, step response of R-C and R-L circuits, first order op-amp circuits)	Read the lecture notes: Chapter Seven			
12	Second order circuits 1 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits)	Read the lecture notes: Chapter Eight			
13	Second order circuits 2 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits)	Read the lecture notes: Chapter Eight			
14	Second order circuits 3 (Source free R-L-C circuits, step response of R-L-C circuits, general second order circuits, second order op-amp circuits)	Read the lecture notes: Chapter Eight			
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Fundamentals of Electric Circuits, by C. K. Alexander and M. N. O. Sadiku, 5th edition. Electrical Engineering 101, D. Ashbey, 3rd edition