EEE201 – ELECTRICAL CIRCUITS I

Course Code	Course Name		Semester	
EEE201	Electrical Circuits I		Fall ☒ Spring ☐ Summer ☐	
Hours			**Credit**	**ECTS**
Theory	**Practice**	**Lab**	4	5
4	0	0		

Course Details	
Department	Electrical and Electronics Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☒ Elective ☐
Lecturer(s)	Prof. Dr. Yalçın Ata
Course Objectives	To equip students with a comprehensive understanding of fundamental electrical circuit concepts and analytical techniques, including Ohm's and Kirchhoff's laws, Thevenin and Norton equivalent circuits, and nodal and mesh analyses. The course emphasizes the analysis of first- and second-order circuits, operational amplifiers, and the use of phasor domain representation for sinusoidal steady-state analysis. Through problem-solving and practical applications, students will develop the foundational skills required for advanced topics in electrical engineering.
Course Content	This course covers the fundamental principles of electrical circuit analysis, including charge, current, voltage, and power concepts, as well as the behavior of resistors, capacitors, and inductors. Topics include Ohm's Law, Kirchhoff's Laws, node voltage and mesh current methods, Thevenin and Norton equivalents, and network theorems such as superposition and maximum power transfer. The course also introduces operational amplifiers, including inverting, non-inverting, and summing configurations. Analysis of first- and second-order circuits is performed in both the time domain and frequency domain, with an emphasis on transient and sinusoidal steady-state responses. Additional topics include phasor domain representation, impedance, power calculations in AC circuits.
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☐ Discussion ☐
Prerequisites/ Corequisites	

Work Placement(s)	-

Textbook/References/Materials

- Electric Circuits, Global Edition, 10th Edition, (Pearson) James W. Nilsson, Susan Riedel, 2015
- Fundamentals of Electric Circuits, (McGraw Hill) by Charles Alexander, Matthew Sadiku, 2017.
- Electric Circuits, (McGraw Hill), Schaum's Outlines, 7th ed., Mahmood Nahvi, Joseph A. Edminister, 2018

Course Category				
Mathematics and Basic Sciences	☐		Education	☐
Engineering	☒		Science	☐
Engineering Design	☐		Health	☐
Social Sciences	☐		Profession	☐

Weekly Schedule

No	Topics	Materials/Notes
1	Introduction to Electrical Circuits	Ch. 1 (Nilsson)
2	Resistive Circuits; Sources; measurement equipments	Ch. 2,3
3	Linearity; Nodal Analysis	Ch. 3,4
4	Nodal Analysis; Mesh Analysis	Ch.4
5	Thevenin's and Norton's theorems;	Ch.4
6	Thevenin's and Norton's theorems; Power Transfer; Superposition	Ch.4
7	Op-Amps	Ch.5
8	Midterm Exam	-
9	Analysis of resistive Op-Amp circuits	Ch.5
10	Energy-Storage Elements	Ch.6
11	First-Order Circuits	Ch. 7
12	First-Order Circuits	Ch. 7
13	Second-Order Circuits	Ch. 8
14	Second-Order Circuits	Ch.8
15	Sinusoidal Steady-State Analysis	Ch.9
16	Final Exam	-

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance		
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework	3	10%
Presentation / Seminar		
Project		
Report		
Seminar		
Midterm Exam	2	50%
Final Exam	1	40%
	Total	**100%**
Contribution of Midterm Studies to Success Grade		60%
Contribution of End of Semester Studies to Success Grade		40%
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	16	4	64
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time			
Quiz/Studio/Criticize			
Homework	3	5	15
Presentation / Seminar			
Project			
Report			
Midterm Exam and Preparation for Midterm	2	10	20
Final Exam and Preparation for Final Exam	1	15	15
Total Workload			**114**
Total Workload / 25			**4.56**
ECTS Credit			**5**

Course Learning Outcomes	
No	**Outcome**
L1	Interpreting the basic circuit concepts, such as voltage, current, power, energy, etc.
L2	Using node and mesh analyses methods for the analysis of linear time invariant circuits.
L3	Analyzing circuits by utilizing Thevenin's and Norton's theorems.
L4	Analyzing circuits with operational amplifiers.
L5	Interpreting the operation of capacitors and inductors; and analyzing both transient and steady-state response of first order circuits.
L6	Analyzing second order circuits.
L7	Identifying the concept of phasor; and applying it for the AC steady-state analysis of circuits.

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**					**Total**
L1	4	5	4	3	3	1	X	X	X	X	X					-
L2	4	4	3	4	3	1	X	X	X	X	X					-
L3	4	5	3	4	2	1	X	X	X	X	X					-
L4	4	4	4	3	2	1	X	X	X	X	X					-
L5	4	4	4	2	1	1	X	X	X	X	X					-
L6	4	4	4	2	1	1	X	X	X	X	X					-
L7	4	3	3	2	1	1	X	X	X	X	X					-
															Total	-

i. Sufficient knowledge in the fields of mathematics, natural sciences, and related engineering disciplines; the ability to apply theoretical and practical knowledge in solving complex engineering problems.

ii. The ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.

iii. The ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.

iv. The ability to select and use modern techniques and tools required for the analysis and solution of complex problems encountered in engineering applications; the ability to effectively use information technologies.

v. The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of complex engineering problems or discipline-specific research topics.

vi. The ability to work effectively in intra-disciplinary and multidisciplinary teams; the ability to work independently.

vii. The ability to communicate effectively both orally and in writing; proficiency in at least one foreign language; the ability to write effective reports, understand written reports, prepare design and production reports, make effective presentations, and give and receive clear and understandable instructions.

viii. Awareness of the necessity of lifelong learning; the ability to access information, track developments in science and technology, and continuously renew oneself.

ix. Acting in accordance with ethical principles, knowledge of professional and ethical responsibilities, and the standards used in engineering applications.

x. Knowledge of business practices such as project management, risk management, and change management; awareness of entrepreneurship and innovation; knowledge of sustainable development.

xi. Knowledge of the impact of engineering practices on health, environment, and safety at global and societal levels, and awareness of contemporary engineering issues; awareness of the legal consequences of engineering solutions.