Identification	**Subject (Code, title, credits)**	ETR393 - Basics of Circuitry - 6 ECTS credits	
	Department	Physics and Electronics	
	Program	Undergraduate	
	Term	Fall 2025	
	Instructor	MSc, MIET, Alim Huseynov	
	E-mail:	Alim.Huseynov@gmail.com	
	Phone:		
	Classroom/hours	11 Mehseti str. (Neftchilar campus)	
	Office hours	Monday-Friday, from 9:00 to 18:00	
Prerequisites	-		
Language	English		
Compulsory/ Elective	Elective		
Required textbooks and course materials	Textbooks: [1] - Basic Engineering Circuit Analysis - J. David Irwin, R. Mark Nelms, 2015 [2] - Introduction to Electric Circuits - James A. Svoboda, Richard C. Dorf – 2014 [3] - Electronics Fundamentals Circuits Devices and Applications – D.M. Buchla and T.L. Floyd-2014		
Course outline	This course introduces students to the fundamental concepts of electrical circuits, focusing on the behavior of basic electrical components and analysis techniques. Starting from foundational principles such as voltage, current, and resistance, students will gradually explore more complex concepts such as nodal and loop analysis, reactive components (capacitors and inductors), and resonance in RLC circuits. The course emphasizes practical understanding by introducing MATLAB-based circuit analysis and the use of measuring devices. By the end of the course, students will have a solid foundation in both theoretical circuit analysis and practical problem-solving techniques.		
Course objectives	• To develop a foundational understanding of key concepts in electrical circuits. • To introduce students to the analysis of basic and complex circuits using both theoretical and computational tools like MATLAB. • To teach students how to apply nodal, loop, and resonance techniques in analyzing real-world circuits. • To enhance practical skills in measuring electrical quantities using standard devices and meters. • To familiarize students with the functionality and applications of operational amplifiers.		
Learning outcomes	By the end of the course, students will be able to: • Understand and apply basic circuit concepts such as voltage, current, resistance, and power. • Identify and analyze different types of circuit elements, including resistors, capacitors, and inductors. • Accurately use measuring devices such as voltmeters, ammeters, and ohmmeters in electrical circuits. • Analyze resistive circuits and solve them using MATLAB simulations. • Apply nodal and loop analysis techniques to determine voltages and currents in circuits. • Understand the behavior and applications of capacitors, inductors, and their impact in RC, RL, and RLC circuits. • Analyze resonant circuits and predict their frequency response. • Use MATLAB to analyze the behavior of RC, RL, and RLC circuits. • Understand the basic principles and applications of operational amplifiers in circuit design.		
Teaching methods	**Lecture**		☑
	Group discussion		☑
	Experiential exercise		☑
	Case analysis		☐
	Quiz, Classroom Exams		☑
	Course paper		☐
	Others		☑
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		30
	Attendance	At each lesson	5
	Quiz	During the semester	15
	Activity	During the semester	10
	Final Exam		40
	Total		100

Policy	▪ **Preparation for class** The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major pointsintroduced in the text. Reading the assigned chapters and having some familiaritywith them before class will greatly assist your understanding of the lecture. Afterthe lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions. • **Withdrawal (pass/fail)** This course strictly follows grading policy of the School of Humanities, Education and Social sciences. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course thefollowing term or year. ▪ **Cheating/plagiarism** Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations. ▪ **Professional behavior guidelines** The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. **Attendance** Students who attend the whole classes will get 5 marks. for three absence student loses 1 mark. • **Quizzes** There will be a quizzes per two weeks. The quizzes will be announced in the classroom two weeks before and will relate to homework. • **Activity** Students who will be active during discussion of past lessons will be awarded with one activity mark.

Tentative Schedule			
Weeks	Date/Day	Topics	Reference to textbooks
1.	18-09-25	Basic Concepts, Voltage, Current, And Resistance Conduction of oral and written survey. Problem solving	[1] p1 [2] p1 [3] p1
2.	25-09-25	Circuit Elements Conduction of oral and written survey. Problem solving	[1] p8 [2] p20
3.	02-10-25	Introducing measuring devices and meters. Conduction of oral and written survey. Problem solving	[2] p30 [3] p967
4.	09-10-25	Resistive Circuits Quiz 1 - Lecture 1 – Lecture 3	[1] p24 [2] p53
5.	16-10-25	Analyzing Resistive Circuits Using MATLAB Conduction of oral and written survey. Problem solving	[1] p82
6.	23-10-25	Nodal analysis techniques Conduction of oral and written survey. Problem solving	[1] p90 [2] p114
7.	30-10-25	Loop analysis techniques Quiz 2 - Lecture 4 – Lecture 6	[1] p111 [2] p128
8.	06-11-25	Midterm exam.	
9.	13-11-25	Capacitors Conduction of oral and written survey. Problem solving	[1] p220 [2] p269 [3] p401
10.	20-11-25	RC circuits Conduction of oral and written survey. Problem solving	[2] p330 [3] p459
11.	27-11-25	Inductors Quiz 3 - Lecture 7 – Lecture 10	[1] p227 [2] p280 [3] p517
12.	04-12-25	RL circuits Conduction of oral and written survey. Problem solving	[2] p330 [3] p557
13.	11-12-25	RLC circuits and resonance Conduction of oral and written survey. Problem solving	[1] p275 [2] p378

			[3] p603
14.	18-12-25	Analyzing RC, RL and RLC Circuits Using MATLAB Conduction of oral and written survey. Problem solving	[2] p873
15.	25-12-25	Operational Amplifiers Quiz 4 - Lecture 11 – Lecture 14	[1] p147 [2] p219 [3] p835
	TBC	Final exam	

This syllabus is a guide for the course and any modifications to it will be announced in advance.