

## SYLLABUS

<b>General information</b>	<b>Title and code of subject,number of credits</b>	EENG 250 – Fundamentals of Electrical Engineering 8 ECTS		
	<b>Department</b>	Physics and Electronics		
	<b>Program</b>	Bachelor		
	<b>Academic semester</b>	Spring, 2023		
	<b>Lecturer</b>	M.Sc Babak Emdadi		
	<b>E-mail:</b>	<a href="mailto:emdadi.babak2021@khazar.org">emdadi.babak2021@khazar.org</a>		
	<b>Phone number:</b>	+994 507136561		
	<b>Lecture room/Schedule</b>	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus)		
	<b>Consultations</b>			
<b>Course language</b>	English			
<b>Type of the subject</b>	Major			
<b>Textbooks and additional materials</b>	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Electrical engineering concepts and applications, S. A. Reza Zekavat, 2013.</li> <li>2. Electronic devices: electron flow version, Thomas L. Floyd, 9th Edition, 2012.</li> <li>3. Fundamentals of electric circuits, Charles K. Alexander, Matthew N. O. Sadiku, 5th Edition, 2013</li> </ol> <p>Optional Reference Texts:</p> <ol style="list-style-type: none"> <li>4. Electrical Engineering: Principles and Applications, Allan R. Hambley, 5th Edition, 2011</li> </ol> <p>Additional Resource Texts:</p> <ol style="list-style-type: none"> <li>5. Principles and Applications of Electrical Engineering, Giorgio Rizzoni, 5th Edition, 2014</li> </ol>			
<b>Teaching methods</b>	<b>Lecture</b>			
<b>Assessment</b>	<b>Components</b>	<b>Date/ Deadline</b>	<b>Percent (%)</b>	
	<b>Active participation</b> • Solving exercises	At each lesson	10	
	<b>Quizzes</b>	During the semester, 2 time	10	
	<b>Attendance</b>	At each lesson	10	
	<b>Mid-term exam</b>		30	
	<b>Final exam</b>		40	
	<b>Final</b>		<b>100</b>	
<b>Course description</b>	<p>The purpose of this course is to teach undergraduate students the fundamentals of electrical engineering. This course mainly covers topics that are related to direct current circuits. Generally, the course consists of the following sections. The first section covers basic concepts and basic laws of electric circuits. The second section analyzes operation principles of filters. The third part studies electronic components such as diodes, capacitors, inductors, transistors, operational amplifiers, and their application. The last sections talk about magnetically coupled circuits, electric machines, and logic circuits. Moreover, along this course students will be introduced to use schematic capture and simulation software that make easier to design and analyze electrical circuits.</p>			
<b>Course objectives</b>	The main objective of this course is to introduce the main concepts of electrical engineering, and to teach fundamentals of electronic circuit design.			

<b>Learning outcomes</b>	<p>What students should know by the end of the course:</p> <ul style="list-style-type: none"> <li>• Basic concepts of electric circuits.</li> <li>• Basic laws of electric circuits.</li> <li>• Fundamentals of electronic circuit design.</li> <li>• Operation principles of resistors, diodes, capacitors, inductors, transistors, amplifiers, active filters, transformers, DC motors, DC generators and logic gates.</li> <li>• Design and analyze of electric circuits using Orcad software.</li> </ul>
<b>Rules (Educational policy and behavior)</b>	<ul style="list-style-type: none"> <li>▪ <b>Preparation for class</b> The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions.</li> <li>• <b>Withdrawal (pass/fail)</b> 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 the following term or year.</li> <li>▪ <b>Cheating/plagiarism</b> 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.</li> <li>▪ <b>Professional behavior guidelines</b> 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.</li> <li>▪ <b>Attendance</b> Students who attend the whole classes will get 5 marks. For three absence student loses 1 mark.</li> <li>• <b>Quizzes</b> There will be a quizzes per two weeks. The quizzes will be announced in the classroom two weeks before and will relate to homework.</li> <li>• <b>Activity</b> Students who will be active during discussion of past lessons will be awarded with one activity mark.</li> </ul>

This program reflects the comprehensive information about the subject and information about any changes will be provided in advance.

Week	Dates (planned)	Subject topics	Textbook/ Assignments
1		<i>Fundamentals of Electric Circuit:</i> Systems of units. Charge and current. Voltage. Power and energy. Circuit elements. Applications.	[1], [3]
2		<i>Resistive Circuits:</i> Ohm's law. Nodes, branches, and loops. Kirchhoff's laws. Series resistors and voltage division. Parallel resistors and current division. Nodal and Mesh Analysis.	[1], [3]
3		<i>Capacitance and inductances:</i> Capacitors. Series and parallel capacitors. Inductors. Series and parallel inductors. Practical inductors Mutual inductance. Applications. <b>Quiz 1</b>	[1], [2]
4		<i>Frequency Analysis:</i> First-Order Filters, Transfer Functions, Low-Pass Filters, High-Pass Filters, Second-Order Filters, Band-Pass Filters, Band-Stop Filters	[1], [2]
5		<i>Electronic Circuits:</i> Diodes and applications. Half-wave rectifiers. Full-wave rectifiers. <i>Questions and Exercises</i>	[1], [2]

<b>6</b>		<i>Electronic Circuits</i> : The zener diode. Zener diode applications. The varactor diode. Optical diodes.	[2]
<b>7</b>		<i>Electronic Circuits</i> : Bipolar junction transistors, BJT amplifiers. Operational amplifiers. <b>Quiz 2</b>	[2]
<b>8</b>		<i>Electronic Circuits</i> : Bipolar junction transistors. BJT amplifiers.	[2]
<b>9</b>		<b>Mid-term exam</b>	
<b>10</b>		<i>Electronic Circuits</i> : Operational amplifier. Operational amplifier circuits.	[2]
<b>11</b>		<i>Electronic Circuits</i> : Operational amplifier. Operational amplifier circuits. Questions and Exercises. <b>Quiz 3</b>	[2]
<b>12</b>		<i>Magnetically Coupled Circuits</i> : Mutual inductance. Energy in a coupled circuit. Transformers.	[3] [2]
<b>13</b>		<i>Electric Machines</i> : Features of electric machines. Classification of motors. DC motors and their types. DC generators and their types.	[1]
<b>14</b>		<i>Logic Circuits</i> : Number systems. Boolean algebra. Boolean logic gates. <b>Quiz 4</b>	[1]
<b>15</b>		<b>Recap of all covered material</b>	
		<b>Final Exam</b>	