

## SYLLABUS

<b>General information</b>	<b>Title and code of subject, number of credits</b>	ETR 452 Electrical machines 8 ECTS	
	<b>Department</b>	Physics and Electronics	
	<b>Program</b>	Bakalavr	
	<b>Academic semester</b>	2024, Fall	
	<b>Lecturer</b>	PhD , dosent Hasanov Elchin	
	<b>E-mail:</b>	elgafgas@yahoo.com	
	<b>Phone number:</b>	+994 50 5287740	
	<b>Lecture room/Schedule</b>	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	<b>Consultations</b>	II, 15:00 – 16:00	
	<b>Office hours</b>	Sunday 10-00	
<b>Prerequisites</b>			
<b>Course language</b>	English		
<b>Type of the subject</b>	Major		
<b>Textbooks and additional materials</b>	<ol style="list-style-type: none"> <li>1. Y. B. Orucov, Q. İ. Abbasov, S. M. Gözəlov, N. C. Ələkbərova elektrik maşınları. I hissə d ə r s l i k g ə n c ə – 2014</li> <li>2. Azərbaycan Memarlıq və İnşaat Universiteti. Elektrik Maşınları - 2 ( Dərs vəsaiti) Bakı – 2019</li> <li>3. S. K. Sahdev. Electrical Machines. Cambridge University Press 2018.</li> <li>4. Osmanov S.A. Elektrik maşınları (I hissə). Dərslik., ADNA,2005.</li> <li>5. Osmanov S.A., İbadov O.İ. Elektrik maşınları. Dərs vəsaiti, ANKİ, Bakı 2005.</li> <li>6. Electrical Machines-2 Digital Notes Prepared by Prof. K Subhas Department of EEE MRCET 2018-19</li> <li>7. ELECTRICAL MACHINES-I Digital notes B. TECH (II YEAR –I SEM) 2020-2021 Department of Electrical &amp; Electronics Engineering Prepared by: G. SEKHAR BABU Assistant Professor</li> <li>8. <a href="#">Rohit Mehta</a>. Principles of electrical machines. 2022</li> <li>9. Ильинский Н.Ф., Козаченко В.Ф. Общий курс электропривода. –М.: Энергоатомиздат, 1992. – 543с.</li> </ol>		
<b>Teaching methods</b>	<b>Lecture</b>	+	
	<b>Group discussions at seminars</b>	+	
<b>Assessment</b>	<b>Components</b>	<b>Date/ Deadline</b>	<b>Percent (%)</b>
	<b>Tests</b>	During the semester	5
	<b>Activity</b>	At each lesson	10
	<b>Quizzes</b>	During the semester	15
	<b>Attendance</b>	During the semester	5
	<b>Midterm exam</b>		30
	<b>Final exam</b>		35
	<b>Final</b>		<b>100</b>
<b>Course description</b>	Electrical machines are one of the main disciplines based on which power supply and energy saving are based, therefore knowledge in this area will allow students in their practical activities to consciously and more effectively use electrical machines. The knowledge gained should expand and stimulate the creative abilities of students, encourage them to further study the subjects of the specialty.		
<b>Course objectives</b>	The purpose of the "Electrical Machines" subject is to provide students studying Electrical and Electronics Engineering at the bachelor's level with a comprehensive understanding of electrical engineering principles. This includes learning the laws of electrical engineering, the rules for calculating electric circuits, and the operation of various types of machines such as transformers, asynchronous and synchronous machines, direct current machines, as well as alternating and direct current micromachines, including rotating transformers. The course covers the working principles, structural features, methods and rules for construction, and analysis of energy, electromagnetic, electromechanical, and operational characteristics of electrical equipment. It aims to develop students' professional knowledge about the types, structure, and operating rules of electrical equipment, while also fostering systematic knowledge and skills. Ultimately, the course contributes to the development and strengthening of both academic and social-personal competencies.		
<b>Learning outcomes</b>	<b>Expected Learning Outcomes:</b>		

	<p>At the end of the course, students and trainees are expected to acquire the following knowledge and skills:</p> <p><b>They should know:</b></p> <ul style="list-style-type: none"> <li>• The location, role, and importance of electric machines in various fields of activity.</li> <li>• The mathematical and physical foundations of electric machines.</li> <li>• The general theoretical principles of alternating current electric machines.</li> <li>• The designation, applications, and classification of transformers, asynchronous and synchronous machines, and direct current machines.</li> <li>• The constructive structure and working principles of these machines.</li> <li>• The mathematical equations, substitution schemes, and vector diagrams related to electric machines, as well as their energetic, electromagnetic, and electromechanical properties.</li> <li>• The rules and methods for selecting electric machines used in electrical installations of various purposes and types, depending on engine and generator modes.</li> </ul> <p><b>They should be able to:</b></p> <ul style="list-style-type: none"> <li>• Connect transformers, asynchronous and synchronous machines, and direct current machines for operation, adjust their main parameters, and conduct experimental research on various operating modes.</li> <li>• Calculate the main operational parameters and establish mechanical, adjustment, and working characteristics.</li> <li>• Build models and conduct research using computer programs.</li> <li>• Apply rules for calculating resistance forces, moments, and torque on the engine shaft.</li> <li>• Select, determine, and calculate parameters that affect the quality and productivity of processes performed with electric machines.</li> </ul>
<p><b>Rules (Educational policy and behavior)</b></p>	<ul style="list-style-type: none"> <li>• Lesson organization</li> </ul> <p>General information on the subject will be provided for the students during lectures. Student's knowledge on the previous topics will be evaluated and new topic will be explained by mins of visual aids during seminars. Student's knowledge level will be tested orally and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory.</p> <ul style="list-style-type: none"> <li>• Effectiveness (pass/fail)</li> </ul> <p>This course strictly follows the assessment policy conducted by the subject teaching faculty. Hence a student must score at least 60% to pass the course normally. In case of failure he will be forced to repeat the course in the next term or year.</p> <ul style="list-style-type: none"> <li>• Plagiarism</li> </ul> <p>Cheating or other forms of plagiarism during review surveys, midterms and final exams will result in disqualification. In this case a student will automatically receive zero "0" without further discussion.</p> <ul style="list-style-type: none"> <li>• Professional conduct directives</li> </ul> <p>Students will behave professionally during class hours to create a conducive academic environment. Off course discussions and unethical behavior are strictly prohibited.</p> <ul style="list-style-type: none"> <li>• Attendance</li> </ul> <p>Participation of students at all classes is important. Students should inform dean's office about missing lessons for particular reasons (illness, family issues and etc.). Students, missing more than 25% of lessons, are not allowed to take the exam.</p> <ul style="list-style-type: none"> <li>• Quizzes.</li> </ul> <p>Quizzes will be four times during semester. The time of quizzes will be announced in the classroom three weeks before. The quizzes will be related to the homework material.</p> <ul style="list-style-type: none"> <li>• Activity</li> </ul> <p>Students who will be active during discussion of past lessons will be awarded with one activity mark.</p>

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	17.09./24	Purpose and classification of electrical machines  Mexaniki hərəkət.	[1] p.709-741

2	24.09./24	Direct current electric machines	[1] p.750-773 [1] p-780-795
		Problem solving..	
3	01./10/24	Types of DC machines and their main characteristics	[1] p.800-815
		Problem solving.	
4	08/10/24	AC electric machines, three-phase asynchronous motor	[1] p.815-838
		Problem solving.	
5	15/10/24	Single-phase asynchronous motors	
		Problem solving.	
6	22/10.24	Three-phase synchronous machines	[1] p.846-872
		Problem solving.	
7	29/10/24	Single-phase synchronous machines and universal commutator motors	[1]p.881-900,
		Problem solving	
8	05.11/24	Stepper and induction electric motors	[1] p.957-984
		Problem solving.	
9		<b>Midterm exam</b>	
10	12/11/24	Electric machine sensors (tach generators)	[1] p.916-947
		Problem solving	
11	19.11.24	Rotating transformers	[4]p. 73-96
		Problem solving	
12	26.11.24	Induction synchronous machines (selsyns)	[1] p.1061-1085
		Problem solving	
13	03/12/24	Mechanical characteristics of electric motors and their main parameters	[3]p.555-611
		Problem solving.	
14	10/12/24	Construction of a DC machine	[1] page 9-6
		. Problem solving	[1] page 10-6
15	17/12/24	Asynchronous micromachines Geared (inductor) motors	[1] page 11-6

