

**Bachelor program,
Instrumentation Engineering (INEN) program, “Electrical Engineering” department**

Course Unit Title	Electrical Engineering	
Course Unit Code	VTSS-B09	
Type of Course Unit	Compulsory	
Level of Course Unit	First cycle Bachelor	
National Credits	0	
Number of ECTS Credits Allocated	7	
Theoretical (hour/week)	2	
Practice (hour/week)	1	
Laboratory (hour/week)	2	
Year of Study	2	
Semester when the course unit is delivered	4	
Course Coordinator	Aliyev Ilgar	
Name of Lecturer (s)	Aliyev Ilgar	
Name of Assistant (s)	-	
Mode of Delivery	Face to Face	
Language of Instruction	English	
Prerequisites	-	
Recommended Optional Programme Components	Electronics workbench, AutoCAD, ETAP, MATLAB	
Course description:		
The purpose of the course is to acquire the ability to analyze the processes occurring in electrical circuits by studying the elements and parameters of DC and AC electrical circuits.		
Objectives of the Course:		
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Learning Outcomes		
At the end of the course the student will be able to		Assessment
1.	Analyze DC and AC circuits by applying different calculation methods and theorems.	1,3
2.	Know the types and construction of devices used in the production, transmission and distribution of electricity and their working principles.	1,2,3
3.	Properly connect electrical measuring devices to the electrical circuit	2,3
4.	Draw electrical diagrams and read electrical schematics.	2,3
5.	Calculate the power consumed in electrical systems and power losses during the transmission of electricity.	1,3
6.	Calculate real, reactive and apparent power, and power factor of given electrical loads.	1,3
7.	Analyze three-phase circuits, measure the power delivered to a three-phase load.	2,3
Assessment Methods: 1. Final Exam, 2. Presentation, 3. Midterm exam		
Course’s Contribution to Program		
		CL
1	Ability to develop as a specialist in the field of fundamental sciences and apply basic knowledge.	4
2	Ability to analyze and model functional and structural schemes of various purpose devices and systems.	3
3	Ability to use modern methods and tools, creation, selection, and application of engineering and information technology tools and modern devices and equipment.	2
4	The ability to use the strategy of team cooperation in the exchange of information, knowledge, and experience to achieve the set goal.	5
5	As a result of training, the ability to use engineering knowledge, mathematical models, and basic concepts of physics and chemistry in production and technological processes,	4

	automation, measurement, and control systems.	
6	The ability to use modern software to process technical documents of devices, design their structures, and algorithmize processes.	4
7	The ability to apply artificial intelligence to improve the quality characteristics of measurement and control systems.	4
8	The ability to process information acquisition, processing, and transmission processes based on schematic and programmable logical integrated circuits.	4
9	Ability to use knowledge to improve quality indicators and environmental safety of production processes.	5
10	Self-development ability to apply theoretical and experimental knowledge in solving modern engineering problems.	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

We ek	Chapter	Topics	Exam
1	Textbook 1 Chapter 1	Basic concepts. Structure of atom. Electrical charge. Electrical circuit. Current, emf, voltage. Resistance. Conductance Lab: Application of DC series, parallel and mix combination electrical circuits	
2	Textbook 1 Chapter 2	Voltage and current sources. Internal resistance of the source. Sources transformation. Ohms law. Electrical power and energy Lab: Application of DC series, parallel and mix combination electrical circuits	
3	Textbook 1 Chapter 3	DC circuits. DC series circuits. voltage division. DC parallel circuits. Current division. Series and parallel circuits. Lab: Consumer and generator mode of EMF source	
4	Textbook 1 Chapter 4	Complex electrical circuits. Branch, node, loop. Kirchoff's laws Lab: Star to delta (Delta to star) transformations	
5	Textbook 1 Chapter 5	DC circuit theorems. Mesh currents method. Superposition method Lab: Wheatstone bridge	
6	Textbook 1 Chapter 6	Nodal analysis method. Two nodes analysis method. Lab: Analysis of nodal voltage method and superposition theorem in practically	
7	Textbook 1 Chapter 9.1	DC circuit theorems. Superposition method. Lab: Analysis of nodal voltage method and superposition theorem in practically	
8		Sinusoidal voltage and current. Power and power factor. Power triangle. Apparent power, active and reactive power. Lab: Analysis of series RLC	Midterm
9	Textbook 1 Chapter 9.2	Sinusoidal voltage and current. Power and power factor. Power triangle. Apparent power, active and reactive power. Lab: Analysis of series AC circuits in practically	
10	Textbook 1 Chapter 10	Sinusoidal voltage and current. Instantaneous, peak, average and effective values. Phase, phase difference. Lab: Analysis of parallel AC circuits in practically	
11	Textbook 1 Chapter 11	Determination of currents and voltages in AC circuits. Resistive, inductive and capacitive circuits. Impedance. Phasor algebra. Lab: Analysis of parallel AC circuits in practically	
12	Textbook 1 Chapter 12	AC series circuits. Voltage resonance. Lab: Analysis of three phase star connected circuit	
13	Textbook 1	AC parallel circuits. Current resonance.	

	Chapter 13	Lab: Connection of wattmeter to a electrical circuit	
14	Textbook 1 Chapter 14	3 phase circuits. 3 phase alternator. Star connection. Balanced source. Balanced load. Voltage and currents in balanced and unbalanced supply systems. Advantages of star connection Lab: Analysis of three phase delta connected circuit	
15	Textbook 1 Chapter 15	Delta connection. Voltage and currents in delta connected 3 -phase circuits Lab: Analysis of three phase delta connected circuit	
16			Final exam

Recommended Sources

TEXTBOOK(S)

1. V. Mehta, K. Mehta. Basic Electrical engineering.
2. T. Kuphaldt. Lessons in electric circuits. Vol 1-2.
3. J. Bird. Electrical circuit theory and technology.
4. S. Mulukutla. Introduction to Electrical Engineering.
5. Principles of Power Systems V.K Mehta.

Assessment

Attendance	0%	Less than 75% class attendance results in NA grade
Presentation	10%	
Lab. works	10%	
Course work	0%	
Quiz	10%	
Midterm Exam	20%	Written Exam
Final Exam	50%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Academic Regulations of Azerbaijan State Oil and Industry University for undergraduate studies

Course Policies

1. Attendance of the course is mandatory.
2. Material presented in the lecture as well as assigned readings will be included in testing.
3. Late assignments will not be accepted unless an agreement is reached with the lecturer.
4. Cheating and plagiarism will not be tolerated.
5. Cheating will be penalized according to the Azerbaijan State Oil and Industrial University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
Course duration in class (including midterm)	15	4	60
Presentation	1	10	10
Self-study	15	4	60
Tutorials	15	4	60
Midterm Examination	1	3	3
Preparation for midterm exam	1	4	4
Final Examination	1	3	3
Preparation for final exam	1	10	10
Total Workload			210
Total Workload/30(h)			7
ECTS Credit of the Course			7