S Y L L A B U S

General information	**Title and code of subject, number of credits**	EENG 211 - Circuits Theory – 6 ECTS credits	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2020 Fall	
	Lecturer	Associate professor,PhD in technical, Hasanov Elchin	
	E-mail:	elgafgas@yahoo.com	
	Phone number:	+994 50 5287740	
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Office hours	Friday, 16:00 -17:20,	
Prerequisites	PHSC 112		
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	***Textbooks*: Core Textbook**: 1. Charles Alexander, Matthew Sadiki Fundamentals of Circuit Theory 5th edition. 2013 2. F.A.Benson Electric circuit problems with solutions 2017 University of Sheffield ,Sheffield, UK 3. Rafig Akhmadov , Circuit Theory Khazar University 2008 4.www.solved- problems.com Problems in Circuit Theory with solutions 5. Lecture notes. **Supplementary Textbooks:** Glargio Rizzoni . Principles and Applications of Electrical Engineering. 2000		
Teaching methods	**Lecture**		+
	Group discussions at seminars		+
Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Quizzes	During the semester, 2 quizzes	10
	Active participation	At each lesson	5
	Presentations		10
	Attendance	At each lesson	5
	Midterm exam		30
	Final exam		40
	Final		**100**
Course description	This course Circuits Theory - introduces Electric Charge and Electric Current. Voltage. Electric Power and Energy Inductance. Voltage and Current Sources. Basic laws. Ohm's Law. Short and open circuits. Resistance and conductance. Nodes, Branches and Loops. Fundamental theorem of network topology. KCL and KVL. Series resistors and voltage division. Parallel resistors and current division. Wye-Delta transformations.		
Course objectives	**Course objectives for the Students:** • Develop a high level of understanding of the fundamental principles of DC and AC current Systems. Develop basic laboratory skills demonstrating the application of physical principles. • Work cooperatively to facilitate a collegial atmosphere conducive to learning for all students in the class. • Prepare for and attend each class by reading the assigned sections before class, completing homework, and participating in class discussions and team activities. **Course objectives for the Instructor:** • To provide all students the tools necessary to succeed in their pursuit of a high level of understanding of the principles of Operational Amplifiers. Ideal Op. Amplifier. Inverting Amplifier. Non-inverting amplifier. Summing Amplifier. Difference Amplifier. Cascaded Operational Amplifiers Circuits. • To provide all students with an atmosphere conducive to learning the principles of physics. • To provide sufficient feedback to students, enabling them to gauge their progress towards achieving their goal in learning the principles of physics. • To facilitate student learning through the use of appropriate activities, appropriate technology, and		

	the illustration of physics applications in the real world.
Learning outcomes	What students should know by the end of the course: Nodal Analysis without voltage sources. Nodal Analysis with Voltage Sources. Supernode. Mesh Analysis without current sources. Mesh Analysis with current source. Supermesh. Operational Amplifiers. Ideal Op. Amplifier. Inverting Amplifier. Noninverting amplifiers Summing Amplifier. Difference Amplifier. Cascaded Op.Amp. Circuits. Passive Filters. Lowpass Filter. Bandpass Filter. Bandstop Filter. Active Filters: First-order Lowpass Filter. First-order Highpass Filter. BandPass Filter. Bandreject (or Notch) Filters
Rules (Educational policy and behavior)	Lesson organization 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 oraly and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory. Attendance Participation of students at all classis is important. Students should inform dean's office about missing lessons for particular reasons (illness, family issues and etc.). Students, missing more than 30% of lessons, are not allowed to take the exam. Tests Those students who have informed the teacher and the dean's office about missing the test in advance for particular reasons, are allowed to take the test next week. Exams All the issues related to the participation and admission to the exam are regulated by the faculty dean. Topics of midterm and final exams are provided for the students before the exams. The questions of midterm exam are not repeated in the final exam. Violation of the rules of the exams Disrupting the test and taking copy during midterm and final exams is forbidden. Test papers of the student who do not follow these rules are canceled and the students are expelled from the test by getting 0 (zero). The rule for completing the course In accordance with the University rules the overall success rate to complete the course should be 60% or above. The students who failed the exam would be to take this subject next semester or next year. Rules of conduct for Students Disruption of the lesson and not following ethical norms during the lesson, as well as conduction of the discussions by the students without permission and using mobile phones is forbidden.

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	*18.09.20*	Definition of electric circuit. System of Units. Electric Charge. Dc and Ac Currents. Voltage. Power and Energy. Passive Sign Convention . Circuit Elements . Electricity Bills. Ohm's law. Resistivity. Short and open circuits. Conductance Power. Problem solving.	[1], Chapter 1 [2],
	18.09. 20	Conduction of oral and written survey. Problem solving.	
2	*25.09. 20*	Nodes, Branches and Loops. Network topology theorem. Kirchhoff's laws. Series resistors and voltage division. Problem solving Parallel resistors and current division. Wye-Delta Transformations. Problem solving. *Quiz N 1*	[1], Chapter 2 [3],
	25.09. 20	Conduction of oral and written survey. Problem solving..	
3	*02.10. 20*	Nodal Analysis without voltage sources. Nodal Analysis with Voltage Sources.	[1], Chapter 3.

		Supernode. Problem solving Mesh Analysis without current sources. Mesh Analysis with current source. Supermesh. Problem solving	[2],
	02.10. 20	Conduction of oral and written survey. Problem solving. *Quiz 2*	
4	*09.10. 20*	Linearity property. Superposition. Source transformation. Thevenin`s theorem. Problem solving  Norton`s Theorem. Maximum power transfer. Resistance measurement. Problem solving	[1], Chapter 4 [2],
	09.10. 20	Conduction of oral and written survey. Problem solving..	
5	*16.10. 20*	Operational Amplifiers. Ideal Op. Amplifier. Inverting Amplifier. Noninverting amplifier. Problem solving Summing Amplifier. Difference Amplifier. Cascaded Op.Amp. Circuits. Problem solving. *Quiz 3*	[1], Chapter 5 [3],
	16.10. 20	Conduction of oral and written survey. Problem solving..	
6	*23.10. 20*	Capacitors. Series and Parallel Capacitors. Inductors. Problem solving Inductors. Series and Parallel Inductors. Integrator . Differentiator. Problem solving.	[1], Chapters 7 Chapter 8 [3],
	23.10. 20	Conduction of oral and written survey. Problem solving.	
7	*30.10. 20*	Sinusoids and phasors. Phasor relationship for circuit elements. Impedance and admittance. Problem solving Kirchhoff's laws in the frequency domain. Impedance combinations. Representation of Sinusoidal waves by Vectors and Complex numbers. Problem solving *Quiz 4* Complex Magnitude. Addition of Sinusoidal Time Functions . Problem solving	[1]p.881-900,
	30.10. 20	Conduction of oral and written survey. Problem solving	
8	*06.11. 20*	Complex Magnitude. Addition of Sinusoidal Time Functions . Problem solving AC Power analysis. Instantaneous and average power. Maximum average power transfer. Effective or RMS value. Problem solving	[1], Chapter 9 [2],
	06.11. 20	Conduction of oral and written survey. Problem solving.	
9	*13.11. 20*	*Mid term exam*	
	13.11. 20	Apparent power and Power factor. Complex power. Conservation of AC power. Wattmeter. Electricity consumption cost .Problem solving Sinusoidal Steady-State analysis. Nodal Analysis. Mesh analysis. Superposition	[1] p.916-947

		Theorem. Problem solving. *Quiz 5*	
	20.11. 20	Conduction of oral and written survey. Problem solving	
10	*21.11. 20*	Source transformation. Thevenin and Norton Equivalent Circuits. Op Amp AC Circuits. Problem solving	[4]p. 73-96
	27.11. 20	Conduction of oral and written survey. Problem solving	
11	*28.11. 20*	AC Power Analysis. Instantaneous and average power. Maximum Average Power Transfer. Effective or RMS Value. Problem solving Apparent Power and Power Factor. Complex Power. Conservation of AC Power. Problem solving	[1] p.1061-1085
	04.12. 20	Conduction of oral and written survey. Problem solving	
12	*05.12. 20*	Frequency Response. Transfer function. The decibel scale. Series Resonance. Parallel Resonance.	[3]p.555-611
	11.12. 20	Conduction of oral and written survey. Problem solving.	
13	*11.12. 20*	Passive Filters. Lowpass Filter. Bandpass Filter. Band stop Filter. Active Filters: First-order Lowpass Filter. Problem solving First-order High pass Filter. Band Pass Filter. Band reject (or Notch) Filter Problem solving	[1] page 9-6
	18.12. 20	Conduction of oral and written survey. Problem solving	[1] page 10-6
15	*18.12. 20*	Series connection of resistance, inductance and capacitance. Parallel connection of resistance , inductance and capacitance. Transformation of series circuits to parallel and vice versa.	[1] page 11-6
	25.12. 20	Conduction of oral and written survey. Addition of sinusoidal time functions. Resonance circuits . Series (voltage) resonance circuit. Parallel (currrent) resonance. Problem solving	[2] page 85-128
		Final Exam