

SYLLABUS

General information	Title and code of subject, number of credits	ETR393 - Basics of Circuitry- 6 ECTS	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2019 Fall	
	Lecturer	Associate Professor, (PhD) in Physics and Mathematics Shahmerdan Sh. Amirov	
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	Lecture room/Schedule	41 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations	Wednesday, 12-13	
Course language	English		
Type of the subject	Major		
Prerequisites	MATH 101 – Matematics I		
Textbooks and additional materials	<p>Textbooks:</p> <p>1. Basic Electric Circuit Theory , Isaak D. Mayergoyz, W. Lawson Academic Press, Dec 2, 2012 link (for purchasing)</p> <p>2. Fundamentals of circuit design , Hongshen Ma</p> <p>3. Charles Alexander, Matthew Fundamentals of Circuit Theory 2005</p> <p>4. Basic Curcitiiry Reference Manual link</p>		
Teaching methods	Lecture		x
	Group discussions at seminars		x
Assessment	Components	Date/ Deadline	Percent (%)
	Quizzes, Lab work	During the semester	10
	Active participation	At each lesson	5
	Project	At the end of the semester and students must assemble a circuit that reflects the operation of electronic devices	15
	Attendance	At each lesson	5
	Midterm exam		30
	Final exam		35
	Final		100
Course description	<p>The course discusses the basic methods for calculating the steady-state and transient processes in electrical circuits, their application to the most common electronic engineering circuits, including amplifiers, rectifiers, stabilizers, triggers and other devices. Much attention is paid to the properties and characteristics of semiconductor elements: diodes, bipolar and field effect transistors, thyristors, operational amplifiers, and the simplest logic elements. Separate chapters are devoted to circuitry of digital devices, including DAC and ADC. A set of test and individual tasks will allow you to master the practical skills of designing and calculating electronic circuits necessary for professional activities.</p>		
Course objectives	<p>The course is devoted to the study of the basic laws of electrical engineering, methods for analyzing electrical circuits and circuitry implementations of electronic devices designed to convert analog, pulse and digital signals. The theoretical knowledge and practical skills of designing digital devices acquired during training provide the basis for further acquaintance with existing approaches to the design of computing devices.</p>		
Learning outcomes	<p>After completing the course, the student not only gets an idea of the basics of designing digital devices, but also masters the design skills of such devices using the most advanced</p>		

	computer-aided design tools. Practical study of the discipline is implemented using the modern element base of programmable logic circuits.
Rules (Educational policy and behavior)	<p>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 orally and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory.</p> <p>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 25% of lessons, are not allowed to take the exam.</p> <p>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.</p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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.</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	The Basics Voltage and Current, Resistance and Power Sources of Electrical Energy Ground Electrical Signals Electronic Circuits as Linear Systems	[2]p.7-12
	20.09	Conduction of oral and written survey. Problem solving	
2	24.09	Fundamental components: Resistor , Capacitor Inductors	[2]p. 13-19
	27.09	Learning combinations of resistors, capacitors and inductors	
3	01.10	Impedance and s-Domain Circuits The Notion of Impedance , The Impedance of a Capacitor , Simple RC filters Superposition, Dominant Impedance Approximation Redrawing Circuits in Different Frequency Ranges	[2]p. 20-26
	04.10	Conduction of oral and written survey. Problem solving	
4	08.10	The Impedance of an Inductor , Simple RL Filters s-Domain Analysis, s-Domain Analysis Example Simplification Techniques for Determining the Transfer Function Conduction of oral and written survey. Problem solving	[2]p. 27-36
	11.10	Learning combinations of resistors, capacitors and inductors	
5	15.10	Practical voltage and Current Sources. Thevenin and Norton equivalent circuits. Source and load models of electronic circuits. Critical terminology : Buffer , Bias and Couple	[2]p. 37-52
	18.10	Conduction of oral and written survey. Problem solving	
6	22.10	Diode basics: P-N junction, Zener diode, Zener knee voltage. Peak detector, LED circuit, Voltage reference circuits	[1]p. 46-63
	25.10	Conduction of oral and written survey. Problem solving	
7	29.10	BJ Transistors ; NPN and PNP transistors,	[1]p. 72-86
	01.11	Conduction of oral and written survey. Problem solving	
8	05.11	Field Effect Transistors.	
	11.11	Conduction of oral and written survey. Problem solving	

9	16.11	Midterm Exam	
	18.11	Operational amplifiers Noninverting and inverting amplifier circuits	[3], chapter 5
10	23.11	Study Operational amplifiers Noninverting and inverting amplifier circuits	
	27.11	Passive Filters. Lowpass Filter. Bandpass Filter. Bandstop Filter. Active Filters: First-order Lowpass Filter. Problem solving First-order Highpass Filter. BandPass Filter. Bandreject Filters	[3] page 9-6
11	30.11	Study Passive Filters. Lowpass Filter. Bandpass Filter. Bandstop Filter. Active Filters: First-order Lowpass Filter. Problem solving First-order Highpass Filter. BandPass Filter. Bandreject Filters	
	02.12	Electric measurement devices. General information. Magnetic-electrical and induction devices. Broadening measurement range with ammeter Shunt . Broadening measurement range with voltmeter. Additional resistance	[3], chapter 6
12	07.12	Learning measurement devices and methods. Magnetic-electrical and induction devices. Broadening measurement range with ammeter Shunt . Broadening measurement range with voltmeter. Additional resistance	[3]p.612-633
	09.12	Measuring resistance. Mega-ohmmeter. Ohmmeter. Measuring electric power and energy	
13	14.12	Practice Measuring resistance. Mega-ohmmeter. Ohmmeter	
	16.12	Basic AC Circuit analysis. Impedance and Admittance Phasor-Domain Circuit elements. AC series Circuit analysis. Voltage divider AC parallel circuit analysis Current divider	[3]p.555-611
14	21.12	Learning AC series Circuit analysis. Voltage divider AC parallel circuit analysis Current divider	
	23.12	Apparent power and Power factor. Complex power. Conservation of AC power. Wattmeter. Electricity consumption cost	[3] p.916-947
15	28.12	Term Project submission	

