S Y L L A B U S

General information	**Title and code of subject,number of credits**	ETR 234 – Analog and Digital Electronics 6 ECTS
	Department	Physics and Electronics
	Program	Bachelor
	Academic semester	Spring, 2023
	Lecturer	M.Sc Babak Emdadi
	E-mail:	emdadi.babak2021@khazar.org
	Phone number:	+994 507136561
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus)
	Consultations	
Course language	English	
Type of the subject	Major	
Textbooks and additional materials	***Textbooks*:** 1. Rabaey, Chandrakasan & Nikolil, "Digital Integrated Circuits," Prentice Hall, 2nd edition, 2003. 2. Analog Integrated Circuit Design. David Johns, Ken Martin, 1997 3. Scott Hamilton. An analog electronics companion: basic circuit design for engineers and scientists. Cambridge University Press, 2003 - pages: 649 4. Lecture Notes for Digital Electronics.	
Teaching methods	**Lecture**	

Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Active participation	At each lesson	10
	Quizzes	During the semester	10
	Attendance	At each lesson	10
	Mid-term exam		30
	Final exam		40
	Final		**100**

Course description	The analog and digital electronics course covers the basics of analog and digital circuits, including amplifiers, filters, logic circuits, counters, and registers. The course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, digital-to-analog and analog-to-digital converters. As the course is taught, students' ability to work with practical schemes should develop.
Course objectives	• Explain the main features of analog electronics, work with circuits • Develop an understanding of the essence of the course. • To provide students with material resources • To impart the fundamentals of digital electronics to students and improve their understanding of

	the working principle of digital electronics devices • Explain the main distinguishing features of digital electronics compared to analog electronics • Learning the methods and devices of mutual conversion of analog and digital signals. • To enable students to work in the laboratory with visual aids of digital electronics
Learning outcomes	What students should know by the end of the course: • Getting to know the secrets of analog and digital electronics • To solve problems arising in various electronic devices • Eliminate technical deficiencies by alternative methods • Create a functional electronic device based on what they learned from electronics • Based on the taught and learned methodology, students will acquire the ability to work with digital schemes. • With the help of the equipment available in the laboratory, they will be able to check the digital circuits and, if necessary, eliminate the deficiencies.
Rules (Educational policy and behavior)	▪ Preparation for class 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. • Withdrawal (pass/fail) 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. ▪ Cheating/plagiarism 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. ▪ Professional behavior guidelines 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. Attendance Students who attend the whole classes will get 5 marks. For three absence student loses 1 mark. • Quizzes There will be a quizzes per two weeks. The quizzes will be announced in the classroom two weeks before and will relate to homework. • Activity Students who will be active during discussion of past lessons will be awarded with one activity mark.

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		**Reinforcement cascades.** Principles of construction of amplifier cascades. Common emitter cascade Common collector cascade	Chapter VIII Pg. 74-83
2		**Phase inverse cascade. Common base cascade** Amplifier cascades based on field transistors Frequency characteristics of amplifier cascades Multi-stage amplifiers Classification of amplifiers Capacitor coupled amplifier Transformer coupled amplifier	Chapter VIII Pg. 83-93
3		**Multi-stage amplifiers** Resonant amplifier DC amplifier Power amplifier	Chapter IX P. 93-98 Chapter X Pg. 99-103

4		**Power amplifier** Class B transformer less amplifier	Chapter X P. 103-105
5		**Operational amplifier** Differential cascade. Stable current generator The structure of the operational amplifier	Chapter XI Pg. 106-112
6		**Operational amplifier** Inverting amplifier. Non-inverting amplifier The principle of virtual closure. Differential amplifier Feedback in amplifiers	Chapter XI Pg. 112-121
7		**Sinusoidal oscillation generator** Phase and amplitude balance condition Self-excitation of the generator	Chapter XII Pg. 122-129
8		*Mid-term exam*	
9		**Logic algebra** Logical operation Logical functions Elements of logic OR logic element AND logic element NO logic element	Chapter XIV 14.1-14.2 Chapter XV 15.1-15.3
10		**Elements of logic** OR-NO logic element AND-NO logic element Transistor-transistor logic	Chapter XV 15.4-15.6
11		**Impulse technique** Transistor switch. Comparator	Chapter XIII 13.1 Chapter XIII 13.2
12		**Impulse technique** Schmidt trigger Multivibrator	Chapter XIII 13.3 Chapter XIII 13.4
13		**Triggers** Classification of triggers. RS-trigger	Chapter XVI 16.1 Chapter XVI 16.2
14		**Digital devices** Binary code Registers Counters Decoder	Chapter XVII 17.1-17.2 17.3-17.4
15		*Recap of all covered material*	
		Final Exam