S Y L L A B U S

General information	**Title and code of subject, number of credits**	ETR 359 Microprocessor-based Systems – 6 ECTS credits	
	Department	Physics and Electronics	
	Program	Bachelor	
	Academic semester	2020 fall	
	Lecturer	Master of Science (Electronics Engineering) Sabuhi Ganiyev	
	E-mail:	s.ganiyev@gmail.com	
	Phone number:	+994 70 520 73 50	
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations	Saturday 09:00 – 10:00	
Prerequisites	MATH 101		
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	***Textbooks*:** 1. Introduction to Microprocessor, B Basavaraj – VIKAS® Publishing House Pvt Ltd, 2010 (required) Optional Reference Texts: 2. Microprocessors and microcontrollers by Pablo Mary, Panda Jeebananda, PHI Learning Private Limited, 2016. Additional Resource Texts: 3. 3. Microprocessors and Introduction to Microcontroller (8085, 8086, 8051 - Architecture, Interfacing and Programming) - A Conceptual Approach, A.P.GODSE, D.A.GODSE, Technical Publications, 2014. 4. The Intel Microprocessors: Pearson New International Edition, Barry B. Brey, Pearson Prentice Hall™, 8th edition, 2013. **Auxiliary Web sources:** https://www.youtube.com/watch?v=peX0rICizC0&list=PLX3mp7xUgnhLqbawZMuXrNSh4yHFuCD4X https://www.youtube.com/watch?v=liRPtvj7bFU&list=PL0E131A78ABFBFDD0 https://www.youtube.com/watch?v=RVNXZS-HOgw&list=PL_ApKxsfIQPFIVpFmCB9EjThyMk7_V5qI https://www.youtube.com/watch?v=sLW1TptEJBQ&list=PLcYzlQJ999BkF-iyUxH3uevN-VGUwDAIF		
Teaching methods	**Lecture**		x
	Group discussions at seminars		x
Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Active participation	At each lesson	5
	Quizzes	During the semester	20
	Attendance		5
	Midterm exam		30
	Final exam		40
	Final		**100**
Course description	The purpose of this course is to teach undergraund students the fundamentals of microprocessor systems. This course consist of three sections. The first section covers historical backgraund of microprocessor and its application, microprosessor architecture and its operations, data transfer, arithmetic and logical instructions, RISC (reduced instruction set computer) and CISC (Complex Instruction Set Computers) prosessors. The second part studies intel 8086 microprosessors and its architecture, memory paging addressing modes, real and protected mode memory addressing and various types of instructions. The third section analizes 8257 Interrupt controller, basic DMA (Direct Memory Access) operation and 8237 DMA controller, arithmetic coprocessor and 80x87 architecture.		
Course	The main objectives of this course is to introduce the basic concepts of microprocessor, assembly		

objectives	language programming and microprocessor interfacing to memory and I/O peripherals.
Learning outcomes	What students should know by the end of the course: • structure of microprocessor: CPU (Central Processing Unit), memory and input/output peripherals. • main components and working principals of the Intel 80x86 microprocessor • basics of assembly language • the memory organization and memory interfacing • the hardware and software interrupts and their applications.
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. Quizzes Those students who have informed the teacher and the dean's office about missing the quiz in advance for particular reasons, are allowed to take the quiz 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 quiz and taking copy during midterm and final exams is forbidden. Quiz papers of the student who do not follow these rules are canceled and the students are expelled from the quiz 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	15.09 16.09	*Introduction to microprocessors:* Microprocessor. Evolution of microprocessors. Organization of microcomputers. Microprocessor programming. Digital logic. Timing diagram conventions. *Questions and Exercises*	[1] p. 3-22 [1] p.24-25
2	22.09 23.09	*Data representation:* Positional number systems. Inter-system conversion of numbers. Representation of integers. Representation of real numbers. Binary arithmetic. Character representation. *Questions and Exercises*	[1] p.26-46 [1] p. 47-48
3	29.09 30.09	*Programming a microprocessor:* Organization of the 8085. Instruction set of the 8085. Addressing modes. Examples of assembly language programs. *Questions and Exercises*	[1] p. 50-64 [1] p. 64-65
4	06.10 07.10	*Semiconductor memories:* Kinds of memories. Classification of memories. Characteristics of memories. Static RAMs. Organization of 51100x. Refreshing the DRAM. Page mode operation of DRAMs.Refreshing the DRAM. Page mode operation of DRAMs. Nibble mode operation. Static column mode. Power requirements of DRAMs. Soft errors in DRAMs. *Questions and Exercises*	[1] p. 69-87 [3] p. 96-98

5	13.10 14.10	*Semiconductor memories:* Reprogrammable ROMs. Organization of EPROMs. Electrically erasable EPROMs. Shadow RAM. Memory system reliability. *Questions and Exercises,* ***Quiz 1***	[1] p. 87-94 [1] p. 96-98
6	20.10 21.10	*Microprocessor timings:* Timing and control unit. Timing of Intel 8085. Instruction timings of µP. *Questions and Exercises*	[1] p. 99-113 [1] p. 115
7	27.11 28.11	*Intel 8086:* Internal architecture of Intel 8086. Flag Register. The BIU. Real Mode Memory Addressing. *Questions and Exercises.*	[1] p. 117-127 [1] p. 145
8	03.12 04.12	*Intel 8086:* Introduction to protected mode memory addressing. Memory paging. Pin diagram of 8086. Clock generator. *Questions and Exercises.* ***Quiz 2***	[1] p. 127-144 [1] p. 146
9	10.11 11.11	***Mid term exam***	
10	17.11 18.11	*Data movement instructions:* MOV revisited. POP. Load-effective address. String data transfers. Miscellaneous data transfer instructions. Segment override prefix. Assembler detail; *Questions and Exercises.*	[1] p. 148-183 [1] p. 186
11	24.11 25.11	*Arithmetic and logic instructions:* Addition, Subtraction and Comparison. Multiplication and Division. *Questions and Exercises.*	[1] p. 187-203 [1] p. 218-220
12	01.12 02.12	*Arithmetic and logic instructions:* BCD and ASCII Arithmetic. Basic Logic Instructions. Shift and Rotate. String Comparisons *Questions and Exercises.* ***Quiz 3***	 [1] p. 203-217 [1] p. 218-220
13	08.12 09.12	*Program control instructions:* The Jump Group. Basic Interrupt Processing. 8259A Programmable Interrupt Controller. *Questions and Exercises*	[1] p. 222-238 [1] p. 258
14	15.12	*Program control instructions:* Direct Memory Access. The 8237 DMA Controller. The Arithmetic Coprocessor. Data Formats for the Arithmetic Coprocessor. The 80X87 Architecture. *Questions and Exercises*	[1] p. 238-258 [1] p. 258
15	16.12	*Program control instructions:* The Arithmetic Coprocessor. Data Formats for the Arithmetic Coprocessor. The 80X87 Architecture. *Questions and Exercises.* ***Quiz 4***	[1] p. 238-258 [1] p. 258
		Final Exam