SYLLABUS			
General information	Title and code of subject, number of credits	ETR 390 - Control System - 6 ECTS	
	Department	Electronics and Telecommunications	
	Program	Bachelor	
	Academic semester	2023 - Spring	
	Lecturer	MSc, Alim Huseynov	
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	Phone number:	+99455 425 3599	
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations		
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	Textbooks: 1. Practical process control, Cecil L.Smith, 2009 2. Modern Control Technology: Components & Systems, Kilian 3. Introduction to Mechatronics and Measurement Systems, David G. Alciatore & Michael B. Histand, 2011 4. Control Systems Engineering, 7th edition, Nise, 2014 5. Mechatronics-Electronic control systems in mechanical and electrical engineering, Sixth Edition , William Bolton, 2014		
Teaching methods	Lecture		x
	Group discussions at seminars		x

	Components	Date/ Deadline	Percent (%)
Assessment	Active participation Discussion	At each lesson	10
	Quizzes	During the semester, 4 quiz	20
	Midterm exam		30
	Final exam		40
	Final		100

Course description	This course of control system describes fundamental components of industrial control systems, difference between manual and automatic control systems, basics of modeling and transfer function representation, basic properties of feedback, classical controller design in time and frequency domain: lead, lag, lead-lag compensation, rate feedback, PID controller, input elements like different sensors and output elements like actuators and motors. The role of control systems in green engineering will continue to expand as the global issues facing us require ever increasing levels of automation and precision. This course allows drawing and analyzing the block diagram of open loop and closed loop control system, to recognize elements control system such as instrumentation devices, Programmable Logic Controllers and end devices such as actuator.
Course objectives	During control system students will be able to examine the basic concepts of control system. At the end of course the students understand what the controller, types of controllers and how work the controller and where they are used. They will study that lies on the base of control system, will be able, to analyze the input and output signals of control system by using feedback.
Learning outcomes	What students should know by the end of the course: Control system, controller, PID controller, temperature controller, open loop, and closed loop systems, on off controller, proportional controller, cascade blocks and parallel blocks of control system, signal operation, transfer function, states of control system, instrumentation devices, signal conditioning techniques, modern control strategies.
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 25% of lessons, are not allowed to take the exam.

Lates

Those students who are late for lessons for more than 15 minutes are not allowed to participate at the lesson. Despite this, the student is allowed to take part in the second part of the lesson.

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.

Quizzes
- Quizzes will be held 4 times during the semester. The quizzes will be announced in the classroom two weeks before. Quiz is from homework problems.

  The homework problems will be selected from questions and problems in the end.
  of each chapter. The No. of homework problems will be announced after finishing each chapter.

  - **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	Subject topics	Textbook/ Assignments
1.	12-02-22	Lecture №1. Introduction to control system: types of control system. Closed loop and open loop control system Seminar 2. Solve exercises	[2] p.1-24 [4] p. 1-32 Materials provided by Lecturer
2.	19-02-22	Lecture №2 Feedback control, External disturbance inputs, Plant variations, Dynamic response, Steady-state accuracy, Non-linearity. Seminar 2. Solve exercises	[2] p. 453-510 [4] p. 1-32 Materials provided by Lecturer
3.	26-02-22	Lecture №3 Control loop stability. Seminar 3. Quiz 1	[1] p. 69-110 [2] p. 453-510 Materials provided by Lecturer
4.	05-03-22	Lecture №4. Proportional Mode control Seminar 4. Solve exercises	[1] p. 138-172 [2] p. 453-510 Materials provided by Lecturer
5.	12-03-22	Lecture №5. Integral Mode Control Seminar 5. Solve exercises	[1] p. 174-210 [2] p. 453-510 Materials provided by Lecturer
6.	19-03-22	Lecture №6. PID Control	[1] p. 212-241

		Seminar 6. Quiz 2	[2] p. 453-510 Materials provided by Lecturer
7.	26-03-22	Lecture №7. PID Controller Tuning Seminar 7. Solve exercises	[1] p. 243-283 Materials provided by Lecturer
8.	02-04-22	Lecture №8. Tranfer function of control system components, Mathematical modeling of control system Seminar 8. Solve exercises	[4] p.33-380 Materials provided by Lecturer
9.	09-04-22	Mid term exam	
10.	16-04-22	Lecture №10. Types of signals analog and digital, Signal conditioning techniques. Seminar 9-10. Solve exercises	[2] p.59-114 [5] p.69 - 111
11.	23-04-22	Lecture №11. ADC and DAC techniques. Types and implementation. Seminar 11. Solve exercises	[3] p. 346 – 363 [5] p. 95-112
12.	30-04-22	Lecture №12. PLC, DCS and SCADA. Programming concepts, industrial standards and applications. Seminar 12. Quiz 3	[2] p. 511-563 [5] p. 349 - 376
13.	07-05-20	Lecture №13. Position, Pressure and Level sensing techniques and sensors. Seminar 13. Solve exercises	[2] p.221-265 [3] p.375 - 406 [5] p.29-56
14.	14-05-20	Lecture №14. Flow and Temperature sensing techniques and sensors. Seminar 14. Solve exercises	[2] p. 265-278 [3] p. 408-414 [5] p. 54-61
15.	21-05-20	Lecture №15. End elements: valves and motors. Seminar 15. Solve exercises	[3] p. 431-477 [5] p. 165-239
		Final Exam	