S Y L L A B U S

<table>
<tr><td rowspan="9">General information</td><td>Title and code of subject, number of credits</td><td colspan="2">ETR 454 – Signals & Systems 6 ECTS</td></tr>
<tr><td>Department</td><td colspan="2">Physics & Electronics</td></tr>
<tr><td>Program</td><td colspan="2">Bachelor</td></tr>
<tr><td>Academic semester</td><td colspan="2">Fall, 2024</td></tr>
<tr><td>Lecturer</td><td colspan="2">M.Sc Babak Emdadi</td></tr>
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<tr><td>Phone number:</td><td colspan="2">+994 50 713 6561</td></tr>
<tr><td>Lecture room/Schedule</td><td colspan="2">11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus)</td></tr>
<tr><td>Consultations</td><td colspan="2"></td></tr>
<tr><td>Course language</td><td colspan="3">English</td></tr>
<tr><td>Type of the subject</td><td colspan="3">Major</td></tr>
<tr><td>Textbooks and additional materials</td><td colspan="3">Textbooks:
1. A. V. Oppenheim, A. S. Willsky with S. Hamid Nawab; Signals and Systems, Prentice Hall, 1997 (2nd edition).
2. Mohammed Ferdjallah: Introduction to Digital Systems, 2011
3. John Wakerly: Digital design, Principles and practices, 2000</td></tr>
<tr><td>Teaching methods</td><td colspan="3">Lecture</td></tr>
<tr><td rowspan="6">Assessment</td><td>Components</td><td>Date/ Deadline</td><td>Percent (%)</td></tr>
<tr><td>Active participation
• Solving exercises</td><td>At each lesson</td><td>10</td></tr>
<tr><td>Quizzes</td><td>During the semester</td><td>10</td></tr>
<tr><td>Attendance</td><td></td><td>10</td></tr>
<tr><td>Mid-term exam</td><td></td><td>30</td></tr>
<tr><td>Final exam</td><td></td><td>40</td></tr>
<tr><td>Final</td><td></td><td>100</td></tr>
<tr><td>Course description</td><td colspan="3">The purpose of this course is to teach undergraund students the features of signals and systems. The Students must know the Continuous-time and discrete-time signals and systems, Linear time-invariant systems: impulse response, convolution, Fourier series, Continuous-time Fourier transform, Discrete-time Fourier transform, and Sampling theory.</td></tr>
<tr><td>Course objectives</td><td colspan="3">This course aims to introduce the fundamentals of the signals, linear time invariant systems, and Fourier transform of the signals.</td></tr>
<tr><td>Learning outcomes (LO))</td><td colspan="3">Having successfully completed this course, students will be able to:
LO-1: Define continuous-time and discrete-time signals and systems.
LO-2: Identify linear time-invariant systems.
LO-3: Calculate impulse response and convolution.
LO-4: Calculate Fourier series coefficients.
LO-5: Define and calculate continuous-time Fourier transform.
LO-6: Define and calculate discrete-time Fourier transform.
LO-7: Express sampling theory.</td></tr>
<tr><td>Rules (Educational policy and behavior)</td><td colspan="3">▪ 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.</td></tr>
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	▪ **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 10 marks. For two absence (1 week) student loses 1 mark. • **Quizzes** There will be two quizzes. The quizzes will be announced in the classroom one weeks before and will relate to homework. • **Activity** Students who will be active during discussion of past lessons will be awarded 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		*Classification of Signals and Systems:* Standard signals.Step, Ramp, Pulse. Impulse. Real and Complex exponentials and Sinusoids	[2] p. 2-16
2		*Classification of Signals and Systems:* Classification of Signals- Continuous Time (CT) and Discrete Time(DT) signals, Periodic and Aperiodic signals .	[1] p. 4-20 [1] p.30-52 [1] p. 24-28 [1] p. 67-81
3		*Classification of Signals and Systems:* Deterministic and Random signals. Energy and Power signals	[2] p. 31-57 [2] p. 76-85
4		*Classification of Systems:* CT systems and DT systems. Linear and non- Linear Time variant and Time-invariant. Causal and Non-causal . Stable and Unstable	[2] p. 113-146 [2] p. 153-155
5		*Analysis of Continuous Signals:* Fourier series for periodic signals. Fourier Transform.	[1] p. 216-240 [3] p. 124-148
		Quiz 1(Lec1-Lec4)	[1] p. 242-251
6		*Analysis of Continuous Signals:* Properties. Laplace Transforms and properties	[2] p. 173-198 [2] p. 201-208 [2] p. 201-208
7		*Linear Time Invariant Continuous Time Systems:* Impulse response Convolution Integrals Differential equations ***Quiz 2(Lec5-Lec6)***	[2] p. 271-300 [2] p. 310-314
8		***Mid-term exam***	
9		*Linear Time Invariant Continuous Time Systems:* Fourier and Laplace transforms in Analysis of CT systems Systems connected in series	[2] p. 384-422 [2] p. 425-427

10		*Analysis of discrete time signals* Baseband Signal Sampling Fourier Transform of discrete time signals (DTFT)	[2] p. 565-588 [2] p. 596-600
11		*Analysis of discrete time signals* Proporties of DTFT ***Quiz 3 (Lec9-Lec10)***	[2] p. 602-635 [2] p. 667-693 [2] p. 636-638 [2] p. 694-698
12		*Linear Time Invariant- Discrete Time Systems* Impulse response- Difference equations Convolution Sum Discrete Fourier Transform	[2] p. 764-788 [2] p. 801-805
13		*Linear Time Invariant- Discrete Time Systems* DT system connected in series and parallel	[2] p. 807-825 [2] p. 845-850
14		***Recap of all covered material*** ***Quiz 4 (Lec11-Lec13)***	
15		Solving problems and ambiguities of students about the course Solving extra examples	
		Final Exam