Identification	**Subject (Code, title, credits)**	ETR615-Digital Signal Processing – ECTS 8 credits	
	Department	Physics and Electronics	
	Program	Master	
	Term	Fall, 2024	
	Instructor	MSc, MIET, Alim Huseynov	
	E-mail:	Alim.Huseynov@gmail.com	
	Phone:	+99455 425 3599	
	Classroom/hours	11 Mehseti str. (Neftchilar campus)	
	Office hours	Monday-Friday, from 9:00 to 18:00	
Prerequisites	-		
Language	English		
Compulsory / Elective	Elective		
Required textbooks andcourse materials	Textbooks: 1. Digital Signal Processing, Fundamentals and Applications, Lizhe Tan, Jean Jiang. 2. Discrete Systems and Digital Signal Processing with MATLAB, Taan S. ElAli. 3. Digital Signal Processing, Using MATLAB, Fourth Edition, V. K. Ingle, J.G. Proakis.		
Course outline	Technology such as microprocessors, microcontrollers, and digital signal processors have become so advanced that they have had a dramatic impact on the disciplines of electronics engineering, computer engineering, and biomedical engineering. Engineers and technologists need to become familiar with digital signals and systems and basic digital signal processing (DSP) techniques. The objective of this course is to introduce students to the fundamental principles of these subjects and to provide a working knowledge such that they can apply DSP in their engineering careers. This course prepares the students with the knowledge of digital signal processing and their application in digital data manipulation. It develops the analytical ability for designing various digital signal processing systems and familiarizes the students with various practical applications of these systems		
Course objectives	To introduce students basic techniques in designing and implementing digital signal processing systems. To learn basic methods of spectral analysis. To explore data communication systems. To teach students to design digital filters.		
Learning outcomes	To learn about mathematical representation of analog signals in digital domain, manipulate signals using analytical techniques and familiarize with discrete time signal & systems. To interpret the information of discrete time signals by means of frequency domain analysis using mathematical tools such as Z-transform, Discrete Fourier Transform (DFT), Fast Fourier Transform etc. To design & realize the responses of discrete-time systems like FIR and IIR Filter etc.		
Teaching methods	**Lecture**		☑
	Group discussion		☑
	Experiential exercise		☑
	Case analysis		☐
	Quiz, Classroom Exams		☑
	Course paper		☐
	Others		☐
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		30
	Attendance	At each lesson	5
	Quizzes	During the semester	20
	Activity	During the semester	5
	Final Exam		40
	Total		100

Policy	▪ **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 pointsintroduced in the text. Reading the assigned chapters and having some familiaritywith them before class will greatly assist your understanding of the lecture. Afterthe 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 thefollowing 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.

Tentative Schedule			
Week	Dates	Topics	Textbook/ Assignments
1.	18-09-24	Lecture 1. Introduction to digital Signal processing and to Matlab programming Seminar 1. Solving exercising and Matlab scripting	[1] – pages 1-12 and App A [3] – pages 1-21
2.	25-09-24	Lecture 2. Signal sampling and Quantization Seminar 2. Solving exercising and Matlab scripting	[1] – pages 13-58
3.	02-10-24	Lecture 3. Digital Signals and Systems Seminar 3. Solving exercising and Matlab scripting	[1] – pages 59-90 [2] – pages 55-64 [3] – pages 22-58
4.	09-10-24	Lecture 4. Discrete Fourier Transform and Signal Spectrum Seminar 4. Solving exercising and Matlab scripting	[1] – pages 91-137 [2] – pages 143-195 [3] – pages 59-102
5.	16-10-24	Lecture 5. The z-Transform Seminar 5. Solving exercising and Matlab scripting	[1] – pages 143-168 [2] – pages 195-264 [3] – pages 103-140
6.	23-10-24	Lecture 6. Digital Signal Processing Systems, Basic Filtering Types, and Digital Filter Realizations Seminar 6. Solving exercising and Matlab scripting	[1] – pages 173-219 [3] – pages 212-291
7.	30-10-24	Lecture 7. Finite Impulse Response Filter Design Seminar 7. Solving exercising and Matlab scripting	[1] – pages 229-306 [2] – pages 591-648 [3] – pages 291-369
8.	06-11-24	Lecture 8. Infinite Impulse Response Filter Design Seminar 8. Solving exercising and Matlab scripting	[1] – pages 316-407 [2] – pages 541-590 [3] – pages 370-457
9.	13-11-24	Mid-term exam	
10.	20-11-24	Lecture 9. Adaptive Filters and Applications Seminar 9. Solving exercising and Matlab scripting	[1] – pages 421-465 [3] – pages 573-586

11.	27-11-24	Lecture 10. Waveform Quantization and Compression Seminar 10. Solving exercising and Matlab scripting	[1] – pages 475-521
12.	04-12-24	Lecture 11. Multi-rate Digital Signal Processing, Oversampling of analog-to-digital Conversion, and Undersampling of Bandpass signals. Seminar 11. Solving exercising and Matlab scripting	[1] – pages 529-590
13.	11-12-24	Lecture 12. Subband and Wavelet-Based Coding Seminar 12. Solving exercising and Matlab scripting	[1] – pages 591-641
14.	18-12-24	Lecture 13. Image Processing Basics Seminar 13. Solving exercising and Matlab scripting	[1] – pages 650-714
15.	25-12-24	Lecture 14. Hardware and Software for Digital Signal Processors Seminar 14. Solving exercising and Matlab scripting	[1] – pages 727-782
	TBC	Final Exam	

This syllabus is a guide for the course and any modifications to it will be announced in advance.