

Identification	Subject	ETR 454 - Signals and systems – 6 ECTS	
	Department	Physics and Electronics	
	Program	Undergraduate	
	Term	Fall 2019	
	Instructor	Nasim Fazli	
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	Phone:	(+994 12) 421-10-93 (ext. 255)	
	Classroom/hours	41 Mehseti str.(Nefitchilar campus), Room # , Monday, Wednesday,10:10-11:40	
	Office hours	Monday, Wednesday 09:10 – 10:10 or by appointment	
Prerequisites	MATH 101		
Language	English		
Compulsory/Elective	Compulsory		
Required textbooks and course materials	<p><i>Core textbook:</i></p> <ol style="list-style-type: none"> 1. A. V. Oppenheim, A. S. Willsky with S. Hamid Nawab; <i>Signals and Systems</i>, Prentice Hall, 1997 (2nd edition). <p><i>Additional</i></p> <ol style="list-style-type: none"> 2. Lathi, Bhagwandas Pannalal; <i>Linear systems and signals</i>. Vol. 2. New York: Oxford University Press, 2005. 3. Haykin, Simon, and Barry Van Veen. <i>Signals and systems</i>. John Wiley & Sons, 2003. 4. Luis Chaparro. <i>Signals and systems using MATLAB</i>. Elsevier Inc., 2011 (1st Edition) or 2015 (2nd Edition). 		
Course outline	The course is devoted to the basic issues of the theory of discrete and digital signals and systems. It considers mathematical models and methods for analyzing signals and discrete time systems; methods for calculating discrete filters with desired properties; procedures for changing the signal sampling rate; effects related to the finite precision of numbers in digital systems.		
Course objectives	<p><i>Generic Objective of the Course:</i> To develop an understanding of the basic concepts of signals and systems</p> <p><i>Specific Objectives of the Course:</i></p> <ol style="list-style-type: none"> 1. For successful mastering of the course, mathematical preparation is required in the scope of the course of higher mathematics of a technical university. 2. To perform laboratory work, you must have a programming language 		
Learning outcomes	<p>The ability to perform the calculation and design of networks, structures and means of info-communications using modern information technologies.</p> <p>The ability to master the basic methods, methods and means of obtaining, storing, processing information.</p> <p>The ability to identify the natural science essence of the problems arising in the course of professional activity, to attract the appropriate physical and mathematical apparatus to solve them.</p> <p>The ability to apply methods for solving problems of analysis and calculation of the characteristics of radio circuits and devices.</p> <p>Ability to perform mathematical modeling of objects and processes using standard techniques, including using standard application software packages.</p> <p>The ability to apply existing methods and algorithms for solving problems of digital signal processing.</p>		
Teaching methods	Lecture		x
	Group discussion		x
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	5 questions each 6-max score	30
	Attendance		10
	Assignment and quizzes	4 quizzes, during the semester, 5 points for each	20
	Final Exam	5 questions each 8 max	40

		score	
	Total		100
Policy	<ul style="list-style-type: none"> • NO CELL PHONES are allowed during lecture and lab sessions. PLEASE turn them off before lecture! (Not silent or vibrating mode) • No late assignments will be accepted without prior arrangement with the instructor for acceptable excuses. Medical and family emergency will be considered on case-by-case basis. • No late homework will be accepted. Homework is to be completed on an individual basis. Students may discuss homework with classmates, but students are responsible for your own work. If students have consulted classmates, please note the individuals name on the top of students' assignment. • Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes. • No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam. • If students should miss class due to personal emergency or medical reasons, please notify the instructor by email immediately. A doctor's note will be required for make-up work. • Students are responsible for completing the reading assigned from the textbook related to the covered topics and for checking email regularly for important information and announcements related to the course. • University policy on academic honesty concerning exams and individual work will be strictly enforced. • BE ON TIME! 		

Weeks #	Date	Subjects /actions	Notes
1	16.9.2019	Introduction	Book1(Intro), Book2 (Ch. B),
	18.9.2019	Signal, transforms, exponentials	1.1 – 1.3 Book1
2	23.9.2019	Key functions and system intro	1.4Book1
	25.9.2019	CT and DT systems, Basic system properties	1.5-1.6Book1
3	30.9.2019	Stability, TI, and linearity	1.6 Book1
	2.10.2019	DT LTI systems, convolution	2.1 – 2.2 Book1
4	7.10.2019	CT convolution, properties	2.2 – 2.3 Book1
	9.10.2019	CT convolution, impulse response, CT systems as differential EQs	2.3 – 2.4 Book1
5	14.10.2019	CT systems with differential EQs	2.4 Book1
	16.10.2019	DT systems with difference EQs	2.4 Book1
6	21.10.2019	Fourier series introduction	3.1 – 3.3 Book1
	23.10.2019	Fourier series calculations, existence / convergence	3.3 – 3.4 Book1

7	28.10.2019	Fourier series properties	3.5 Book1
	30.10.2019	Using properties and reverse engineering	3.5 Book1
8	4.11.2019	Building intuition, filtering	3.8 Book1
	6.11.2019	Filters and frequency response	3.9 – 3.10 Book1
	11.11.2019	Holiday	
9	13.11.2019	Midterm	30%
10	18.11.2019	Fourier transform. Fourier properties	4.1 – 4.2 Book1 4.3 Book1
	20.11.2019	More Fourier properties	4.3 Book1
11	25.11.2019	Convolution and multiplication	4.4 – 4.5 Book1
	27.11.2019	Tour of Laplace transforms	9.1 – 9.5 Book1
12	2.12.2019	Block diagrams, partial fraction expansion	4.6 – 4.7, appendix Book1
	4.12.2019	Symmetry, revisiting filtering, intro to DT frequency response	5.1, Review 3.9 – 3.10 Book1
13	9.12.2019	Z-transform	10.1 – 10.5 Book1
	11.12.2019	DT frequency response	5.1 – 5.3 Book1
14	16.12.2019	Pole-zero plots, frequency response, connecting DTFT and CTFT	10.4 Book1
	18.12.2019	Sampling theorem	7 Book1
15	23.12.2019	Final course review, problem solving 1	
	25.12.2019	Final course review, problem solving 2	
16	30.12.2017	Final course review, problem solving 3	
		Final Exam	40%