

Course Details										
Code						ear	Semester			
MEC311							Fall			
Title	т	Α	L	ECTS						
Signals and Systems	3	1	1	6						
Language	German									
Level	Undergraduate	X	Graduate			Postgra	duate			
Department / Program	Mechatronics Engineering									
Forms of Teaching and Learning	Face-to-Face									
Course Type	Compulsory		х	Ele	ective					
Objectives	To provide basic signal and systems concepts. To introduce the basic problems, tools and applications belonging to the signals and systems. To enable the students to gain insight into signal processing theory and information systems.									
Content	Introduction of contious and discrete-time signals. LTI-Systems. Properties of LTI-Systems. Convolution, Fourier-Series, Forier Transform, Fourier Transform Properties, Discrete Fourier Transform, Discrete -Time Fourier Transform, z-Transform.									
Prerequisites	-									
Coordinator	-									
Lecturer(s)	Prof. Dr. Cem Civelek									
Assistant(s)	Uğur Yıldırım									
Work Placement	-									
Recommended or Required R	eading									
Books / Lecture Notes	<ul> <li>Signale und Systeme, Kiencke, U., Puente León, F., Jäkel, H. De Gruyter Studium, 2015, ISBN: 978-3-11-040386-2</li> <li>Signale und Systeme, Alan V. Oppenheim, Alan S. Willsky, Jan T. Young, Wiley-VCH; Auflage: 2, 1992, ISBN-10: 3527284338.</li> <li>Signals and Systems, Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Pearson Ed., 1996. ISBN: 0136511759.</li> <li>Signaltheorie: Grundlagen der Signalbeschreibung, Filterbänke, Wavelets, Zeit-Frequenz-Analyse, Parameter- und Signalschätzung, Alfred Mertins, Springer-Verlag.</li> </ul>									
	<ul> <li>Signale und Systeme: Theorie, Simulation, Anwendung: Eine beispielorientierte Einführung mit MATLAB, Ottmar Beucher, Springer Vieweg, 2015.</li> </ul>									



	<ul> <li>Signal- und Systemtheorie, Norbert Fliege, Martin Bossert, Thomas Frey, Vieweg+Teubner Verlag; Auflage: 2, 2008.</li> <li>Einführung in die Systemtheorie, Girod, Rabenstein, Stenger, Vieweg+Teubner Verlag; Auflage: 3, 2005.</li> </ul>									
Other Sources	-									
Additional Course Material										
Documents	-									
Assignments	5 Homeworks									
Exams	1 Midterm Exam, 1 Final Exam	1 Midterm Exam, 1 Final Exam								
Course Composition										
Mathematics und Basic Sciences	30	)	%							
Engineering	30	)	%							
Engineering Design			%							
Social Sciences			%							
Educational Sciences			%							
Natural Sciences		%								
Health Sciences		%								
Expert Knowledge	40	%								
Assessment										
Activity	Cou	nt	Percentage (%)							
Midterm Exam	1	35								
Quiz										
Assignments	5	15								
Attendance										
Recitations										
Projects										
Final Exam	1	50								
		Total	100							
ECTS Points and Work Load										
Activity	Count	Duration	Work Load (Hours)							
Lectures	14	4	56							
Self-Study										
Assignments	5	15								
Presentation / Seminar Preparation										



Midterm Exam		1	8	8						
Recitations		14	4	56						
Laboratory		28								
Projects										
Final Exam		1	10	10						
Total Work Load 173										
ECTS Points (Total Work Load / Hour)     6										
Learning Outcomes										
1	1 Basics of mathematics and science									
2	Basics of engineering									
3	Skills for using software tools									
4	Definition of problems in the field of engineering, development and implementation of solution approaches									
5	Experimental basis and interpretation of the results									
6	Interdisciplinary learning skills									
7	Ability to work in groups									
8	Preparation for the lifelong learning process									
9	Ethics, awareness of safety, health, the environment and social contribution in engineering applications									
10	Social science skills									
11	Oral and written communication and presentation skills									
12										
Weekly Conter	nt									
1 Introduction, Signals and Systems, Continuous Time Basic Signals, Discrete Time Basic Signals										
2	Systems, properties of systems, continuous time signals and systems: linear time-invariant systems (LTI systems), the convolution integral, the impulse response, properties of LTI systems									
3	The impulse response, properties of LTI systems, the step response, systems described by differential equations									
4	Fourier analysis of continuous time signals and systems: Eigenfunctions of LTI systems, Fourier series representation of continuous time periodic signals									
5	Fourier series representation of the continuous time periodic signals, Fourier transformation									
6	Fourier transform, properties of the Fourier transform									
7	Laplace transform, transfer function									
8	Introduction to Linear Feedback Systems									
9	Filtering, ideal frequency-selective filters, non-ideal frequency-selective filters, characteristics, discrete time signals and systems: time discreteization, sampling theorem, aliasing, reconstruction									
10	Aliasing, reconstruction, Fourier series representation of the discrete time periodic signals, Fourier transformation of discrete time signals									



11	Fourier transformation of discrete time signals, the discrete Fourier transformation (DFT)
12	Properties of the discrete time Fourier transform, fast Fourier transform (FFT)
13	Z-Transformation, Definition, Properties
14	Analysis of LTI systems with the help of z-transformation, FIR filter, IIR filter
15	

Contribution of Learning Outcomes to Program Objectives (1-5)												
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
1	5	3	2	5	3	5	5	5	5	2	1	
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
Contribution	Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High											
https://obs.tau.edu.tr/oibs/bologna/index.aspx?lang=tr&curOp=showPac&curUnit=05&curSunit=5726#												
Compiled by:			Fatih Çögen									
Date of Comp	ilation		26.08.2022									