EEE 430 Digital Signal Processing

Course Code	Course Name	Semester	
EEE 430	Digital Signal Processing	Fall ☒ Spring ☐ Summer ☐	
Hours		**Credit**	**ECTS**
Theory	**Practice** / **Lab**	3	5
3	-- / --		

Course Details	
Department	Electrical and Electronics Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☐ Elective ☒
Lecturer(s)	Prof. Dr. İsmail Hakkı ALTAŞ
Course Objectives	Students learn LTI Systems, Difference Equations, and classification of LTI systems. Students know the Discrete Time Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, System Transfer Function in the Frequency Domain, Z Transform and its applications. Students can use digital filter design, FIR Filter Design Methods, and IIR Filter Design Methods.
Course Content	- Discrete-time signals and systems - Discrete-time Fourier Transform - Sampling in Frequency Domain - Fast Fourier Transform - System Transfer Function in Frequency Domain - Z transform and its applications - Digital Filter Design - FIR Filter Design Methods - IIR Filter Design Methods
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☒ Discussion ☒
Prerequisites/ Corequisites	---
Work Placement(s)	---

Textbook/References/Materials

- Alan V. Oppenheim, Ronald W. Schafer, Discrete Time Signal Processing, 2nd Ed. (1999) Prentice Hall.
- Sanjit K. Mitra, Digital Signal Processing Laboratory Using Matlab, (1999), McGraw-Hill

Course Category				
Mathematics and Basic Sciences	☐		Education	☐
Engineering	☒		Science	☐
Engineering Design	☒		Health	☐
Social Sciences	☐		Profession	☐

Weekly Schedule

No	Topics	Materials/Notes
1	Discrete-time signals and systems	
2	Discrete-time signals and systems	
3	Discrete-time Fourier Transform	
4	Sampling in Frequency Domain	
5	Fast Fourier Transform	
6	Fast Fourier Transform	
7	System Transfer Function in Frequency Domain	
8	Midterm Exam	
9	Z transform and its Applications	
10	Z transform and its Applications	
11	Digital Filter Design	
12	Digital Filter Design	
13	FIR Filter Design Methods	
14	IIR Filter Design Methods	
15	IIR Filter Design Methods	
16	Final Exam	

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance	--	--
Lab	--	--
Practice	--	--
Fieldwork	--	--
Course-specific internship	--	--
Quiz/Studio/Criticize	2	15%
Homework	--	--
Presentation / Seminar	--	--
Project	1	15%
Report	--	--
Seminar	--	--
Midterm Exam	1	20%
Final Exam	1	50%
	Total	**100%**
Contribution of Midterm Studies to Success Grade		50%
Contribution of End of Semester Studies to Success Grade		50%
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	14	3	42
Lab	0	0	0
Practice	0	0	0
Fieldwork	0	0	0
Course-specific Work Placement	0	0	0
Out-of-class study time	14	2	28
Quiz/Studio/Criticize	2	5	10
Homework	0	0	0
Presentation / Seminar	0	0	0
Project	1	15	15
Report	0	0	0
Midterm Exam and Preparation for Midterm	1	15	15
Final Exam and Preparation for Final Exam	1	25	25
Total Workload			**125**
Total Workload / 25			**125/5**
ECTS Credit			**5**

Course Learning Outcomes	
No	**Outcome**
L1	Students gain problem-solving skills for DSP and can perform analyses using the structure of appropriate fundamental transformations.
L2	Students can use sampling theory in applications.
L3	Students can calculate the system transfer function and phase response.
L4	Students can design IIR and FIR filters for Basic Filter structures.
L5	Students can apply theoretical knowledge with modern technical tools.

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**					**Total**
L1	4	4														-
L2	4	4	4													-
L3	4	4														-
L4	3	3	3													-
L5				4												-
															Total	-

i. Sufficient knowledge in the fields of mathematics, natural sciences, and related engineering disciplines; the ability to apply theoretical and practical knowledge in solving complex engineering problems.

ii. The ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.

iii. The ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.

iv. The ability to select and use modern techniques and tools required for the analysis and solution of complex problems encountered in engineering applications; the ability to effectively use information technologies.

v. The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of complex engineering problems or discipline-specific research topics.

vi. The ability to work effectively in intra-disciplinary and multidisciplinary teams; the ability to work independently.

vii. The ability to communicate effectively both orally and in writing; proficiency in at least one foreign language; the ability to write effective reports, understand written reports, prepare design and production reports, make effective presentations, and give and receive clear and understandable instructions.

viii. Awareness of the necessity of lifelong learning; the ability to access information, track developments in science and technology, and continuously renew oneself.

ix. Acting in accordance with ethical principles, knowledge of professional and ethical responsibilities, and the standards used in engineering applications.

x. Knowledge of business practices such as project management, risk management, and change management; awareness of entrepreneurship and innovation; knowledge of sustainable development.

xi. Knowledge of the impact of engineering practices on health, environment, and safety at global and societal levels, and awareness of contemporary engineering issues; awareness of the legal consequences of engineering solutions.