EEE 417 Communications Systems II

Course Code	Course Name	Semester	
EEE 417	Communications Systems II	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 the types of modulation used in digital communication systems and basic expressions related to communication. - Students learn the concepts of block diagrams, analog and digital communication comparisons, bit, bps, baud, baud rate, BER, channel, noise, passive filters, and active filters. - Students learn unipolar, polar, and Bipolar line coding. - Students learn ASK, FSK, PSK, discrete, periodic, non-periodic, and energy concepts. They will also understand the concepts of power, random, deterministic, translation, scaling, and inversion.
Course Content	- Sampling Theorem, Ideal sampling, Pulse amplitude modulation (PAM), PAM demodulation methods, Bandpass sampling theorem - Pulse time modulation, analysis of PPM and PDM signals, PPM and PDM demodulation - Multiplexing (TDM, FDM), bandwidth requirements of TDM and FDM - Quantized systems and quantization noise, modulation, and demodulation of PCM - Baseband data transmission, Intersymbol interference (ISI), Nyquist criterion - Matched filter, Associated receiver, Probability of error - Digital modulation techniques (B-ASK, B-FSK, B-PSK) - Digital modulation techniques (M-ASK, M-FSK, M-PSK, M-QAM)
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☒ Discussion ☒
Prerequisites/ Corequisites	EEE 314

Work Placement(s)	

Textbook/References/Materials

- Communication systems, S. Haykin, M. Moher, 5th Edition, 2010.
- Digital communications, J.G. Proakis, D. G. Manolakis, 4th Edition, 2007.

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

Weekly Schedule

No	Topics	Materials/Notes
1	Sampling Theorem, Ideal sampling, Pulse amplitude modulation (PAM), Sampling examples in practice	
2	PAM demodulation methods, Bandpass sampling theorem	
3	Pulse time modulation, analysis of PPM and PDM signals, PPM and PDM demodulation	
4	Demodulation of baseband signal in practice, Bandwidth requirements	
5	Multiplexing (TDM, FDM), bandwidth requirements of TDM and FDM	
6	Quantized systems and quantization noise, modulation, and demodulation of PCM	
7	Systems that use PCM in practice	
8	Midterm Exam	
9	Baseband data transmission, Intersymbol interference (ISI), Nyquist criterion	
10	Matched filter	
11	Associated receiver, Probability of error	
12	Digital modulation techniques (B-ASK, B-FSK, B-PSK)	
13	Digital modulation techniques (B-ASK, B-FSK, B-PSK)	
14	Digital modulation techniques (M-ASK, M-FSK, M-PSK, M-QAM)	
15	Digital modulation techniques (M-ASK, M-FSK, M-PSK, M-QAM)	
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	2	15%
Presentation / Seminar	--	--
Project	--	--
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	4	8
Homework	2	5	10
Presentation / Seminar	0	0	0
Project	0	0	0
Report	0	0	0
Midterm Exam and Preparation for Midterm	1	15	15
Final Exam and Preparation for Final Exam	1	20	22
Total Workload			**125**
Total Workload / 25			**125/25**
ECTS Credit			**5**

Course Learning Outcomes	
No	**Outcome**
L1	Students will learn basic digital communication knowledge.
L2	Students will be provided with system analysis skills.
L3	Students will be equipped with analytical thinking skills.
L4	Students will understand modulation and demodulation techniques used in digital communication systems.
L5	Students will be informed about the practical applications of digital communication systems.

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		4	4	4												-
L5			4	3	3											-
															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.