



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT  
COURSE INFORMATION FORM**

Course Title	Course Code
ENGINEERING DESIGN WITH FPGA	151228xxx

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
8	2	4	9

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
	5	4		

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

<b>Prerequisite</b>	
<b>Objectives of the Course</b>	Practical designs using Field Programmable Gate Arrays and VHDL
<b>Brief Course Content</b>	FPGA structure, design flow using VHDL, use of ISE and Vivado software, design issues on FPGAs, clock management, I/O considerations and user interfaces, communication with external devices and sensors, complex designs with user interfaces like ADC/DAC, display devices like VGA, input devices like key-pads etc.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Learn VHDL/FPGA and use HDL tools	1,2,5,7	1,2,3,4,12,14,15	E,G,J
2 Learn HDL simulation	1,2,5,7	1,2,3,4,5	E,G,J
3 HDL design of a complex digital circuit and prepare reports/presentations for it.	1,2,5,7,9	1,2,3,4,12,14,15	E,G,J
4			
5			
6			
7			
8			

\*Teaching Methods 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

\*\*Assessment Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

<b>Main Textbook</b>	E. Seke, Sayısal Haberleşmeye Giriş (VHDL chapter), Seçkin Yayıncılık, 2015
<b>Supplementary Resources</b>	1) V.A. Pedroni, Circuit Design with VHDL, MIT Press 2) Open Core
<b>Necessary Course Material</b>	

Course Weekly Schedule	
1	Design issues of the aimed system and expectations
2	Preparation of design requirements. Basic setups for testing specific parts
3	Discussions of the design parts
4	Evaluation of the working components and flaw corrections
5	Combining already working/complete parts
6	Evaluation of the combined components and flaw corrections
7	Start building entire system
8	Mid-Term Exams (alpha testing)
9	Evaluation of complete system and flaw corrections
10	Flaw correction and evaluation of alternative approaches
11	Develop a complete test and evaluation flow
12	Completion of entire working design
13	Mechanical designs and enclosures
14	Problems and discussions on enclosures/user interfaces
15	Full tests, rebuilds, final touches, reports
16,17	Final Exams (presentation, demonstration)

Calculation of Course Workload			
Activities	Count	Time (Hour)	Total Workload (Hour)
Weekly classroom time	14	2	28
Weekly study time (review, reinforcing, preparation)	14	3	42
Homework			
Taking a quiz			
Studying for a quiz			
Oral exam			
Studying for an oral exam			
Report writing (Preparation)	11	4	44
Project (Preparation)	14	10	140
Presentation (Preparation time included)	4	4	16
Mid-Term Exam			
Studying for Mid-Term Exam			
Final Exam			
Studying for Final Exam			
<b>Total workload</b>			<b>270</b>
<b>Total workload / 30</b>			<b>9.0</b>
<b>Course ECTS Credit</b>			<b>9</b>

Assessment	
Activity Type	%
Mid-term	
Experiment Reports	20
Term Project Report & Presentation	80
<b>Final Exam</b>	
<b>Total</b>	<b>100</b>

<b>COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES</b> (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
<b>NO</b>	<b>PROGRAM OUTCOMES</b>	<b>Contribution</b>
<b>1</b>	a. Sufficient knowledge of mathematics	1
	b. Sufficient knowledge of basic sciences	1
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	5
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	4
<b>2</b>	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	4
<b>3</b>	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	5
<b>4</b>	To analyze and solve the complicated engineering problems:	4
	a. skill of developing, selecting and applying the required techniques and devices	4
<b>5</b>	b. skill of using information technologies effectively	4
	To study the complicated Electrical-Electronics engineering problems and research subjects:	2
<b>6</b>	a. skill of experimental design	2
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	2
<b>7</b>	a. Skill of performing individual studies	
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
<b>8</b>	a. Skill of effective oral and writing communication in Turkish	1
	b. Skill of improving and using foreign language knowledge	1
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	1
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	3
<b>9</b>	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	1
<b>10</b>	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	1
	b. Knowledge about legal regulations and standards of engineering	1
<b>11</b>	a. Knowledge about project management, risk management and change management	1
	b. Awareness of the significance of entrepreneurship and innovation	
	c. Knowledge about sustainable development	
<b>12</b>	Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions	2
<b>13</b>	Knowledge about modern problems in local and universal scale	

<b>INSTRUCTORS</b>				
<b>Prepared by</b>	Erol Seke			

**Date:**24.10.2024