



ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM

Course Title	Course Code
INTRODUCTION TO VHDL-FPGA	151227634

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
7	3	2	7

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
	5	2		

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

Prerequisite	
Objectives of the Course	Learn how to make designs on Field Programmable Gate Arrays using VHDL.
Brief Course Content	Introduction to programmable devices, FPGA structure, design flow using VHDL, use of ISE software, VHDL signal/data types, design and use of components, connections, synchronous design, waveform and VHDL simulation test benches, use of LEDs and switches on the development kit, pitfalls in VHDL, variables, more complicated keywords in VHDL, correct use of arithmetic and logical operators, state-machines, functions and procedures, memory components, communication with external components using examples

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 Learn VHDL and use HDL tools	1,2,5,7	1,2,3,4,12,14,15	A,E,G
2 Learn HDL simulation	1,2,5,7	1,2,3,4,5	A,E,G
3 Learn to prepare HDL design of complex digital circuit and prepare reports for it	1,2,5,7,9	1,2,3,4,12,14,15	A,E,G
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

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

Course Weekly Schedule	
1	Starting an ISE project
2	3 to 8 Decoder
3	Up Counter
4	Up-Down Counter, ISim simulator
5	Key De-bouncing
6	Two Counter Instances with de-bouncer
7	Two BCD Counters with de-bouncer
8	Mid-Term Exams
9	Knight Rider with Buttons
10	Generic Rotary Encoder
11	Key Sequence Reader
12	For Loop
13	Simple State Machine
14	Block Memories
15	Timed Outputs
16,17	Final Exams

Calculation of Course Workload			
Activities	Count	Time (Hour)	Total Workload (Hour)
Weekly classroom time	14	5	70
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 and presentation time included)	14	1	14
Project (Preparation and presentation time included)	1	40	40
Presentation (Preparation time included)			
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	20	20
Final Exam	1	2	2
Studying for Final Exam	1	20	20
		Total workload	210
		Total workload / 30	7.0
		Course ECTS Credit	7

Assessment	
Activity Type	%
Mid-term	30
Experiment Reports	10
Term Project Report & Presentation	20

Final Exam	40
Total	100

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES

(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

NO	PROGRAM OUTCOMES	Contribution
1	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
2	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
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	1
4	To analyze and solve the complicated engineering problems:	1
	a. skill of developing, selecting and applying the required techniques and devices	1
5	To study the complicated Electrical-Electronics engineering problems and research subjects:	2
	a. skill of experimental design	2
6	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	2
	a. Skill of performing individual studies	
7	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
	a. Skill of effective oral and writing communication in Turkish	1
8	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
	8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology
9	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	2
10	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	
11	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	1
12	Knowledge about modern problems in local and universal scale	

INSTRUCTORS

Prepared by	Erol Seke			
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Date:06.07.2024