



ESOGÜ Electrical-Electronics Engineering Department

COURSE CODE: 151227634-151247634 **COURSE TITLE:** Intro. to VHDL-FPGA

Semester	Weekly Hours		COURSE			
	Theoretical	Practical	Credits	ECTS	Type	Language
7	3	2	4	7	Compulsory () Elective (x)	Turkish () English (x)
Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).						
Math and Basic Science		Electrical Engineering [mark (√) if there is high design content]		General Education	Humanities	
0		4 (√)		0	0	
Assessment		THEORETICAL-PRACTICAL COURSES			LABORATORY COURSES	
		Type	Number	%	Activity Type	Number %
Midterm		Midterm	1	30	Quiz	
		Quiz			Lab performance	10 10
		Homework			Report	
		Project	1	20	Oral exam	
		Other (.....)			Other (.....)	
Final				40		
Makeup exam (Oral/Written)		written				
Prerequisites						
Brief content of the course		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				
Objectives of the course		Learn how to make designs on Field Programmable Gate Arrays using VHDL.				
Contribution of the course towards professional education		Students who choose to continue their carrier in advanced circuit will get to know the theoretical and some practical details of one of the highly technical and advanced subject. It is advised that a basic digital circuit design course is completed before this course.				
Outcomes of the course		7. Students learn basics of FPGAs and VHDL 8. Make introduction to design of digital systems using VHDL 9. Build knowledge base for advanced VHDL and FPGA based designs 10. Build self-confidence for high technology digital systems				
Textbook of the course		V.A. Pedroni, Circuit Design with VHDL, MIT Press				
Other reference books		1) M.B. Pursley, Introduction to Digital Communications, Pearson-Prentice Hall, 2005. 2) Open-Core				
Required material for the course		Course is highly practical involving both in class and in lab practical designs and experiments. For the lab part, each student/group is provided an FPGA development kit, a computer with VHDL development software installed. Course slides and previous example designs are provided to students.				

WEEKLY PLAN OF THE COURSE	
Week	Topics
1	Internals of FPGA, VHDL, an example introductory application
2	Design flow using ISE, an example run
3	VHDL signal/data types, defining new types, examples of combinatorial circuit designs
4	Synchronous circuits, design of a test bench and use of related software
5	Signal attributes, standard libraries, common pitfalls
6	Variables
7	CASE, WHEN, FOR, GENERATE keywords, GENERIC keyword
8,9	Midterm
10	Logical and arithmetic operators, state-machines, use of memory components, BRAM
11	Functions and procedures
12	Serial communication
13	Presentations of term-projects, discussions and demonstrations
14	Presentations of term-projects, discussions and demonstrations
15,16	Final

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronic Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronic Engineering				X
2	Ability to identify complex engineering problems in Electrical and Electronic Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.				X
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronic Engineering.	X			
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronic Engineering, skills to use information technology effectively.			X	
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronic Engineering			X	
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.			X	
7	Communicating effectively in oral and written form both in Turkish and English. Effective report writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.		X		
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing				X
9	Understanding of professional and ethical responsibility				X
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				X
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				X

Scale for assessing the contribution of the course to the program outcomes:

4: High

3: Medium

2: Low

1:None

Name of Instructor(s): Asist. Prof. Erol Seke

Signature(s):

Date: