Course Description Form	
Course Code and Name	CENG486 VLSI DESIGN (TECH.ELECT.)
Course Semester	8
Catalog Content	IC fabrication process overview, device cross sections, introduction to CAD environment, design flow, design library, schematic entry, analog circuit simulation, layout drawing, layout checks, post layout simulation, passive device models (resistor, capacitor, inductor), semiconductor device models (mosfet, diode, BJT), sensitivity and nonlinearity analysis, transistor level design of basic analog building blocks (amplifiers, voltage references, etc…)
Textbook	CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition) by Neil Weste, David Harris, 2010.
Supplementary Textbooks	VLSI Digital Signal Processing Systems: Design and Implementation by Keshab K. Parhi, 1999. VLSI Design (VLSI Circuits) 1st Edition by M. Michael Vai, 2000.
Credit	6
Prerequisites of the Course **(** *Attendance Requirements***)**	There is no prerequisite or co-requisite for this course
Type of the Course	Elective
Instruction Language	English
Course Objectives	1. Using integrated circuit design tools and software effectively 2. Understanding basic information related to analog integrated circuit design 3. Analyzing and designing basic analog building circuit blocks
Course Learning Outcomes	1. Understand IC design flow 2. Use CAD environment effectively 3. Learn integrated device models 4. Design integrated analog building blocks with given performance parameters using the software.
Instruction Methods	The mode of delivery of this course is Face to face

Weekly Schedule

1. Week: Very large scale integrated circuits (VLSI) design methods
2. Week: Very large scale integrated circuits (VLSI) design methods
3. Week: Design verification and test methods
4. Week: Collectors, striking, counters
5. Week: ALU
6. Week: Memory and finite state machines (FSM) structure
7. Week: synchronization, meta-stability
8. Week: PLL and DLL circuits
9. Week: PLL and DLL circuits
10. Week: Programmable logic devices (CPLD, FPGA, FPLD) and integrated circuit designs
11. Week: Programmable logic devices (CPLD, FPGA, FPLD) and integrated circuit designs
12. Week: HDL hardware description An introduction to the language
13. Week: Computer-aided design tools, integrated circuit design using the HDL
14. Week: Computer-aided design tools, integrated circuit design using the HDL

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours: 3
Reading Activities
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

Assessment Criteria

	Numbers	**Total Weighting (%)**
Midterm Exams	1	30
Assignment	2	30
Application		
Projects		
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40
Attendance		

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours			
Reading Tasks	14	3	42
Studies	14	3	42
Material Design and Implementation			
Report Preparing			
Preparing a Presentation			
Presentations			
Midterm Exam and Preparation for Midterm Exam	1	12	12
Final Exam and Preparation for Final Exam	1	12	12
Other (should be emphasized)			
Total Workload			150
Total Workload / 25			6
Course Credit (ECTS)			6

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Sufficient knowledge on mathematics, science and computer engineering; ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems				X	
2	Ability to identify, define, formulate and solve complex engineering problems; ability to choose and apply appropriate analysis and modelling methods for these purposes				X	
3	Ability to design a complex system, process, device, software, algorithm, or product under realistic constraints and circumstances to meet certain requirements; ability to apply modern design techniques for this purpose					X
4	Ability to choose, develop and use modern techniques and tools necessary for engineering applications; ability to effectively use computing technologies			X		
5	Ability to design and implement systems or experiments to solve engineering problems, collect and interpret data to evaluate and analyze the results of solutions				X	
6	Ability to work effectively in intradisciplinary and interdisciplinary teams or individually		X			

	7	Ability to efficiently prepare, evaluate and interpret reports			X		
	8	Ability to make presentations and conduct effective verbal and written communication in Turkish and English	X				
	9	Awareness of the necessity of lifelong learning; ability to access information, follow scientific and technological developments; ability to perpetually renew oneself		X			
	10	Awareness of professional and ethical responsibility, ability to act in accordance with ethical principles	X				
	11	Ability to apply knowledge on project management, risk management and change management		X			
	12	Awareness of entrepreneurship and innovation, ability to design and build sustainable systems	X				
	13	Ability to devise local and global solutions to contemporary issues considering the effects of engineering applications on health, environment and security	X				
	14	Awareness of the legal consequences of engineering solutions	X				
	15	Ability to apply knowledge on software development process and documentation rules	X				
	16	Knowledge on standards used in engineering applications			X		
	17	Awareness of occupational health and security, information security and privacy	X				
The Course's Lecturer(s) and Contact Information	Computer Engineering Department Chair bmbb@gazi.edu.tr						