Principles of Logic Design

Course Code:

CSE 221

Course Period:

Autumn

Course Type:

Core

Credits:

4

Theoric:

3

Practice:

0

Laboratory Hour:

2

ECTS:

6

Course Language:

English

Course Objectives:

The aim of this course is to provide the students the ability to analyze, design and implement digital circuits; starting with combinational circuits and moving on to the sequential circuits.

Course Content:

Students will be able to design and analyze digital electronic circuits. They will learn how Boolean algebra forms the theoretical foundation on which these circuits are built. They will learn how information can be represented in a digital system and what common logic

functions are used to process it. They will learn how memory components expand the functionality the behavior of digital circuits. Most importantly, they will see how circuits can be aggregated to larger components that allow more complex designs.

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1) Knowledge of numbering systems, data encoding and Boolean Algebra.	1	1,3	A, C
2) Boolean function simplification and implementation; ability to design combinational circuits.	1,2,3	1,2,3	A, B, C
3) Ability to analyze and design complex sequential circuits; and implement these circuits on real hardware	2,3,5	1,3	A, B, C
4) Ability to work in teams	6	3	B

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction, Number Systems	Textbook
2	Number Codes and Registers, Binary Logic and Boolean Algebra	Textbook
3	Boolean Functions and Theorems, Canonical Forms	Textbook
4	Karnaugh Maps, Don’t Cares and NAND/NOR Implementations	Textbook
5	Combinational Circuits, Binary Adders and Subtractors	Textbook
6	Review & Midterm Exam I	
7	Multipliers & Comparators, Encoders, Decoders, MUX/DEMUX	Textbook
8	Sequential Circuits and Latches, Flip Flops	Textbook

9	Sequential Circuit Analysis, State Reduction	Textbook
10	Sequential Circuit Design & Review	Textbook
11	Shift Registers, Registers, Counters	Textbook
12	Midterm Exam II	
13	Random Access Memory, Memory Decoding, Read Only Memory	Textbook
14	Register Transfer Level, Control Logic	Textbook

RECOMMENDED SOURCES

Textbook	M. Morris Mano, **Digital Design, 4th Edition,** Prentice Hall
Additional Resources	Lecture Notes: http://cse.yeditepe.edu.tr/v2/en/academic/course-pages [1] Lab material: http://cse.yeditepe.edu.tr/v2/en/academic/course-pages [1]

MATERIAL SHARING

Documents
Assignments
Exams

ASSESSMENT

IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	64
Assignment	4	8
Lab Work	10	28
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution

		1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.					**X**
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					x
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.					x
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.					
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.					x
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.					x
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.					
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.					
9	Awareness of professional and ethical responsibility.					
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.					
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions.					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 12x Total course hours)	12	5	60

Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Midterm examination	2	2	4
Homework	4	4	16
Final examination	1	3	3
Total Work Load			139
Total Work Load / 25 (h)			5.56
ECTS Credit of the Course			6