هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Advanced Programming

Course Title:	**Digital logic Design**
Course Code:	**CS1254**
Program:	**Computer Science**
Department:	Computer Science& Engineering
College:	**Computer Science and information technology**
Institution:	Albaha University
Version:	**2**
Last Revision Date:	**4 April 2023**

Table of Contents:

A. General information about the course:

Course Identification	
1. Credit hours:	3
2. Course type	
a.	University ☐ College ☐ Department☒ Track☐ Others☐
b.	Required ☒ Elective☐
3. Level/year at which this course is offered: Level 4 / 2nd Year	

4. Course general Description

Lecture:

This is an introductory level course that gives its participants ability to analyze and design digital circuits. Students learn procedural approaches to designing digital circuits starting from specification of the problem. Students become familiar with the number systems that are used in computers and other digital circuits. They learn to use Boolean algebra and logic gates. Methods of manipulating and simplifying Boolean expressions are learned. Basic combinational logic function models are designed. Students become familiar with arithmetic functional blocks, latches, flip-flops, counters, and registers. Sequential circuits are also designed, and students are introduced to PLD programming. In addition to the classroom portion of the course, there are several laboratory sessions where students build and test their logic designs.

Lab:

The Experiments in the Lab have been divided into two major portions: • Hardware Labs• Simulation labs. Both have been designed to familiarize students with the Combinational Digital Logic Design and Sequential Digital Logic Design through the implementation of Digital Logic Circuits using ICs of basic logic gates and some simple digital logic circuits..

5. Pre-requirements for this course (if any): None

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

The main purpose for this course is to teach students how to:

- Recognize fundamental principles of designing digital circuits.
- Describe combinational and sequential circuits
- Minimize combinational logic circuits
- Analyze combinational and sequential logic circuits
- design combinational and sequential logic circuits
- Implement logic circuits using PLD's
- Work both independently and collaboratively.
- Communicate concepts and techniques in oral presentations.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	22	50%
2.	E-learning		
3.	Hybrid ● Traditional classroom ● E-learning		
4.	Distance learning	22	50%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	44

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Recognize fundamental principles of designing digital circuits.	K1	- Lectures - Discussions	- Homework (rubric) - Midterm - Final exam
1.2	Describe combinational and sequential circuits	K2	- Lectures - Discussions	- Homework (rubric) - Midterm - Final exam
2.0				
2.1	Minimize combinational logic circuits	S1	- Lectures - Problem based learning - Assignments - Demonstration	- Homework (rubric) - midterm - Final exam - Lab reports (rubric) - Lab exam evaluation form (rubric)
2.2	Analyze combinational and sequential logic circuits	S3	- Lectures - Problem based learning - Assignments - Demonstration	- Homework (rubric) - midterm - Final exam - Lab reports (rubric) - Lab exam evaluation form (rubric)
2.3	Design combinational and sequential logic circuits	S2	- Lectures - Problem based learning - Assignments - Demonstration - Projects	- Homework (rubric) - Final exam - Lab reports (rubric) - Lab exam evaluation form (rubric) - Project Evaluation form (rubric)
2.4	Implement logic circuits using PLD’s	S2	- Lectures - Problem based learning - Assignments - Demonstration	- Homework (rubric) - Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.5	Communicate concepts and techniques in oral presentations	S5	Oral presentation	Project evaluation form (rubric)
3.0				
3.1	Work both independently and collaboratively	V1	-Projects	Project evaluation form (rubric)

C. Course Content

No	List of Topics	Contact Hours
1.	Digital Systems and Binary Numbers	3
2.	Boolean Algebra and Logic Gates	3
3	Gate Level Minimization	3
4	Combinational Logic	3
5	Synchronous Sequential Logic	4
6	Registers and Counters	3
7	Memory and Programmable Logic	3
Total		22

No	List of Topics (Lab)	Contact Hours
3.	Digital Logic Gates	1
4.	Simplification of Boolean Functions	1
5.	Combinational Circuits	3
4.	Code Converters	3
5.	Design with Multiplexers	1
6.	Adders and Subtractors	2
7	Flip Flops	2
8	Sequential Circuits	3
9	counters	3
10	Shift Registers	3

Total	22

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	Every two Weeks	10%
2.	Midterm	6	20%
3.	Project evaluation form (rubric)	12	10%
.4	Lab reports and discussions (rubric)	Every two Weeks	10%
5.	Lab exam evaluation form (rubric)	12	10%
6	Final Exam	13	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"Digital Design With an Introduction to the Verilog HDL", M. Morris Mano, Michael D. Ciletti - *Digital Design*, Wakerly, Fourth Edition, Prentice Hall
Supportive References	Computer Science Curriculum 2013 – http://cs2013.org - ACM (Association for Computer Machinery) Curricula Recommendations - http://www.acm.org/education/curricula-recommendations
Electronic Materials	• ACM (Association for Computer Machinery) web site - http://www.acm.org/ • IEEE Computer Society web site - http://www.computer.org/portal/web/guest/home • Access to the Saudi Digital Library (SDL). Using the learning management system of the university – Rafid System (https://lms.bu.edu.sa/).
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• A classroom or lecture hall with whiteboard for 25 students. • A digital circuit's laboratory.
Technology Resources (AV, data show, Smart Board, software, etc.)	• A digital image projection system with connection to desktop computer and laptop computer. • High speed Internet connection. • An instructor computer station.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• None
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students	• Surveys (indirect).

Assessment Areas/Issues	Assessor	Assessment Methods
	• Faculty • Peer Reviewers • Program Leader • Course Coordinator	• Direct feedback from students (interview between Program leader and students). • Course evaluation by Peer Reviewers (indirect). • Class visit by Program Leader • Comprehensive Course report (where we can find information about teaching difficulties and action plan, …)
Effectiveness of students assessment	• Students • Faculty • Peer Reviewers • Course Coordinator • Exam Evaluation Committee • Course Coordinator	• Surveys (indirect). • Direct feedback from students (interview between Program leader and students). • Assessment results (direct) • Course evaluation by Peer Reviewers (indirect). • Comprehensive Course report (where we can find information about assessment difficulties and action plan, …) • Exam evaluation by the Exam Evaluation Committee (indirect)
Quality of learning resources	• Students • Faculty • Peer Reviewers • Course Coordinator	• Surveys (indirect) • Course evaluation by Peer Reviewers (indirect). • Comprehensive Course report (where we can find information about difficulties and challenges about learning resources as

Assessment Areas/Issues	Assessor	Assessment Methods
		well as consequences and action plan, …)
The extent to which CLOs have been achieved	• Faculty • Program Leader • Course Coordinator	• Student Results (direct) • Comprehensive Course report (where we can find the CLO assessment results)
Other	None	

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Curriculum Committee Meeting
REFERENCE NO.	
DATE	APRIL 6, 2023