Course Specification

(Bachelor)

Course Title	**Logic Design**
Course Code:	**CEN 1251**
Program:	**Bachelor in Computer Science**
Department:	**Computer Science**
College:	**Faculty of Computers and Information Technology**
Institution:	**University of Tabuk**
Version:	**1.0**
Last Revision Date:	**27 July 2022**

Table of Contents

A. General information about the course:

1. 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: 4 / 2

4. Course general Description:

This course covers the following topics, Digital systems and Binary Numbers: Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic. Boolean Algebra and Logic Gates. Gate-Level Minimization. Combinational Logic. Synchronous Sequential Logic. Registers and Counters

5. Pre-requirements for this course (if any):

MATH1102

6. Co-requisites for this course (if any):

N/A

7. Course Main Objective(s):

- Identify basic different number systems.
- Comprehend the fundamentals of Boolean algebra and logic gates.
- Analyze and minimize logic circuits.
- Explain the behavior of a combinational circuit
- Explain the behavior of a sequential circuit

- Design combinational and sequential circuits

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		

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

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.1	Use set theory and logic in the solution of computing problems	K1,K2	▪ Lectures ▪ Lab sessions ▪Class Discussions	● Exams ● Quizzes ● HomeWork ● Labwork
1.2	Understand the requirements of the problems	K1		
1.3	Understand the hardware implementation of the instruction set architecture using logic gate	K2,K4		
2.0	**Skills**			
2.1	Design combinational components based on Boolean Algebra theory.	S2,S3	· Lectures • Lab sessions • Class Discussions	● Exams ● Quizzes ● HomeWork ● Labwork
2.2	Design sequential components based on the concept of finite state machine.	S2,S3		
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	● Binary Systems: Number Base Conversions. ● Lab: Introduction to LAB equipment and rules	4
2.	● Complements, Binary Codes, Binary Storage and Operations. ● Lab: Implementing basic logic gates	4
3.	● Boolean Algebra and Logic Gates, Basic Theorems and Boolean Functions ● Lab: Implementation Basic Theorems of Boolean Algebra	4

4.	● Canonical and Standard Forms, Other Logic Operations. ● Lab: Implementing Canonical and Standard Forms of Boolean Functions	4
5.	● Digital Logic Gate (part 1) ● Lab: Implementation of Boolean function with gates	4
6.	● Digital Logic Gate (part 2) ● Lab: Implementing Digital Logic Gate	4
7.	● Gate-Level Minimization (part 1) ● Lab: Implementing the simplified Boolean function	4
8.	● Gate-Level Minimization (part 2) ● Lab: Implementing the above topic	4
9.	● The Map Method: Two and Three Variable Map ● Lab: Implementing the Karnaugh Map method	4
10.	● Four Variable Map Method ● Lab: Implementing the Boolean function with Four Variable using Karnaugh Map Method	4
11.	● Combinational Logic, Combinational Circuits, Analysis Procedure. ● Lab: Implementing Combinational Circuits	4
12.	● Analysis Procedure and Design Procedure. ● Lab: Implementing Combinational Circuits	4
13.	● Arithmetic Circuits: Binary Adder and Subtractor ● Lab: Implementing Binary Adder and Subtractor circuits	4
14.	● Comparators ● Lab: Implementing Comparators circuit	4
15.	● Synchronous Sequential Logic ● Lab: Implementing Synchronous Sequential Logic circuit	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	HomeWork , Quizzes	2-15	10%
2.	LabWork	2-15	20%
3.	Mid-Exam 1	6 or 7	15%
4.	Mid-Exam 2	11 or 12	15%
5.	Final Exam	16	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, 4/E . Mano & Ciletti ©2007 Prentice Hall, ISBN-10: 0131989243 | ISBN-13: 9780131989245.
Supportive References	● Logic and Computer Design Fundamentals, 4/E . M. Morris Mano , Charles Kime , ISBN-10: 013198926X, ISBN-13: 9780131989269, Publisher: Prentice Hall, 2008 ● • Digital Design: Principles and Practices, 4/E . Wakerly ©2006 | Prentice Hall , ISBN-10: 0131863894 | ISBN-13: 9780131863897
Electronic Materials	● Faculty members websites ● Blackboard Platform
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom , Logic Design Laboratory

Items	Resources
Technology equipment (projector, smart board, software)	**projector**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching	Faculty, Program Leaders, and Advisory Board	Both Direct and Indirect
	Students	Indirect
Effectiveness of Students Assessment	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Both Direct and Indirect
Quality of Learning Resources	Faculty, Students, and Advisory Board	Indirect
The Extent to which CLOs have been Achieved	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Direct (as in section B) and Indirect/Surveys
	Students	Indirect
Other	-	-

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	