Course Specifications

Course Title:	Digital Logic Design I
Course Code:	CENX 211
Program:	B.S. in Computer Engineering
Department:	Department of Computer Engineering
College:	College of Computer and Information Sciences
Institution:	King Saud University

Table of Contents

A. Course Identification

1. Credit hours: 4 (3,1,2) hours
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Level 5
4. Pre-requisites for this course (if any)**:** Discrete Math, Math 151
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	6 hours per week	100%
2	**Blended**		
3	**E-learning**		
4	**Correspondence**		
5	**Other**		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	45
2	**Laboratory/Studio**	30
3	**Tutorial**	15
4	**Others** (specify)	
	Total	90
Other Learning Hours*		
1	**Study**	30
2	**Assignments**	15
3	**Library**	
4	**Projects/Research Essays/Theses**	
5	**Others** (specify)	
	Total	45

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Topics include: number systems, application of Boolean algebra, modular design of combinational logic and basic design of sequential circuits using state diagrams.

2. Course Main Objective

This course provides students with basic knowledge on combinational and sequential circuit design. The course includes a lab component to help students get hands-on experience with the theoretical concepts they take in the course

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Identify number systems including base conversion and arithmetic operations	1
1.2	Solve Boolean expressions and simplify using Boolean algebra rules and k-maps	1
1.3	Identify the physical properties of logic gates such as fan-in, fan-out, logic voltages and noise margins.	1
2	**Skills:**	
2.1	Analyze sequential circuits	2
2.2	Design state diagrams and sequential circuits	2
3	**Competence:**	
3.1	Design combinational logic circuits and building blocks (decoders, encoder, multiplexers, adders, …)	6

C. Course Content

No	List of Topics	Contact Hours
1	Number systems, base conversion and arithmetic operations	8
2	Boolean algebra and their application in logic circuits	8
3	Simplification of Boolean expressions	8
4	The physical properties of logic gates	4
5	Combinational building blocks such as decoders and multiplexers	8
6	Basic memory elements such as the SR latch and the D flip-flop	8
7	Sequential circuits analysis	12
8	Sequential circuits design	4
Total		60

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Identify number systems including base conversion and arithmetic operations	Lecture and Tutorials	Exam / Homework
1.2	Solve Boolean expressions and simplify using Boolean algebra rules and k-maps	Lecture and Tutorials	Exam / Homework
1.3		Lecture and Tutorials	Exam / Homework
1.4	Identify the physical properties of logic gates such as fan-in, fan-out, logic voltages and noise margins.	Lecture and Tutorials	Exam / Homework
1.5	Formulate basic state diagrams, analyze and design sequential circuits	Lecture and Tutorials	Exam / Homework
2.0	**Skills**		
2.1	Formulate combinational logic circuits and building blocks (decoders, encoder, multiplexers, adders, …)	Lab demonstration	Lab work
3.0	**Competence**		
3.1	Conduct experimentation involving digital electronic circuits in lab work	Lab demonstration	Lab work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Examination (1)	6	15%
2	Midterm Examination (2)	12	15%
3	Homework Assignments	Bi-Weekly	10%
4	LAB	Bi-Weekly	20%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
5	Final Exam (Laboratory + Theory)	End	40% (5+35)%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

1. Instructor provides at least 6 office hours per week.
2. Email consultation is available.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Logic and Computer Design Fundamentals, M. Morris Mano & Charles R. Kime, 5th Ed. 2015, Pearson Education.
Essential References Materials	Tutorial book and Lab book are available in the college print shop.
Electronic Materials	https://lms.ksu.edu.sa
Other Learning Materials	LogSim software, digital logic circuits, experimental equipment.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room with number of seats enough to accommodate enrolled students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Overhead projector with required software to facilitate presentations on smart board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NO

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Faculty	Attainment level of every CLO is measured directly.
Extent of achievement of course learning outcomes	Students	Attainment level of every CLO is measured indirectly.
Quality of learning resources	Students	Indirect – Edugate survey.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of assessment	Faculty-Peer Review	Final examination is moderated.
Effectiveness of teaching and assessment	Department Council	Course reports are evaluated by the Department Council.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	