Course Specifications

Course Title:	Logic Design
Course Code:	ICS 121
Program:	Information and Computer Science
Department:	Computer Science and Information
College:	College of Science at Az Zulfi
Institution:	Majmaah University

Table of Contents

A. Course Identification

1. Credit hours: (3) (2 Lec + 2 lab)
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 2nd Level – 1st year
4. Pre-requisites for this course (if any)**:** **N/A**
5. Co-requisites for this course (if any)**:** **N/A**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	48	80%
2	**Blended**	6	10%
3	**E-learning**	0	0%
4	**Correspondence**	0	0%
5	**Other**	6	10%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	15
3	**Tutorial**	15
4	**Others** (specify)	-
	Total	60
Other Learning Hours*		
1	**Study**	15
2	**Assignments**	15
3	**Library**	15
4	**Projects/Research Essays/Theses**	15
5	**Others** (video lectures)	15
	Total	75

* 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

Logic Design course covers the design and implementation of digital logic circuits. And it includes these topics : Overview of electronics Binary Systems and Codes Boolean Algebra and Logic Gates Gate-Level Minimization Combinational Circuits. Sequential Circuits Registers and Counters.

2. Course Main Objective

- Be able to understand of number systems, Boolean algebra and logic design
- Be familiar with truth tables, Boolean algebra, Karnaugh maps, and other methods to the design and characterization of digital circuits as well as to obtain design equations.
- Be able to apply alternative techniques to simplify the design process yielding innovative designs.
- Be able to analyze and design synchronous sequential circuits as well as the use of registers and counters in these circuits.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	Study number systems and codes and their application to digital systems.	a2
1.2	Explain the mathematical characteristics of logical gates	a1
1.3	Utilize decoders and multiplexers in the design of logic	a1
1.4	Design and describe the operation of basic memory elements.	a1
1.5	Use registers and counters in the sequential circuits	a1
2	**Skills :**	
2.1	Apply Boolean algebra to the design and characterization of digital circuits	b1
2.2	Apply truth tables, Boolean algebra, Karnaugh maps.	b1
2.3	Implement design equations and procedures to design combinational systems consisting of gates.	b1
2.4	Apply alternative techniques to simplify the design process.	b1
2.5	Analyze the behavior of sequential synchronous circuits	b1
3	**Competence:**	
3.1	Submit a group final project at the end of the semester that involves the implementation of design theory, and the use of a simulation package to develop a complex digital circuit.	c3
3.2		
3.3		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to digital systems and their applications	4
2	Binary systems	12
3	Boolean Algebra and logic gates	12

4	Karnaugh maps and Gate Level Minimization	12
5	Combinational Logic Design	8
6	Synchronous Sequential Logic Design	8
Total		56

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	Study number systems and codes and their application to digital systems.	Lectures Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & Lab Activities Quizzes
1.2	Explain the mathematical characteristics of logical gates		
1.3	Utilize decoders and multiplexers in the design of logic		
1.4	Design and describe the operation of basic memory elements.		
1.5	Use registers and counters in the sequential circuits		
2.0	**Skills**		
2.1	Apply Boolean algebra to the design and characterization of digital circuits	Lectures Lab demonstrations Case studies Individual presentations Brainstorming	Written Exam assignments Lab Activities Quizzes
2.2	Apply truth tables, Boolean algebra, Karnaugh maps.		
2.3	Implement design equations and procedures to design combinational systems consisting of gates.		
2.4	Apply alternative techniques to simplify the design process.		
2.5	Analyze the behavior of sequential synchronous circuits		
3.0	**Competence**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	20%
2	Second written mid-term exam	12	20%
3	Class activities, group discussions, Presentation	Every 2 weeks	5%
4	Homework + Assignments	After Every chapter	5%
5	Electronic exam	14	5%
6	Lab activities	15	5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
7	Final written exam	16	40%
8			

***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. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- 6-office hours per week in the lecturer schedule.
- The contact with students by e-mail, mobile, office telephone, website and BlackBoard.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	M. Morris Mano, Digital Logic And Computer Design, 2015.
Essential References Materials	Giuliano Donzellini, Luca Oneto, Domenico Ponta, Introduction to Digital Systems Design, , Springer, 2019.
Electronic Materials	Logic Gate Simulator.
Other Learning Materials	Videos and presentations made available on BlackBoard e-Learning platform.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with required digital aids and to support traditional method of teaching using blackboard. Classrooms with proper lighting and air conditioning system integrated with the sound System /audio system. Classroom with smart board interface, display screen and a computer to aid the sessions
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Board with supporting software / computers with updated versions of software as required to understand the subject concepts.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	**N/A**

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Strategies for Obtaining Student Feedback on Effectiveness of Teaching	Instructor	Analysis of students' results. Observation during class work. Students' evaluations. Colleagues' evaluations. Evaluation questionnaire filled by the students. Interview a sample of students enrolled in the course to solicit their opinions
Other Strategies for Evaluation of Teaching	the Department	Self-assessment. External evaluation. Periodic review of course (the Commission of study plans).
Processes for Improvement of Teaching	the Department	Taking into account the recommendations yielded from the internal review of the course. Guidelines about teaching the course provided by the study plans commission. Department guidelines pertaining the faculty member's performance acquired using direct observation. Training and development. Workshops to improve the educational process
Processes for Verifying Standards of Student Achievement	Instructor	check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution. Instructors of the course working together with Head of Department to adopt a unique process of the evaluation.
Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.	Instructor	Comparison of the course to its counterparts offered in similar departments. Periodic revision of course description by faculty member. Periodic revision of course description by the study plans and schedules Commission. Update learning resources related to the course to ensure that the course is up-to-date with the developments in the field. Make use of statistical analysis of course evaluation carried out by the students to improve and develop the course. Provide an opportunity to the students to express their opinions about what is taught and receive suggestions and evaluate their effectiveness.

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	