Sana'a University
Faculty of Engineering
Electrical Engineering Department
B.Sc. of Computer and Control Engineering

42. Course Plan of Digital Systems Design

I. Information about Faculty Member Responsible for the Course

Name of Faculty Member	Prof. Dr. Abdul Raqib Abdo Asaad	Office Hours					
Location&Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail							

II. Course Identification and General Information

1.	Course Title:	Digital Systems Design				
2.	Course Number & Code:	CCE316				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	2	-	3
4.	Study level/year at which this course is offered:	4th Level / 1st Semester				
5.	Pre –requisite (if any):	Logic Circuits 2 (CCE112)				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered	Computer Engineering and Control				
8.	Language of teaching the course:	Arabic & English				
9.	System of Study:	Semesters				
10.	Mode of delivery:	Collective and individual learning				
11.	Location of teaching the course:	Class Room (Faculty of Engineering)				

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

III. Course Description

This course aims to provide students with knowledge necessary and advanced methods applied to the design, simulation and implementation of digital systems and their applications in variant environments such as industrial & Marketing. Course topics include, a review on combinational and sequential logic circuits, programmable logic devices, single-output and multi-output multiplexer networks, ASM, Digital Systems design and implementation, AND-XOR networks, and Ternary logic and circuits. This course depends on lectures and tutorials parts as well as previous knowledge and practical skills gained in logic circuits I & II. Based on these activities and previous knowledge, students will be able develop their problems-solving and design skills related to digital system design and development.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

1. Demonstrate the operation of a logic gates and digital systems and their applications to the field of computer engineering.
2. Describe digital logic systems using flowchart method and the Hardware Description Method
3. Identify a digital system scope, available solution, constrains and alternative solutions.
4. Analyze digital system's problems while constructing and/or developing existing systems with an appropriate digital system solution.
5. Design a digital system to meet desired specifications and imposed constraints.
6. Use computer simulation tools for the development of different types of digital systems.
7. Perform specific tasks individually and sharing ideas clearly while working within teams.
8. Follow the standards to achieve reports and presentations.

V. Course Content:

- Distribution of Semester Weekly Plan Of course Topics/Items and Activities

A – Theoretical Aspect:

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

Order	Topics List	Sub Topics List	Week Due	Contact Hours
1.	Review	• Logic circuits (I) • Logic circuits (II) • Programmable logic devices	1st, 2nd	4
2.	Design of digital multiplexer networks using the matrix method.	• Single-output networks • Multi-output networks	3rd, 4th	4
3.	ASM design	• FFs and gates • FFs and Multiplexer • FFs and Decoder • FFs per state method • FFs and PLA • FFs and ROM	5th, 6th, 7th	6
4.	Midterm Exam	• All previous topics	8th	2
5.	Digital System	• System components • System description • Components system design (control unit, data processing unit) • System design	9th, 10th, 11th	6
6.	An introduction to AND-XOR networks	• Fixed-polarity networks • Mixed-polarity networks • Single-output networks • Multi-output networks • XOR-MUX networks • Digital systems based on AND_XOR components	12th, 13th	4

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

7.	An introduction to Ternary Logic	• Ternary Logic • Ternary gates • Ternary circuits design	14th, 15th	4
8.	Final Exam	• All topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Practical Aspect

Order	Topics List	Number of Weeks	Contact hours
1.	Review of logic circuits (I), logic circuits (II), and programmable logic devices.	1nd, 2rd	4
2.	Design of digital multiplexer networks: single-output networks, multi-output networks using the matrix method.	3th, 4th	4
3.	ASM design: FFs and gates, FFs and Multiplexer, FFs and Decoder, FFs per state method, FFs and PLA, FFs and ROM.	5th, 6th	4
4.	Digital System: System components, system description, components system design (control unit, data processing unit), system design	7th, 8th	5
5.	An introduction to AND-XOR networks: Fixed-polarity networks, Mixed-polarity networks, single-output networks, multi-output networks, XOR-MUX networks, digital systems based on AND_XOR components	9th, 10th	4
6.	An introduction to Ternary Logic: Ternary Logic, Ternary gates, Ternary circuits design.	11th, 12th	4
7.	Course Project Presentation & Evaluation.	13th	2
8.	Final Lab Exam	14th	2
Number of Weeks /and Units Per Semester		**14**	**28**

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

VI. Teaching strategies of the course:

- Active Lectures,
- Tutorials,
- Assignments,
- Interactive class Discussions,
- Projects,
- Problems solving.

VII. Assignments & Reports:

No	Assignments	Week Due	Mark
1.	• Design of digital multiplexer networks	3rd & 4th	2
2.	• Problems on ASM Design	5th to 7th	2
3.	• Digital System Design • Searches Web for new technologies applied to the digital system Design	9th to 13th	3
4.	• Lab Reports	2nd to 12th	8
	Total		**15**

VIII. Schedule of Assessment Tasks for Students during the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Assignments & Reports	2nd to 13th	15	10%
2.	Quizzes	5th, 10th & 14th	10	6.67%
3.	Midterm Exam (Theory)	8th	20	13.33%
4.	Final Lab. Exam (including Course Project Evaluation)	13th & 14th	30	20%
5.	Final Exam (Theory)	16th	75	50%

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

Total	**150**	**100%**

IX. Learning Resources:

1- Required Textbook(s)

1) M. Morris Mano & Michael D. Ciletti (2012), "Digital design", Fifth Edition, Prentice Hall.
2) Raymond M. Kline (1983), "Structured Digital Design", Latest Edition, Prentice Hall.

2- Essential References

1) A. E. A. Almaini (1994), "Electronic Logic Systems", Second Edition. Pearson Prentice Hall.
2) أ.د. عبدالرقيب عبده أسعد، (1995)، أسس تصميم النظم المنطقية الالكترونية، المركز العلمي للخدمات الجامعية، اليمن، صنعاء.
3) أ.د. عبدالرقيب عبده أسعد، (2001)، شبكات *AND-XOR* وتصميم النظم المنطقية الإلكترونية، جامعة العلوم والتكنولوجيا، اليمن، صنعاء.
4) أ.د. عبدالرقيب عبده أسعد، (2001)، المنطق الرقمي الثلاثي وأسس تصميم الحاسوب، جامعة العلوم والتكنولوجيا، اليمن، صنعاء.

3- Electronic Materials and Web Sites *etc*.

X. Course Policies:

1.	**Class Attendance:** -A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** - For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** - A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.

Prepared by	Head of Department Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

4.	**Assignments & Projects:** - The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
5.	**Cheating**: - For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance
	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

Prepared by	Head of Department Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas