

COURSE PLAN

FIRST: BASIC INFORMATION

College					
College	: Karak College				
Department	: Engineering Department				
Course					
Course Title	: Integrated Circuit				
Course Code	: 020406222				
Credit Hours	: 2 (2 Theoretical, 0 Practical)				
Prerequisite	: 020406121 / 020406211				
Instructor					
Name	:				
Office No.	:				
Tel (Ext)	:				
E-mail	:				
Office Hours	:				
Class Times	Building	Day	Start Time	End Time	Room No.
Text Book					
1. Integrated Circuit, Al-Balqa Applied University & KOICA, 2022					
References					
1. Gary S. May, and Simon M. Sze "Fundamentals of Semiconductor Fabrication", John Wiley & Sons, Inc., 2004.					
2. Streetman B., and Banerjee S.K., "Solid State Electronic Devices ", Prentice-Hall, 6 th Edition, 2006.					
3. Donald Neamen, "An Introduction to Semiconductor Devices", McGraw-Hill, 2005.					

SECOND: PROFESSIONAL INFORMATION

COURSE DESCRIPTION

This course explores materials and processes for manufacturing integrated circuits and the development of technologies for the same. Materials and processes related topics include the characteristics of the materials and detailed step-by-step processes. The history of integrated circuits and the latest CMOS devices and deep sub-micron manufacturing technology are also covered.

COURSE OBJECTIVES

The objectives of this course are to enable the student to do the following:

- Explain the physics of semiconductor, basic theory of Metal Semiconductor Contacts.
- Explain basic unit processes of integrated circuit fabrication and process integration.
- Gain an in-depth understanding of theories related to digital IC design.
- Explain various engineering possibilities in integrated circuit fabrication and challenges.
- Predict new semiconductor device and technology trend

COURSE LEARNING OUTCOMES

By the end of the course, the students will be able to:

- CLO1. **Explain** the basics of material selection and need of micro fabrication of electrical components
- CLO2. Summarize the developments in the field of microelectronics technologies
- CLO3. **Explain** the basic operation principles of semiconductor fabrication equipment
- CLO4. **Explain** the lithography, etching and various film deposition processes
- CLO5. **Explain** the process modules available in IC fabrication
- CLO6. Design process flows of IC fabrication technologies
- CLO7. Evaluate effects of process parameters on final transistor characteristics
- CLO8. Synthesis a state machine that performs the function

COURSE SYLLABUS

Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
1	Semiconductor's introduction	<ul style="list-style-type: none"> Semiconductor Materials, and Devices. Semiconductor Process Technology. Steps of Basic Fabrication. 	CLO1	
2	Crystal Growth	<ul style="list-style-type: none"> Silicon Crystal Growth from the Melt. Silicon Float-Zone Process Material Characterization 	CLO2	
3	Silicon Oxidation	<ul style="list-style-type: none"> Thermal Oxidation Process. Impurity Redistribution during Oxidation. Silicon Dioxide Masking Properties. 	CLO3	
4	Silicon Oxidation	<ul style="list-style-type: none"> Oxide Quality. Characterization of Oxide Thickness. Oxidation Simulation. 	CLO3	
5	Photolithography	<ul style="list-style-type: none"> Optical Lithography. Next-Generation Lithographic Methods and Their Comparisons. Photolithography Simulation. 	CLO4	
6	Etching.	<ul style="list-style-type: none"> Wet Chemical Etching. Dry- Etching. Etch Simulation. 	CLO4	
7	Diffusion.	<ul style="list-style-type: none"> Fundamental of Diffusion Process. Extrinsic Diffusion. Lateral Diffusion. Diffusion Simulation. 	CLO4	
8	Mid Exam			

Week	Topic	Topic Details	Reference (Chapter)	Proposed Assignments
9	Ion Implantation.	<ul style="list-style-type: none"> • Implanted Ions Range. • Annealing and Implant Damage. • Implantation-Related Processes. • Ion Implantation Simulation. 	CLO5	
10	Film Deposition.	<ul style="list-style-type: none"> • Epitaxial Growth Techniques. • Epitaxial Layer Structures and Defects. • Deposition of Dielectric and Polysilicon. • Metallization. • Deposition Simulation. 	CLO5	
11	Process Integration.	<ul style="list-style-type: none"> • Passive Components. • Bipolar Technology. • MOSFET Technology. • Process Simulation. 	CLO5	
12	INTEGRATED CIRCUITS.	<ul style="list-style-type: none"> • History of Integrated Circuits. • Development of Integrated Circuits. • Elements Monolithic Device. 	CLO6	
13	INTEGRATED CIRCUITS.	<ul style="list-style-type: none"> • Charge Transfer Devices. • Ultra-Large-Scale Integration (ULSI). • Testing, Bonding, and Packaging. 	CLO6	
14	IC MANUFACTURING	<ul style="list-style-type: none"> • Electrical Testing and Packaging. • Experimental Design and Statistical Process Control. • Yield. 	CLO7	
15	IC MANUFACTURING And FUTURE TRENDS AND CHALLENGES	<ul style="list-style-type: none"> • Computer-Integrated Manufacturing. • Integration's Obstacles. • System-on-a-Chip 	CLO8	
16	Final Exam			

COURSE LEARNING RESOURCES

This module will be taught using available resources including:

- Class lectures, lecture notes, assignments, quizzes, and exams designed to achieve the course objectives.
- Lectures and materials uploaded to the e-learning system.
- Student should read the material covered in class, complete assignments on time, participate in class discussions, and do whatever it takes to grasp the topics.

ONLINE RESOURCES

Any web site or tutorial that offers information about the basics and principles of power electronics analysis.

ASSESSMENT TOOLS

	ASSESSMENT TOOLS	%	
	Quizzes and Activities/attendance	20	
	Mid Exam	30	
	Final Exam	50	
	TOTAL MARKS	100	

THIRD: COURSE RULES**ATTENDANCE RULES**

Attendance and participation are extremely important, and the usual University rules will apply. Attendance will be recorded for each class. Absence of 10% will result in a first written warning. Absence of 15% of the course will result in a second warning. Absence of 20% or more will result in forfeiting the course and the student will not be permitted to attend the final examination. Should a student encounter any special circumstances (i.e. medical or personal), he/she is encouraged to discuss this with the instructor and written proof will be required to delete any absences from his/her attendance records.

GRADING SYSTEM

The grading system for the Diploma Degrees in the Al-Balqa' Applied University is the total mark out of 100%

GRADE	POINTS
FAILED	0-49
PASSED	50-100

**REMARKS**

Copying assignments, quizzes, or exams from another student will not be tolerated.
Helping other students to cheat in any way or form will not be tolerated.
Excellent attendance is expected.
BAU policy requires the faculty member to assign 35 grades if a student misses 15% of the classes without a valid excuse.
If student miss a class, it is his responsibility to find out about any announcements or assignments he/she may have missed.
Participation in, and contribution to class discussions will affect the final grade positively.
Making any kind of disruption (side talks or mobile ringing) in the class is not allowed and it will affect student negatively.
Makeup exam should not be given unless there is a valid excuse according to BAU policies.

COURSE COORDINATOR**Course Coordinator:****Signature:****Date:****Department Head:****Signature:****Date:**