2023
TP-153

Course Specification
(Bachelor)

Course Title:	Fundamentals of Electronic Devices
Course Code:	EE1224
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	V5
Last Revision Date:	01-01-2025

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: (4th level, 2nd year)					
4. Course general Description:					
Semiconductor: Different semiconductor materials. Impurity doping. Intrinsic and extrinsic semiconductors. Conductivity, Carrier concentration. Charge densities. Diodes: models and circuit analysis. Diode applications (rectifiers and others). Transistors: bipolar junction, junction field effect, and metal-oxide-semiconductor field effect (BJT, FET, AND MOSFET). DC and small signal AC analysis. Amplifier configurations.					
5. Pre-requirements for this course (if any)**:**					
EE 1221, EE1231					
6. Co-requisites for this course (if any)**:**					
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7. Course Main Objective(s):					
Introduction to electronics indicating the important milestones. Semiconductors are introduced as the main material to fabricate electronic devices. The diode is studied as the basic electronic device. Both the Bipolar Junction Transistor and the Field Effect Transistor (FET) are studied as the main electronic devices used in electronic 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**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	15
5.	**Others (specify)**	-
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
K1	Explain the structure, operation, dc and small-signal models, and characteristics of diodes, bipolar junction transistors, and MOSFETs	1.1	Lectures and tutorials	Quiz, Exams
K1	Calculate correctly different parameters (inc. currents and voltages) for various semiconductor materials and electronic devices	1.3	Lectures and tutorials	Quiz, Exams
K1	Analyze (DC and AC) circuits that include diodes	1.6	Lectures and tutorials	Quiz, Exams
K1	Analyze (DC and AC) circuits that include BJTs and MOSFETs	1.6	Lectures and tutorials	Quiz, Exams
K2	Compare hand calculations with simulation model or hardware implementation in a project environment	7.5	Prepare report / presentation using computer	Report / presentation
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
S1	Design diode circuits as well as common-emitter/source, common-collector/ drain, and common-base/gate amplifiers	2.5	Lectures and tutorials	Quiz, Exams
3.0	**Values, autonomy, and responsibility**			
V3	Compare hand calculations with simulation model or hardware implementation in a project environment	5.3	Project task distribution and meetings	Instructor + Peer Evaluation

C. Course Content

No	List of Topics	Contact Hours
1	Course description, objectives, and content – Textbook and extra useful resources – Marks distribution - Policy	1
2	Introduction to electronics	3
3	Semiconductor: Different semiconductor materials. Impurity doping. Intrinsic and extrinsic semiconductors. Conductivity, Carrier concentration. Charge densities.	8
4	Diodes: models and circuit analysis. Diode applications (rectifiers and others).	20
5	Transistors: bipolar junction (BJT). DC and small signal AC analysis.	20
6	Transistors: junction field effect, and metal-oxide-semiconductor field effect (FET AND MOSFET). DC and small signal AC analysis.	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	6th week	20%
2.	Midterm 2	12th week	20%
3.	Report / Presentation	12th week / 7th week	5%
4.	Participation	All term	5%
5.	2 Quizzes	3rd week & 9th week	10%
6.	Final Exam	Final Exam week	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	D. A. Neamen, Microelectronics: Circuit Analysis and Design, 4th Ed., Mc Graw Hill, 2010.
Supportive References	1- T. L. Floyd, Electronic Devices: Electron Flow Version, 9th Ed., Prentice Hall (Pearson Education Inc.), 2012. 2- R. C. Jaeger and T. N. Blalock, Microelectronic Circuit Design, 4th Ed., Mc Graw Hill, 2011. 3- A. S. Sedra and K. C. Smith, Microelectronic Circuits, 5th Ed., Oxford University, 2004. 4- R. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 7th Ed., Prentice Hall. 5- M. Tooley, Electronic Circuits: Fundamentals and Applications, 3rd Ed., Elsevier Ltd., 2006.
Electronic Materials	Computer animations and online resources supplied by the instructor.
Other Learning Materials	Different Online sites.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	One classroom: fits up to 25 students with white board.
Technology equipment (projector, smart board, software)	A laptop computer connected to a projector to display PowerPoint presentations
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Indirect**
Effectiveness of Students assessment	**Students**	**Indirect**
Quality of learning resources	**Relevant Focus Group**	**Indirect**
The extent to which CLOs have been achieved	**Dept. Quality Committee**	**Direct**
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	