



Course Specifications

Course Title:	Electronics
Course Code:	PHY4704
Program:	Physics
Department:	Physics
College:	Applied Sciences
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 4 th Year / Level 12
4. Pre-requisites for this course (if any): Semiconductor Physics
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description This course offers the fundamentals knowledge on electronics; it covers an introduction on conduction mechanisms in semiconductors, devices as pn junction (diode) and some applications of diode in electrical circuits. Treats the characteristics, application of Bipolar junction transistors and the Field effect transistors. Presents the Operational amplifiers and its applications.
2. Course Main Objective 1-Understanding the properties of electronic devices as diode or transistors. 2-This course help students to understand electrical circuit analysis. 3- The course introduces basic principles of amplification of weak electrical signals.



3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Determine the characteristics of diodes and transistors	K1(I)
1.2	Describe the electrical mechanism in electronic device.	K2(I)
2	Skills :	
2.1	Solve the problems using electrical circuit analysis	S2(I)
2.2	Explain the signal treatment in electronic device	S1(I)
3	Values:	
3.1	Collaborate and contribute responsibly and effectively in teamwork	V2(P)

C. Course Content

No	List of Topics	Contact Hours
1	Semiconductor Basics <ul style="list-style-type: none"> ● Revision of the fundamental concepts of semiconductors electric properties and pn junction structure 	3
2	Diode Applications <ul style="list-style-type: none"> ● Half- Wave Rectifiers, Full-Wave Rectifiers ● Power Supply Filters and Regulators ● Diode Limiting and Clamping Circuits 	3
3	Specials diodes <ul style="list-style-type: none"> ● Zener Diodes, Zener diode applications, Varactor Diodes ● Optical Diodes 	3
4	Bipolar Transistors (BJTs) <ul style="list-style-type: none"> ● Transistor Structure, Basic Transistor Operation ● Transistor Characteristics and parameters ● The Transistor as an Amplifier, the Transistor as a Switch 	3
5	Transistor Bias Circuits <ul style="list-style-type: none"> ● The DC Operating Point, Voltage-Divider Bias ● Other Bias Methods 	3
6	BJT Amplifiers <ul style="list-style-type: none"> ● Amplifier Operation, transistor AC Equivalent Circuits ● The Common-Emitter, Collector, Base Amplifier ● The Differential Amplifier 	3
7	Field Effect Transistor (FETs) <ul style="list-style-type: none"> ● The JFET, Characteristics, Parameters and Biasing ● MOSFET Characteristics and parameters, FET Amplifiers 	3
8	Power Amplifiers <ul style="list-style-type: none"> ● Class A Power Amplifiers ● Class B and Class AB Push-Pull Amplifiers ● Class C Amplifiers 	3
9	Amplifier Frequency Response <ul style="list-style-type: none"> ● Basic Concepts, Low-Frequency and high-Frequency Amplifier Response, total Amplifier Frequency Response ● Frequency Response of Multistage Amplifiers 	3



10	Operational Amplifiers <ul style="list-style-type: none"> Introduction to Operational Amplifiers, Op-Amp Input Modes and Parameters Some Typical op-amp Circuits, Negative Feedback 	3
11	Practical Part: <ul style="list-style-type: none"> Students will conduct various experiments in the practical part of the course. Each student will perform the experiment, collect data, extract result, and prepare a written report every week. 	10
Total		40

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 and Understanding		
1.1	Define the characteristic of diode and transistor	1- Describe the basic principles through lectures. 2. Discussing phenomena of different examples with illustrating pictures and diagrams 3. Using Board, Power point	a) Home work b) Exams c) Discussions and Quizzes
1.2	Describe the electrical mechanism in electronic device.		
2.0	Skills		
2.1	Solve the problems using electrical circuit analysis	Discussing phenomena of different examples with illustrating pictures and diagrams 2. clarify the steps to solve a problem 3. Using Board, Power point	a) Home work b) Exams c) Discussions and Quizzes
2.2	Explain the signal treatment in electronic device		
3.0	Values		
3.1	Collaborate and contribute responsibly and effectively in teamwork	1. encourage students to prepare research reports in groups 2. Small group discussion.	a. Evaluate the efforts of each student in preparing the report. b. Evaluation of students presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes & Home works	Every week	5%
2	Exercises, Participation, In-Class Problem Solving	Every week	5%
3	Midterm Exams	6 th week	20%
4	Lab. Reports and Exam	Every week	20%



#	Assessment task*	Week Due	Percentage of Total Assessment Score
5	Final exam	End of the term	50%
6			
7			
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 :

Each student will be supervised by academic adviser in physics Department and academic support time table is given to the student. (O.H. 3hrs a week)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	ELECTRONIC DEVICES, Ninth Edition, Thomas L. Floyd
Essential References Materials	The Art of Electronics, by Paul Horowitz, and Winfield Hill 3rd Edition (2015)
Electronic Materials	<ol style="list-style-type: none"> 1. Physics is Beautiful Free, interactive physics lessons 2. Khan Academy Physics Physics videos 3. The Feynman Lectures on Physics 4. PhET Simulations Online physics simulations
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room for 30 students Laboratory for electronics, there is a special course for laboratory related to electronics
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Library



G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Questionnaires'	teachers	Open discussion in the class room at the end of the lectures

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	

