هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	Electronics 1
Course Code:	**311PHYS-3**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: Level 5/ Year 3
4. Pre-requisites for this course (if any)**: 231 PHYS-4**
5. Co-requisites for this course (if any)**: NIL**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**36**	**80%**
2	**Blended**	**9**	**20%**
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**42**
2	**Laboratory/Studio**	
3	**Tutorial**	**3**
4	**Others** (specify)	
	Total	**45**

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides fundamental knowledge in electronic aspects including resistors, capacitors, and inductors with direct current (DC) and alternating current (AC) sources, the analysis of circuits and semiconductor devices. The course covers basic electronic components, DC circuits, AC circuits, Kirchhoff's law, transient response of RL, RC and RLC circuits, properties of semiconductor materials, p-n junctions, diodes and their applications in rectifiers, filters, and multiplier circuits, and basic structure and configurations of bipolar junction transistors (BJT).

2. Course Main Objective

This course is designed to provide students with:

- Principles and circuit analysis of direct current (DC) and alternating current (AC) electrical circuits.
- Basic properties and characteristics of semiconductor materials and devices.
- Various types of diodes and their applications.
- Structures, operational principles, modes and characteristics of bipolar junction transistor (BJT).
- Basic principles of electrical test equipment and troubleshooting of components and devices.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Identify** the symbols, different parameters and working conditions of the electric and electronic devices included in the course description.	**PLO1.1**
1.2	**Define** the basic terms of D.C. current, A.C current, semiconductor, band gaps, pn junctions, different diodes and BJT transistors.	**PLO1.1**
1.3	**Describe** direct current (DC) and alternating current (AC) circuits and their parameters, metals semiconductors and insulators, band gaps of different materials, different types of semiconductors and their configurations, PN junctions, different types of diodes constructions biases and applications, rectifiers and filters, BJT transistors types, constructions, characteristics and their applications.	**PLO1.2**
2	**Skills :**	
2.1	**Solve** problems related to D.C and A.C electrical circuits, different types of diodes and BJT transistor analysis.	**PLO2.1**
2.2	**Derive** Different relations of D.C circuits, RL, RC and RLC circuits, Power in A.C and D.C circuits, relations of different types of diodes and rectifiers circuits, and BJT transistor circuits.	**PLO2.2**
2.3	**Develop** critical thinking competencies on the analysis of different electrical and electronics circuits.	**PLO2.4**
2.4	**Demonstrate** communication skills during interactive discussion, group assignments, essays or web-based activities, self-learning awareness	**PLO2.4**
3	**Values:**	
3.1	**Show** effective collaboration and bear individual responsibility during group work and/or assignments.	**PLO3.1**

C. Course Content

No	List of Topics	Contact Hours
1	Direct current (DC) circuits: electromotive force (emf) ,Internal resistances, electronic components in DC source, series circuits, parallel circuit, power, Kirchhoff's laws, R.C circuit (charging and discharging).	9
2	Alternating current(AC) circuits: AC source, resistors in AC circuit , inductors in AC circuit, capacitors in AC circuit.	3
3	The RLC A circuits: RLC series circuits, Phasor diagram, Resonance frequency, Rectifiers and filters, Power in AC circuit, Transformer and power transmission.	6
4	Electronic structure of atoms, atom model, atomic number and electron shells.	3
5	Properties of semiconductor materials: Category of solid materials, semiconductors, covalent bond, Conduction in semiconductors, P-type and N-type semiconductors.	3
6	P-N junctions: Depletion region, Barrier potential, Energy diagram and depletion region.	3
7	The diodes: The physics of diodes, biasing of a diode, characteristics of a diode, diode models, testing a diode.	3
8	Application of diodes: Diode as a rectifier (half wave and full wave	3

	rectifier) Power supply filters and regulators, diode data sheet.	
9	Special purpose of diodes: Zener diodes and applications, varactor diode, light emitting diodes (LED), Photodiodes, Laser diodes, current regulated diodes, PIN diode, metal semiconductor diode and tunnel diode.	6
10	Bipolar junction transistors (BJTs): Transistor structure and symbol, transistor currents, operation modes, circuit analysis, transistor characteristics , BJT applications.	3
11	Review	3
Total		45

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	**Identify** the symbols, different parameters and working conditions of the electric and electronic devices included in the course description.	Lectures, blackboard and visualization, group and interactive guided discussion, Interactive discussion	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
1.2	**Define** the basic terms of D.C. current, A.C current, semiconductor, band gaps, pn junctions, different diodes and BJT transistors.	Lectures, blackboard and visualization, group and interactive guided discussion, Interactive discussion	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
1.3	**Describe** direct current (DC) and alternating current (AC) circuits and their parameters, metals semiconductors and insulators, band gaps of different materials, different types of semiconductors and their configurations, PN junctions, different types of diodes constructions biases and applications, rectifiers and filters, BJT transistors types, constructions, characteristics and their applications.	Lectures, blackboard and diagram illustration, group discussion, Interactive illustrations-Student contribution	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
2.0	**Skills**		
2.1	**Solve** problems related to D.C and A.C electrical circuits, different types of diodes and BJT transistor analysis.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	**Derive** Different relations of D.C circuits, RL, RC and RLC circuits, Power in A.C and D.C circuits, relations of different types of diodes and rectifiers circuits, and BJT transistor circuits.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
2.3	**Develop** critical thinking competencies on the analysis of different electrical and electronics circuits.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
2.4	**Demonstrate** communication skills during interactive discussion, group assignments, essays or web-based activities, self-learning awareness	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration – Problem based learning	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
3.0	**Values**		
3.1	**Show** effective collaboration and bear individual responsibility during group work and/or assignments.	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): interactive questioning- group assignment **Indirect**: student survey

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework assignment- Contribution in interactive discussion- Group work or Project	**3**	**3** (3%)
2	Lecture Quiz 1	**4**	**5** (5%)
3	First Mid-term exam	**6**	**15** (15%)
4	Homework assignment- Contribution in interactive discussion- Group work or Project	**10**	**3** (3%)
5	Lecture Quiz 2	**11**	**5** (5%)
6	Second mid-term exam	**12**	**15** (15%)
7	Homework assignment- Contribution in interactive discussion- Group work-essay or Project discussion	**11**	**4** (4%)
8	Final Exam	**16**	**50** (50%)

***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 group of students is assigned to a staff member who will be available for help and academic guidance office hours at specific 2hours on daily basis

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• College Physics, Raymond A. Serway, Jerry S. Faughn, Chris Vuille; Brooks/Cole, 9th Edition 2009. • Thomas L. Floyd, Electronic Devices, Pearson Prentice Hall, Inc., 7th Edition, 2005.
Essential References Materials	• James W. Nilsson and Susan Riedel, Electric Circuits, Addison-Wesely Publishing Company Inc., 2007. • Electronics: Circuits and Devices; Ralph J. Smith, John-Willey and Sons, Inc., • 3rd Edition, 1987. • Basic Electronics for Scientists; James J. Brophy, McGraw-Hill Kogakusha 1990.
Electronic Materials	http://freevideolectures.com/Subject/Electronics# http://www.electronics-tutorials.ws/
Other Learning Materials	Workbench electronics circuit software.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class room- if possible room for interactive discussion (round table)
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show- smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	none

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation
Assessment	Students, Program assessment committee	Direct/ Indirect
Extent of achievement of course learning outcomes	Instructor	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect

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	**Department council**
Reference No.	**8**
Date	**16/4/1442**