هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**Electronics-1**
Course Code:	**311phys**
Program:	**physics**
Department:	**physics**
College:	**science**
Institution:	**Jazan university**
Version:	**311phys-2022**
Last Revision Date:	**21 December 2022**

Table of Contents:

A. General information about the course:

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: Level 8					
4. Course general 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).					
5. Pre-requirements for this course (if any): 231 PHYS					
6. Co- requirements for this course (if any): NIL					
7. Course Main Objective(s) **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.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	29	87%
2.	E-learning	4	12%
3.	Hybrid ● Traditional classroom ● E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	3
	Total	33

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			
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 transistor 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,		Lectures, blackboard and visualization,	**Direct** (formative and

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	different types of diodes and BJT transistor analysis.		brainstorming, group and interactive discussion, Interac tive illustration – Problem based learning	summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
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, brainstorming, 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, brainstorming, 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, autonomy, and responsibility			
3.1	**Show** effective collaboration and bear individual responsibility during		Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): interactive questioning-

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	group work and/or assignments.			group assignment **Indirect**: student survey

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).	5
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.	3
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 rectifier) Power supply filters and regulators, diode data sheet.	3
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.	4
10.	Bipolar junction transistors (BJTs): Transistor structure and symbol, transistor currents, operation modes, circuit analysis, transistor characteristics , BJT applications.	3
Total		33

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework assignment- Contribution in interactive discussion- Group work or Project	**distributed**	20%
2.	Mid-term exam	6	20%
3.	Quizzes	**distributed**	10%
4.	Final Exam	12	50%

*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	• 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 Ed 2005. • James W. Nilsson and Susan Riedel, Electric Circuits, Addison-Wesely Publishing Company Inc., 2007. • Electronics: Circuits and Devices; Ralph J. Smith, John-Willey and Son Inc., • 3rd Edition, 1987. • Basic Electronics for Scientists; James J. Brophy, McGraw-Hill Kogal Ltd., 1990.
Supportive References	
Electronic Materials	http://freevideolectures.com/Subject/Electronics# http://www.electronics-tutorials.ws/
Other Learning Materials	Workbench electronics circuit software.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom- if possible, room for interactive discussion (round table)
Technology equipment (Projector, smart board, software)	Data show- smart board
Other equipment (Depending on the nature of the specialty)	none

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer, and program leader	Indirect (CES)- Indirect peer evaluation
Effectiveness of student's assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/ Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	DEPARTMENT BOARD
REFERENCE NO.	PHYS2304
DATE	28/2/2023