هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Electronics 2**
Course Code:	**411PHYS-4**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**

Table of Contents

A. Course Identification

1. Credit hours: 4
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level7/Year4
4. Pre-requisites for this course (if any)**:311PHYS (Electronics 1)**
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	40	44.4%
2	Blended	10	11.1 %
3	E-learning		
4	Distance learning		
5	Other (lab)	40	44.4 %

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	42
2	Laboratory/Studio	42
3	Tutorial	6
4	Others (specify)	--
	Total	90

B. Course Objectives and Learning Outcomes

1. Course Description

This course is a continuation of Electronics 1 course. It covers different types of transistors, Amplifier circuits, Four layer devices, Silicon-controlled rectifiers, Diac, Triac, Silicon-controlled switch, Operational amplifiers, Digital logic circuits and their applications.

2. Course Main Objective

This course is designed to provide students with the following concepts:

- Physical background of different analog and digital electronic devices.
- Skills of using electronic devices in electronic circuits.
- The electronic devices circuits.
- The applications of different electronic circuits.
- The electronic devices to characterize and operate different electronic device circuits in the lab.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Describe** different types of devices such as BJT,JFET, D-MOSFET, E-MOSFET, ideal, practical and negative feedback operational amplifier and logic gate devices and operations.	**PLO1.1**
1.2	**Explain** different types of transistor amplifiers and other analog and digital devices and their biasing arrangements.	**PLO1.1**
1.3	**Discuss** the functions and structure of different types of transistors, four layer diode, SCR, DIAC, TRIAC, SCS ,UJT analog devices , operational amplifiers and logic gates and their applications.	**PLO1.2**
2	**Skills :**	
2.1	**Solve** problems related to analog devices and digital gates.	**PLO2.1**
2.2	**Analyze and Draw** circuits and characteristic curves of different analog devices and different transistor amplifiers. Also analyze the signal processing for digital devices	**PLO2.2**
2.3	**Perform** experiments using different analog and digital devices and plot the characteristics of different types of devices	**PLO2.3**
2.4	**Develop** competencies in communication, critical thinking and reporting during lab work.	**PLO2.4**
3	**Values:**	
3.1	**Demonstrate** skills to work in groups, also take responsibility for individual tasks during group assignments and lab work and practice safety awareness in the lab.	**PLO3.1,**
3.2	**Develop** competencies in communication, critical thinking and reporting during lab work, interactive discussion and group assignments.	**PLO3.3**

C. Course Content

Theoretical Part

No	List of Topics	Contact Hours
1	**Bipolar junction transistor and its bias circuits:** Transistor structure, basic operations, characteristics and parameters, transistor as a switch, transistor as amplifier. D.C operating point, voltage-divider bias, other bias methods.	6
2	**Bipolar Junction transistor amplifier:** Amplifier Operations, amplifier circuits, CE, CB, CC amplifier, multi-stage amplifier.	6
3	**Field effect transistors:** Junction field effect transistor (JFET), JFET characteristics and parameters, metal oxide semiconductor field effect transistor (MOSFET), MOSFET characteristics and parameters, MOSFET biasing.	**6**
4	**Thyristors and other devices:** Four layer devices, silicon controlled rectifier (SCR), SCR applications, Diac and Triac, silicon controlled switch (SCS), uni-junction transistor (UJT).	**6**
5	**Operational amplifier:** Introduction to operational amplifier (Op-Amps), Op-Amps modes and parameters, Op-Amps with negative feedback	**6**
6	**Logic gates:** Inverter, AND gate, OR gate, NAND gate, NOR gate, Exclusive-OR and Exclusive- NOR gates, applications of the gates.	**3**
7	**Boolean Algebra and logic simplifications:** Boolean operations and expressions, lows and rules of Boolean algebra, DeMorgan's theorem, Boolean analysis of logic circuits.	**3**
8	**Combinational logic analysis:** Basic combinational logic circuits, combinational logic using NAND and NOR gates, logic circuits with pulse input waveforms.	**6**

9	Review	**3**
Total		**45**

Experimental Part:

No	List of Topics	Contact Hours
1	Introduction and safety concepts	3
1	Measurements of D.C, A.C voltage and frequency using cathode ray oscilloscope	**3**
2	R,L,C and R.C A.C. circuits and applications.	**3**
3	Series resonance circuits and applications.	**3**
4	Forward and reverse characteristics of PN junction diodes and light emitting diodes.	**3**
5	Forward and reverse characteristics light emitting diodes characteristics.	**3**
6	Half-wave and full wave rectification.	**3**
7	Zener diode characteristics and applications as voltage regulator.	**3**
8	Bipolar junction transistor characteristics (BJT).	**3**
9	Junction field effect transistors (JFET) characteristics.	**3**
10	Operation amplifier circuits.	**3**
11	Logic gates and applications.	**6**
12	Review and lab. exam	**6**
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	**Describe** different types of devices such As BJT, JFET, D-MOSFET, E-MOSFET, ideal, practical and negative feedback operational amplifier	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	**Explain** different types of transistor amplifiers and other analog and digital devices and their biasing arrangements.	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
1.3	**Discuss** the functions and structure of different types of transistors, four layer diode, SCR, DIAC, TRIAC, SCS ,UJT analog devices , operational amplifiers and logic gates and their applications.	Lectures, blackboard and visualization, brain storming, group and interactive discussion, Interactive illustration –	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Problem based learning	survey
2.0	**Skills**		
2.1	**Solve** problems related to analog devices and digital gates.	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
2.2	**Analyze and Draw** circuits and characteristic curves of different analog devices and different transistor amplifiers. Also analyze the signal processing for digital devices	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	**Perform** experiments using different analog and digital devices and plot the characteristics of different types of electronic devices in listed in the course.	Hands on lab demonstrations- guided discussion – guided discovery	**Direct** (formative and summative): Evaluation of assignments, Step-by-step checkpoint assessment of experiment, In lab interactive questioning, quizzes, written exams **Indirect:** student survey
2.4	**Develop** competencies in communication, critical thinking and reporting during lab work.	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	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments.	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey
3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	Case study- interactive demonstration- guided discussion	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework assignment- Contribution in interactive discussion	3	2 (2%)
2	Quiz 1	4	2 (2%)
3	First Mid-term exam	7	8 (8%)
4	Homework assignment- Contribution in interactive discussion	8	1 (1%)
5	Quiz 2	9	2 (2%)
6	Second mid-term exam	11	8 (8%)
7	Homework assignment- Contribution in interactive discussion- Group work-essay or Project discussion	12	2 (2%)
8	Laboratory Exam	14	25 (25%)
9	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	**Electronic Devices, T.L Floyd, Pearson Prentice Hall, Inc., 7th Edition, 2005.** **Digital Fundamentals, T.L Floyd, Pearson Prentice Hall, Inc., 9th Edition, 2006.**
Essential References Materials	**Electronics: Circuits and Devices; Ralph J. Smith, John-Wiley and Sons, Inc., 3rd Edition, 1987.** **• Electric Circuits; James W. Nilsson, Addison-Wesley Publishing Company Inc., 3rd Edition, 2007.** **Basic Electronics for Scientists; James J. Brophy, McGraw- Hill Kogakusha, Ltd., 1990.**
Electronic Materials	**http://www.electronic materials.com/** **http://www.wikipedia.org/** **http://prenhall.com/floyd** **Work Bench electronics software.**
Other Learning Materials	--------

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)	Equipment to perform lab. experiments as per the Lab. manual

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
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation

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**