

T-104 2022

# **Course Specification**

Course Title: Electronics

Course Code: Phys 325

Program: B.Sc. in Physics

Department: Department of Physics and astronomy

College: College of Science

Institution: King Saud University

Version: 2.0.0

Last Revision Date: Nov 2023





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A. General information about the course:					
Сс	ourse Identificati	on			
1.	Credit hours:	3(2+0+2)			
2.	Course type				
a.	University	College 🗆	Department⊠	Track	Others
b.	Required 🖂	Elective			
3. Level/year at which this course is offered: 6th					
<ul> <li>4. Course general Description         The course aims to introduce students to Semiconductors, semiconductor doping, the p-n         junction properties and applications, the diode, Zener diode, Rectifiers the bipolar Junction         transistor (BJT), BJT voltage divider bias , the field effect transistor(FET ), JFET self bias      </li> <li>5. Pre-requirements for this course (if any): PHYS 221     </li> </ul>					
6. 7.	Co- requiremen Course Main Ob 1. The student sho 2. The student sho	ts for this cours jective(s) ould be able to inter ould be able to use [	<b>se (if any):</b> pret the basic concep Diodes and Transistors	ts of semiconduct and explain their	or electronics. physics.

3. The student should be able to develop the practical skills by conducting electronic experiments.

#### **1. Teaching mode (mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	60	100%
2.	E-learning	0	0
3.	<ul><li>Hybrid</li><li>Traditional classroom</li><li>E-learning</li></ul>	0	0
4.	Distance learning	0	0

#### 2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	0
4.	Tutorial	0







# 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 unde	rstanding		
1.1	Describe the basic concepts and principles of electronic	K1	• Give extensive examples during	• Assignment
1.2	Explain Semiconductors, semiconductor doping, the p-n junction properties and applications	К2	lecture. • Lectures • video	<ul> <li>In class Discussion</li> <li>Give quizzes, mid-term exam and final exam.</li> </ul>
1.3	Describe wave rectifier	K3	<ul> <li>Give extensive examples during lecture.</li> <li>Lectures</li> <li>video</li> </ul>	<ul> <li>Assignment</li> <li>In class Discussion</li> <li>Give quizzes, mid-term exam and final exam</li> </ul>
2.0	Skills			
2.1	Explain Bipolar junction transistor (BJT)and transistor parameter.	S1	<ul> <li>Give extensive examples during lecture</li> <li>Give problem</li> </ul>	• Hold Class discussion, tutorial and lab
2.2	Describes the JFET and JFET characteristics curves	S2	<ul> <li>Give problem sheets to be discussed during lecture and labs.</li> <li>assignments.</li> <li>Discussions in the classes</li> </ul>	sessions. • Give quizzes, mid-term exam and final exam.
3.0	Values, autonomy, ar	nd responsibility		
3.1	Work in a team and acknowledge others' work.	V1	Preform     experiments	Experiment Report Performance.





## C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to semiconductors, Energy bands, Carriers in intrinsic and extrinsic semiconductors and temperature dependence, drift and diffusion currents .	4
2.	The p-N junction ,forward and reverse biasing of a P-N junction ,I-V characteristics of a P-N junction, effects of temperature on diode characteristics , P-N diode circuit analysis: load line method and approximate method.	8
3.	Zener breakdown, Zener I-V characteristics , Zener diode as a voltage regulator. Half- Wave Rectifiers , Full-Wave bridge Rectifiers , Power Supply Filters and Regulators	4
4.	BJT Structure and operation, BJT characteristics and parameters, The BJT as an amplifier, The BJT as a Switch . The DC Operating Point, Voltage-Divider Bias,	8
5.	Field-Effect Transistors(FET), JFET Characteristics and Parameters, JFET self Bias	6
	Total	30

### **D. Students Assessment Activities**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm examination	Week 9-10	15%
2.	Quizzes	Every 3 weeks	10%
3.	Home work	As required	5%
4.	Labs	Weekly	30%
4.	Final examination	From 16 to 18	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

- Fundamentals of Electronic Devices ,by Ronald J. Tocci , Subsequent edition (1991), Merrill Pub Co.(nos 1,2,and 3 topics in the course contents).
- 2- Electronic Devices, by: Thomas L. Floyd. 9th edition, 2016. Prentice Hall. .( .(nos 4,and 5 topics in the course contents).





Supportive References	None
Electronic Materials	None
Other Learning Materials	Internet sites relevant to the course

#### 2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

# F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods (Direct, Indirect)

# G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	8 <sup>th</sup> (1 <sup>st</sup> term/1445)
DATE	06/06/1445

