هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	Physics-3
Course Code:	209Phys-3
Program:	Bachelor in Computer Engineering
Department:	Department of Physics
College:	College of Science
Institution:	King Khalid University
Version:	TP-153-2024
Last Revision Date:	22/10/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3					
3(2+1) hrs					
2. Course type					
A.	☒ University	☐ College	☐ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 6 / Third Year)					
4. Course General Description:					
This course deals with different basic definitions of measurements, different kinds of errors in measurement, and measurement techniques for AC and DC- current and voltage, resistance, frequency, and phase using different tools. The course covers Bridge method measurement, analog and digital measuring instruments, and cathode ray oscilloscope. This course will introduce the application of semiconductor devices using diodes and transistors. It will also cover the basics of fiber optic communication.					
5. Pre-requirements for this course (if any)**:**					
109Phys-2					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course will introduce students to: • The fundamentals of measurement with different kinds of errors and their correction. • How to use measurement instruments like Analog or digital Multimeters, cathode ray oscilloscopes, bridge circuits, diodes, and transistors. • Measurement errors and how to analyze the precision and accuracy of the collected observations. • How to carry out experiments, write down observations, and do the calculations. • To learn the applications of semiconductor devices. • How to work within a team and understand the operation of the fundamental measurement instruments.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 (2+2)hr/ week	100%
2	E-learning		
3	Hybrid ● Traditional classroom ● E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	32
2.	**Laboratory/Studio**	32
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		64

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the fundamentals of measurement, and different kinds of errors.	**K1**	Class lectures, discussion, problem-solving	Examinations, Assignments, Quizzes
1.2	Explain the procedures for measuring alternating and direct current, voltage, resistance, frequency, and phase using different instruments.	**K2**	Lectures and Lab demonstrations	Examinations, Assignments, Quizzes
1.3				
2.0	**Skills**			
2.1	Demonstrate the measurement accuracy	**S1**	Lectures, Tutorials	Examinations, Assignments,

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	and identify the potential sources of error in the measurement.			
2.2	Use equipment of Lab such as multimeter, oscilloscope, diodes, and transistors necessary for minor projects.	**S2**	Lab demonstrations	Lab Report, Lab Activity, Lab Homework, Lab Examinations
2.3	Show written communication skills through reports about measurements.	**S3**	Discussions, Demonstration, Group work	Faculty Observation
3.0	**Values, autonomy, and responsibility**			
3.1	Show citizenship with work individually or within a group to operate measurement instruments.	**V1**	Discussions, Demonstration, Group work	Faculty Observation
3.2	Behave professionally to enhance his educational motivations by reading and self-learning.	**V2**	Group work and class discussions	
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction:** Measurements and Instrumentations Fundamentals, and International System of Units (SI Units).	**2**
2.	**Measurement:** General Measurement System and Classifications of Measuring Instruments. Applications of Measurement System, and Instrument Performance Characteristics.	**4**
3.	**Measurements Errors:** Error, Error Range, Error Percentage, Relative Accuracy, Accuracy Percentage, Precision of a Given Measured Value, Sources of Errors, Classification of Static Errors, Curve Fitting.	**6**
4.	**Resistance Measurement Techniques:** Resistor Tolerance, Resistor Color Code, Power Rating of a Resistor, Temperature Coefficient of a Resistor, Resistance. Measurement Techniques, Voltmeter-ammeter method, Ohmmeter, Bridge circuits.	**6**
5.	**Cathode Ray Oscilloscope (CRO):** Measurement of voltage, current, frequency, and phase by oscilloscope.	**2**

6.	**Semiconductor devices:** Classification of metals, conductors, and semiconductors, Intrinsic and extrinsic semiconductors, p-n junction diode and its application as rectifier, Zener diode, Photodiode, Solar Cell, Transistor and its application.	**6**
7.	**Optical fiber Communication:** Introduction to optical Fibers. Total Internal Reflection, Ray theory of light propagation in optical fibers, Modes of optical fiber, Attenuation, absorption and scattering losses in Fiber, Intra-modal dispersion.	**6**
Total		**32**

Lab Experiments

No	List of Lab Experiments	Contact Hours
1	Introduction to electrical measurements	**2**
2	Errors in measurements	**2**
3	Measurement of Resistance using Ammeter and Voltmeter (Ohm's Law)	**3**
4	Concept of Wheatstone Bridge (Explanation)	**2**
5	Measurement of Resistance using Meter Bridge	**2**
6	Resistor color code and Measurement of Resistance	**2**
7	Review of Lab reports	**2**
8	V-I Characteristics of PN Junction Diode	**2**
9	Characteristics of Zener Diode	**2**
10	Measurement of voltage by CRO	**2**
11	Measurement of frequency by CRO	3
12	Measurement of phase by CRO	**2**
13	Solar Cell	**2**
14	A review of all laboratory experiments and lab reports with a general discussion	**4**
	Total	**32**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz and Assignments	5th& 12th	10%
2.	Mid Exam	10th	30%
3.	Practical Exam	End of Term	20%
4.	Final Exam	End of Term	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	• Alan S Morris and Reza Langari, Measurement, and Instrumentation: Theory and Application, Second edition, Academic Press, 2015. ISBN-13: 978-0128008843 • B. Northrop, Introduction to Instrumentation and measurements. 3rd Edition, CRC Press, 2017 ISBN-13: 978-1138071902
Supportive References	• The Measurement, Instrumentation, and Sensors. John G. Webster, Springer. • Sensor Technology Handbook, by Jon S. Wilson
Electronic Materials	• Saudi Digital Library (SDL) • http://lib.kku.edu.sa/ to search latest reference and textbooks of course
Other Learning Materials	www.lms.kku.edu.sa to access lecture notes, textbook, lab manual, announcements and all other material related to the course will be made available via course's Blackboard page

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A lecture room equipped with 60 seats, Whiteboard, Tables & Chairs, and a Laboratory accommodating 25 students
Technology equipment (projector, smart board, software)	Data Show (Projectors) in the lecture room (Available)
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, Program Leaders	Direct (A questionnaire)
Effectiveness of Students' assessment	Faculty, Peer Reviewers	Direct (Exams, quizzes, Homework)
Quality of learning resources	Students, Programs Leaders	Direct/Indirect (Periodic checking of the quality of the devices and equipment)
The extent to which CLOs have been achieved	Faculty, Quality and Development Committee	Indirect (Self-evaluation report)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department Council
REFERENCE NO.	The meeting No. 6 for the academic year 1446, recommendation No. 3.6.46
DATE	2/5/1446 H