Republic of the Philippines
SULTAN KUDARAT STATE UNIVERSITY
Isulan Campus, Isulan Sultan Kudarat
College of Industrial Technology

ET 123 – ELECTRICAL INSTRUMENTS AND MEASUREMENTS

UNIVERSITY VISION

A leading University in advancing scholarly innovation, multi-cultural convergence, and responsive public service in a borderless Region.

UNIVERSITY MISSION

The University shall primarily provide advanced instruction and professional training in science and technology, agriculture, fisheries, education and other related fields of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

UNIVERSITY STRATEGIC GOALS

a. Deliver quality service to stakeholders to address current and future needs in instruction, research, extension, and production
b. Observe strict implementation of the laws as well as the policies and regulations of the University
c. Acquire with urgency state-of-the-art resources for its service areas
d. Bolster the relationship of the University with its local and international customers and partners
e. Leverage the qualifications and competences in personnel action and staffing
f. Evaluate the efficiency and responsiveness of the University systems and processes

INSTITUTIONAL OUTCOMES (IO)

a. Enhance competency development, commitment, professionalism, unity and true spirit of service for public accountability, transparency and delivery of quality services
b. Provide relevant programs and professional trainings that will respond to the development needs of the region
c. Strengthen local and international collaborations and partnerships for borderless programs
d. Develop a research culture among faculty and students
e. Develop and promote environmentally-sound and market-driven knowledge and technologies at par with international standards
f. Promote research-based information and technologies for sustainable development
g. Enhance resource generation and mobilization to sustain financial viability of the university

PROGRAM OUTCOMES (PO) COMMON TO ALL PROGRAMS AND ITS RELATIONSHIPS TO INSTITUTIONAL OUTCOMES

A graduate of the BIndTech program can:	INSTITUTIONAL OUTCOMES (IO)						
	a	b	c	d	e	f	g
a. Analyze broadly defined industrial technology processes by using analytical tools that enhance creativity, innovativeness, and intellectual curiosity to improve methods, processes, and systems that meet the industry standards;	✓	✓				✓	
b. Design and implement broadly defined industrial systems, components, products, or processes to meet specific industry needs with proficiency and flexibility in the area of specialization in accordance with global standards;	✓	✓		✓		✓	

c. Apply appropriate techniques, resources, and state-of-the-art industrial technology tools to meet current industry needs and use these modern tools and processes to improve and increase entrepreneurial activities upholding the safety and health standards of business and industry;	✓		✓	✓	✓		
d. Communicate with diverse groups of clienteles the appropriate cultural language with clarity and persuasion, in both oral and written forms, including understanding and giving of clear instructions, high comprehension level, effectiveness in delivering presentations and writing documents, and articulating technological innovation outputs;	✓	✓	✓	✓	✓		
e. Develop leadership and management skills in a team-based environment by making informed decisions, keeping the team motivated, acting and delegating responsibility, and inspiring positive changes in the organization by exercising responsibility with integrity and accountability in the practice of one's profession;	✓	✓	✓	✓	✓		
f. Practice the moral responsibilities of an industrial technologist to manage and balance wider public interest and uphold the norms and safety standards of the industrial technology profession;				✓	✓	✓	✓
g. Demonstrate enthusiasm and passion for continuous personal and professional development in broadly defined industrial technology and effecting positive changes in the entrepreneurial and industrial endeavor; and	✓	✓	✓	✓	✓	✓	✓
h. Recognize the need for, and an ability to engage in lifelong learning.	✓	✓	✓	✓	✓	✓	✓

1 COURSE CODE ET 123
2 COURSE TITLE **ELECTRICAL INSTRUMENTS AND MEASUREMENTS**
3 PREREQUISITE NONE
4 CREDITS 3 units

5 COURSE DESCRIPTION
This course deals with the accuracy of measurements and error analysis. Absolute and secondary instruments and indicating instruments. Moving coil and moving iron instruments. Dynamometer type instruments, induction type instruments. Watt meter of measuring of power and power factor. Bridges (DC), Bridges (AC). Current and potential transformers and oscilloscopes and their uses.

6 COURSE LEARNING OUTCOMES (CLO) AND ITS RELATIONSHIPS TO PROGRAM OUTCOMES

Course Learning Outcomes (CLO)	Program Outcom					
At the end of the course, a student can:	a	b	c	d	e	
a. Understand SKSU-VGMO, Classroom Policies, Course Overview, Course Requirements and Grading System;	✓	✓	✓	✓	✓	✓
b. Describe the basic components and functions of digital electronic circuits.	✓	✓	✓	✓	✓	✓
c. Analyze and design combinational logic circuits using various logic gates, implement sequential logic circuits, and understand their timing diagrams.;	✓	✓	✓	✓	✓	✓
d. Apply Boolean algebra to simplify digital circuits.	✓	✓	✓	✓	✓	✓
e. Utilize number systems and codes in digital electronics.	✓	✓	✓	✓	✓	✓
f. Design and troubleshoot digital circuits using simulation software.	✓	✓	✓	✓	✓	✓
g. Demonstrate the functionality of basic digital devices, including multiplexers and flip-flops.	✓	✓	✓	✓	✓	✓

h. Construct and analyze 7-segment display systems.	✓	✓	✓	✓	✓	✓

7 COURSE CONTENTS

WEEK	CONTENT	INTENDED LEARNING OUTCOMES((ILOs)	TEACHING AND LEARNING ACTIVITIES (TLA)	OUTCOMES-BASED ASSESSMENT (OBA)	COURSE LEARNING OUTCOMES (CLOs)
1	**Course Orientation** *SKSU VMGO, Classroom Policies, Course Overview, Course Requirements, Grading System*	At the end of the week, the student can: a. Discuss the University's VMGO, classroom policies, course overview, requirements, and grading system	Discuss the VMGO of the University, the classroom policies, scope of the course, course requirements and grading system	a. Participation in discussions	abcdefg
2	**Introduction to Electrical Measurements** a. Types of Measurements b. Measurement Systems c. Accuracy and Precision d. Standards and Calibration	At the end of the week, the students can: a. Understand different types of measurements (voltage, current, resistance). b. Describe the components of a measurement system and their functions. c. Distinguish between accuracy, precision, and error in measurements. d. Explain the importance of calibration and measurement standards.	a. Class discussion on current flow and bulb brightness. b. Demonstration of PPE c. Interactive lecture with diagrams and physical models of circuits. d. Hands-on activity where students wear and inspect PPE.	a. Group presents safety poster b. Practical exa c. m where students correctly identify and use PPE in a mock electrical task d. Group activity e. Reflection question	abcdefg
3	**Basic Electrical Concepts** a. Voltage, Current, and Resistance b. Series and Parallel Circuits c. Power and Energy d. AC vs. DC Measurements	At the end of the week, the students can: a. Apply Ohm's Law to simple circuits. b. Analyze series and parallel circuits using measurements. c. Calculate power and energy in electrical systems. d. Compare and contrast AC and DC measurement techniques.Identify and use analog measuring instruments (e.g., voltmeters, ammeters).	a. PowerPoint or posters b. Demonstration of tools and materials c. Viewing safety procedure videos.	a. Short written quiz b. Practical test c. Practical performance task d. Observation checklist during practical activities	abcdefg

4	**Electrical Instruments** a. Analog Instruments b. Digital Instruments c. Multimeters d. Specialized Instruments	At the end of the week, the students can: a. Identify and use analog measuring instruments (e.g., voltmeters, ammeters). b. Utilize digital instruments and understand their advantages. c. Operate a multimeter for various measurements (V, A, Ω). d. Explore specialized instruments (e.g., clamp meters, oscilloscopes).	a. Watch a short video demonstrating real-world raceway installations. b. Small group discussions c. Live demonstration d. Supervised hands-on installation of a simple raceway layout	a. Written or oral quiz b. Performance task c. Practical exam d. Practical installation project	abcdefg
5	**Types of Electrical Measuring Instruments** a. Voltmeters b. Ammeters c. Ohmmeters d. Power Meters	At the end of the week, the students can: a. Measure voltage in various circuits and understand their operation. b. Measure current and distinguish between series and parallel configurations. c. Measure resistance accurately using different techniques. d. Use power meters to measure real, reactive, and apparent power.	a. Lecture on the parts and functions of major appliances appliance b. Video Presentation c. Group activity d. Hands-on lab activity	a. Short written quiz b. Group reporting c. Written assessment d. Practical assessment	abcdefg
6	**MIDTERM EXAM**				
7	**Measurement of Voltage** a. DC Voltage Measurement b. AC Voltage Measurement c. Calibration of Voltage Meters	At the end of the week, the students can: Measure DC voltage using appropriate instruments. Measure AC voltage and understand its characteristics. Calibrate voltage measuring instruments for accuracy. Troubleshoot common issues in voltage measurement.	a. Lecture on the parts and functions of major appliances appliance b. Video Presentation c. Group activity d. Hands-on lab activity	a.	

		a.			
8	**Measurement of Current** a. DC Current Measurement b. AC Current Measurement c. Current Shunts d. Safety in Current Measurement	At the end of the week, the students can: a. Measure DC current using suitable techniques. b. Measure AC current and analyze its behavior. c. Explain the use of shunts for current measurement. d. Discuss safety protocols when measuring current..	a. Lecture on the parts and functions of major appliances appliance b. Video Presentation c. Group activity d. Hands-on lab activity	b. Short quizzes c. Observation d. Practical assessment e. Evaluate students ability	abcdefg
9	**Measurement of Resistance** a. Ohm's Law b. Methods of Resistance Measurement c. Temperature Effects d. Calibration of Resistance Meters	At the end of the week, the students can: a. Apply Ohm's Law in resistance measurements. b. Use various methods to measure resistance (e.g., Wheatstone bridge). c. Analyze how temperature affects resistance measurements. d. Calibrate resistance measuring instruments for precision.	a. Lecture on the parts and functions of major appliances appliance b. Video Presentation c. Group activity d. Hands-on lab activity	f. Short quizzes g. Observation h. Practical assessment i. Evaluate students ability	abcdefg
10	**FINAL EXAMINATION**				

Total No. of Hours : 54

8 COURSE REQUIREMENTS AND COURSE POLICIES

COURSE REQUIREMENTS

Each student is required to:

1. submit accomplished assignments, and activities;
2. make a PowerPoint presentation, and a written summary of the assigned report;
3. participate actively in all discussion;
4. discuss an assigned topic to report and participate in class discussions; and
5. pass the major exams (midterm and final)

COURSE POLICIES

Attendance: A student will be marked late if he/she enters the class 5 minutes after start of class period. Any student who comes to class 15 minutes after the scheduled time or always late for three consecutive meetings shall be marked absent.

Missed work or exam: Any student who missed to submit a work assignment or to take a test should consult the concerned instructor for immediate compliance

Cheating and Plagiarism: Any student who committed any form of academic dishonesty (e.g., copy-paste plagiarism) shall be given disciplinary action provided in the SKSU Student's Handbook

Use of Technology: Cell phones should be turned off while the session is in progress. Using laptops, notebook PCs, smart phones, and tablets shall be allowed only when needed. A scientific calculator (e.g. Casio fx-991ES) shall be utilized in solving.

9 GRADING SYSTEM AND RUBRICS FOR GRADING

GRADING SYSTEM

Midterm Grade	
Midterm Examination	50%
Attendance/ Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

Final Term Grade	
GRADE	
Final Term Examination	50%
Attendance/Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

FINAL	
Midterm Grade	50%
Final Term Grade	50%
TOTAL	**100%**

Materials used: Laptop, PowerPoint presentations, and video clips
Books, Magazines, Online slides, Teacher-made slides

References:

- ***Electrical Measurements: Fundamentals and Applications*** *by David A. Bell (2013)*
- ***Measurement and Instrumentation: Theory and Application*** *by Alan S. Morris and Reza Malekian (2015)*
- ***Principles of Measurement Systems*** *by John P. Bentley (2014)*

- ***Measurement Systems: Application and Design*** *by Ernest O. Doebelin (2011)*
- ***Introduction to Electrical Measurements*** *by Robert A. Witte (2009)*
- ***Electrical Measurement: Techniques and Applications*** *by J. B. Gupta (2017)*
- ***Fundamentals of Electrical Measurements*** *by J. A. G. de Almeida (2016)*
- ***Instrumentation and Measurement in Electrical Engineering*** *by Katsuhiko Ogata (2010)*
- ***Electrical Measurements and Measuring Instruments*** *by S. K. Gupta (2019)*
- ***Measurement and Instrumentation: A Comprehensive Guide*** *by J. M. P. Q. de Almeida (2018)*
- *Internet (YouTube.com , SlideShare.com, etc.)*

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