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

ELX 311 – INDUSTRIAL ELECTRONICS

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;	✓	✓		✓		✓	

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** ELX 312
2 **COURSE TITLE** Industrial Electronics
3 **PREREQUISITE** ELX 212, ELX 222, ELX 221
4 **CREDITS** 3 units

5 **COURSE DESCRIPTION**
This course is a study of electronic/electrical control and instrumentation used in industry. Topics include electrical and electronic control systems that utilize closed-loop control systems and associated industrial control devices, transducers and sensors, thyristors, optoelectronics, electrochemical devices, and electrical control diagrams..

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

Course Learning Outcomes (CLO)	Program Outcomes							
At the end of the course, a student can:	a	b	c	d	e	f	g	
a. Understand SKSU-VGMO, Classroom Policies, Course Overview, Course Requirements and Grading System;	✓	✓	✓	✓	✓	✓	✓	
b. Understand the principles of closed-loop control systems.	✓	✓	✓	✓	✓	✓	✓	
c. Analyze and design industrial control circuits using various electronic devices;	✓	✓	✓	✓	✓	✓	✓	
d. Apply knowledge of transducers and sensors in practical applications.	✓	✓	✓	✓	✓	✓	✓	
e. Utilize thyristors and optoelectronic devices in control systems and interpret electrical control diagrams.;	✓	✓	✓	✓	✓	✓	✓	
f. Evaluate the performance of different types of sensors and transducers in industrial settings.	✓	✓	✓	✓	✓	✓	✓	
g. Implement safety protocols and best practices when working with electrical control systems.	✓	✓	✓	✓	✓	✓	✓	
h. Troubleshoot and diagnose issues in electronic control circuits effectively.	✓	✓	✓	✓	✓	✓	✓	

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	**INDUSTRIAL ELECTRONIC CONTROL** a. Basic Electronic Components b. Electronic Control Circuits. c. Control Logic	At the end of the week, the students can: a. Identify and describe the fundamental electronic components used in industrial control systems. b. Analyze and interpret basic electronic control circuits. c. Explain the principles of control logic used in industrial electronic systems.; d. Analyze and design basic electronic control systems for specific industrial applications.	a. Video/power point presentation b. Interactive Lecture on Electronic Components c. Circuit Analysis Workshop d. Control Logic Lecture and Discussion e. Activity 2.1 System Design Project	a. Conceptual Quiz b. participation c. Component Identification Quiz d. Evaluation Report e. Design Submission and Presentation	abcdefg
3	**CONTROL DEVICES AND CIRCUITS** a. Theory of silicon-controlled rectifier. b. Different Uni junction transistors c. Multi vibrators. d. Diac, Triac, and Rheostat.	At the end of the week, the students can: a. Understand the concepts of SCR's b. Enumerate different kinds of Uni junction transistors c. Understand the concepts of a multi vibrator system. d. Identify the difference between the diac, triac, and rheostat.	a. Video/PowerPoint presentation b. Interactive Lecture c. Group Discussion d. Practical Demonstration e. Activity 3.1 Hands-On Testing	a. Conceptual Quiz b. participation c. activity outputs d. Memory Analysis Report	abcdefg

4	**Closed Loop Control Systems** a. Closed Loop Control System Principles. b. Components of Closed Loop Systems c. Closed Loop Control System Behavior	At the end of the week, the students can: a. Define and explain the principles of closed-loop control systems, including feedback and control elements. b. Identify and describe the key components of closed-loop control systems, such as sensors, controllers, and actuators. c. Analyze the behavior of closed-loop control systems using transfer functions and block diagrams. d. Evaluate the performance and stability of closed-loop control systems through simulation and analysis.	a. Video/PowerPoint presentation b. Interactive Lecture on Closed Loop Control c. Component Identification Workshop d. Transfer Function Analysis Exercise e. System Design Project f. Activity 4.1 Simulation and Performance Evaluation Lab	a. Conceptual Quiz b. participation c. activity outputs d. Analysis Assignment e. Design Submission and Presentation f. Performance Evaluation Report	abcdefg
5	**Associated Industrial Control Devices** a. Various industrial control devices and their applications.	At the end of the week, the students can: a. Identify and describe various industrial control devices, including sensors, actuators, and controllers. b. Explain the operational principles of key industrial control devices, such as PLCs, relays, and sensors. c. Analyze how different industrial control devices interact within a control system. d. Troubleshoot common issues associated with industrial control devices.	a. Video/PowerPoint presentation b. Interactive Lecture on Control Devices c. Maintenance Procedure Demonstration c. Hands-on Lab and Demonstration d. Activity 5.1 Performance Evaluation Project	a. Device Identification Quiz b. participation c. activity outputs d. Lab Report on industrial control devices	abcdefg
6	**MIDTERM EXAM**				
7	**Transducers and Sensors** a. Role of transducers and sensors in control systems.	At the end of the week, the students can: a. Define transducers and explain their principles of operation. b. Identify and describe various types of sensors used in industrial applications. c. Integrate sensors into control systems and explain their roles within those systems.	a. Video/PowerPoint presentation b. Interactive Lecture on Transducers c. Specifications Analysis Exercise c. Integration Project d. Activity 7.1 Troubleshooting Simulation	a. Quiz b. participation c. Specifications Comparison Report d. Troubleshooting Report e. Integration Design Presentation	abcdefg

	Thyristors a. Operation and applications of thyristors.	At the end of the week, the students can: a. Define thyristors and describe their structure and operational principles. b. Identify and describe various types of thyristors, including SCRs, TRIACs, and GTOs. b. Analyze basic circuits that include thyristors, focusing on their operation in various applications. c. Design basic control systems that utilize thyristors for switching and control applications..	a. Video/PowerPoint presentation b. Interactive Lecture on thyristor c. Group Activity d. Activity 7.1 Hands-on Lab, e. Troubleshooting Simulation	a. Quiz on thyristor applications b. participation c. activity outputs e. Types Identification Report	abcdefg
9	**Electronic Relay Circuit** a. Basic principles of relay circuits b. Relay Functionality c. Difference between the time delay and photo relay circuits	At the end of the week, the students can: a. Know and identify the principles of relay circuits. b. Understand the function and characteristics of contact relays. c. Differentiate the time delay and the photo relay circuits.	a. Video/power point presentation b. Lecture Relay Basics c. Relay Types Workshop c. Hands-On Wiring Workshop d. Activity 9.1 Actual hands-on and Design Project	a. Quiz b. participation c. activity outputs d. Troubleshooting Report e. Design Submission and Presentation	abcdefg
10	**Automatic Control** a. Control System Fundamentals b. Principles of voltage regulators	At the end of the week, the students can: a. Differentiate and identify the application of linear stabilizing circuits. b. Determine electrical and electronics components as used in voltage regulator circuits. c. Construct and assemble a voltage regulator circuits..	a. Video/PowerPoint presentation b. Interactive Lecture on Control Systems c. Transfer Function Analysis Workshop c. System Design Project d. Activity 10.1 Control Strategy Lab	a. Fundamentals Quiz b. participation c. activity outputs d. Analysis Assignment e. Design Submission and Presentation f. Implementation Report	abcdefg
11	**FINAL EXAMINATION**				

Total No. of Hours : 54

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

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

FINAL GRADE

Midterm Grade 50%

Final Term Grade 50%

TOTAL 100%

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

References:

G. K. Mehta, "Industrial Electronics," McGraw-Hill, 2015.
M. D. Singh & J. Gupta, "Industrial Electronics," S. Chand Publishing, 2010.
G. R. Jones, "Introduction to Industrial Electronics," Wiley, 2017.

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