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

ET 311 TRANSMISSION AND DISTRIBUTION SYSTEM

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 311A
2 **COURSE TITLE** TRANSMISSION AND DISTRIBUTION SYSTEM
3 **PREREQUISITE** ET 211 LOGIC CIRCUITS, ET222 INDUSTRIAL MOTOR CONTROLLER
4 **CREDITS** 3 units

5 **COURSE DESCRIPTION**
This course provides a comprehensive overview of motor control systems utilized in industrial applications. Students will explore the principles of both single-phase and three-phase motors, learning about various motor starters such as Direct On-Line (DOL), star-delta, and soft starters. The course emphasizes advanced control techniques, including variable frequency drives (VFDs) control, alongside practical skills in circuit design and implementation.

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. Identify and describe the major components and systems of an automobile.	✓	✓	✓	✓	✓	✓	✓
b. Demonstrate basic diagnostic and maintenance procedures on various automotive systems.	✓	✓	✓	✓	✓	✓	✓
c. Apply safety practices in the automotive workshop environment.	✓	✓	✓	✓	✓	✓	✓

d. Use diagnostic tools and equipment effectively for troubleshooting automotive issues.	✓	✓	✓	✓	✓	✓	✓
e. Communicate technical information related to automotive technology clearly.	✓	✓	✓	✓	✓	✓	✓

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 Transmission and Distribution System** a) Overview of Electrical Power Systems b) Basics of Electrical Transmission. c) Distribution System Component	At the end of the week, the student can: a) Explain the key components and functions of generation, transmission, distribution, and consumption. b) List and define the main components involved in electrical transmission, including transmission lines and transformers. c) Describe the function and significance of various components such as feeders and distribution lines.	a. Video/power point presentation b. Individual participation in discussions c. Quiz	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts.	abcdefg
3	**Transmission Of Electric Power** a) Fundamentals of Transmission. b) Transmission Line Types	At the end of the week, the student can: a) Explain how electric power is transmitted over long distances and the importance of voltage transformation. Describe the function of each tool and piece of equipment, detailing how they are used in	a) Video/power point presentation b) Individual participation in discussions c) Quiz	a) Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b) Practical Exercises: Assessing ability to apply	abcdefg

	c) Transmission System d) Transmission Efficiency and Losses	automotive repair, maintenance, and diagnostics. b) Distinguish between overhead and underground transmission lines, including their advantages and disadvantages. Demonstrate the proper handling and usage of different automotive tools and equipment, emphasizing safety precautions. c) Describe the roles of transformers, conductors, insulators, and substations in the transmission process. d) Identify the causes of energy losses in transmission systems and discuss methods to improve efficiency.		knowledge in practical contexts.	
4	**Over Head Lines** a) Construction and Design b) Types of Conductors c) Safety and Maintenance d) Environmental Impact	At the end of the week, the student can: a) Explain the key factors in designing overhead transmission lines, including material selection and structural integrity. b) Differentiate between various conductor materials (e.g., aluminum, copper) and their impact on performance and cost. c) Describe the safety measures in place for working on and maintaining overhead lines to ensure reliability and minimize hazards. Discuss the potential environmental impacts of overhead lines, including land use, wildlife effects, and aesthetic concerns. d) Discuss the potential environmental impacts of	a) Video/power point presentation b) Individual participation in discussions c) Quiz	a) Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b) Practical Exercises: Assessing ability to apply knowledge in practical contexts.	abcdefg

		overhead lines, including land use, wildlife effects, and aesthetic concerns.			
5	**Performance of Short and Medium Lines** a) Characteristics of Short Lines b) Characteristics of Medium Lines c) Impact of Line Parameters d) Load Flow Analysis	At the end of the week, the student can: a) Analyze the behavior of short transmission lines, including voltage drop, power factor, and transmission efficiency. b) Examine the effects of line length and load conditions on voltage regulation and line losses for medium-length lines. c) Analyze how resistance, reactance, and capacitance affect the performance and efficiency of short and medium transmission lines. d) Use analytical methods to assess voltage levels and power flows in short and medium transmission lines under varying load conditions.	a) Video/power point presentation b) Individual participation in discussions c) Quiz	a) Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b) Practical Exercises: Assessing ability to apply knowledge in practical contexts.	abcdefg
	MIDTERM EXAM				
6	**Distribution System** a) Types of Distribution Systems b) Distribution System Components c) Voltage Regulation in Distribution	At the end of the week, the student can: a) Identify and describe the characteristics of different types of distribution systems, including radial, loop, and network configurations, and analyze their suitability for various applications and geographical settings. b) Explain the function and importance of key components in distribution	a) Video/power point presentation b) Individual participation in discussions c) Quiz	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts	abcdefg

	d) Smart Distribution Systems e) Challenges in Distribution Systems	systems, such as transformers, feeders, circuit breakers, and switches, and analyze how each component contributes to the overall reliability and efficiency of the system. c) Analyze the methods and technologies used for voltage regulation in distribution systems, including the role of automatic voltage regulators and capacitors, and evaluate how these methods impact system performance and customer satisfaction. d) Understand and explain the concepts and components of smart grid technology in distribution systems, including advanced metering infrastructure and demand response, and analyze their potential benefits for enhancing efficiency and reliability. e) Evaluate current challenges facing distribution systems, such as integrating renewable energy sources, aging infrastructure, and regulatory issues, and analyze potential solutions to improve system resilience and sustainability.			
7	**Underground Cables** a) Types of Underground Cables b) Construction and Design c) Installation Techniques	At the end of the week, the student can: a) Identify and describe the different types of underground cables (e.g., single-core, multi-core, and armored cables) and analyze their applications based on environmental and load conditions. b) Explain the construction materials and design principles of underground cables, including insulation types and cable layout, and analyze how these	a) Video/power point presentation b) Individual participation in discussions c) Quiz	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts	abcdefg

	d) Testing and Maintenance e) Environmental Considerations	factors affect performance and reliability. c) Understand the standard installation techniques for underground cables, including trenching, direct burial, and duct installation, and analyze the factors that influence the choice of installation method. d) Analyze the methods used for testing and maintaining underground cables, including fault detection and insulation testing, and evaluate how regular maintenance impacts the longevity and safety of the cable system. e) Evaluate the environmental impacts of underground cable installations, including land use, potential hazards, and regulatory compliance, and analyze strategies for minimizing negative effects.			
8	**Types of Tariff** a) Flat Rate Tariffs Explain the function b) Time-of-Use Tariffs c) Tiered Tariffs d) Demand Charges e) Net Metering and Feed-in Tariffs	At the end of the week, the student can: a) Explain the concept of flat rate tariffs, including how they are structured and their implications for consumers and utilities, and analyze the advantages and disadvantages of this pricing model. b) Describe the structure of time-of-use (TOU) tariffs and how they encourage consumers to shift energy usage to off-peak times, and analyze their effects on energy consumption patterns. c) Analyze the tiered tariff structure, where rates change based on the volume of energy consumed, and	a. Class Discussion/ Video Presentation b. Role-Playing Activity c. Quiz d. Group Project	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts	abcdefg

		evaluate its effectiveness in promoting energy conservation among consumers. d) Explain demand charges and their role in billing for high-demand customers, analyzing how these charges impact large users and overall grid stability. e) Evaluate net metering and feed-in tariffs as mechanisms to incentivize renewable energy generation, discussing their benefits and challenges in integrating distributed energy resources into the grid.			
9	**Substation** a) Types of Substations b) Types of Substations c) Safety and Maintenance Practices	At the end of the week, the student can: a) Identify and describe the various types of substations (e.g., transmission, distribution, and switching substations) and analyze their specific functions and roles within the power system. b) Explain the key components of substations, including transformers, circuit breakers, and switchgear, and analyze how each component contributes to the operation and reliability of the electrical system. c) Analyze the safety measures and maintenance practices essential for the operation of substations, discussing how these practices ensure personnel safety and system reliability.	a. Class Discussion/ Video Presentation b. Quiz c. Group Research Project	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts	abcdefg

10	**Grounding** a) Types of Grounding Systems b) Grounding Practices and Safety	At the end of the week, the student can: a) Identify and describe the different types of grounding systems used in distribution and transmission, including solid grounding, resistance grounding, and reactance grounding, and analyze their applications and benefits in enhancing system safety and reliability. b) Analyze the best practices for grounding in distribution and transmission systems, focusing on standards, installation techniques, and maintenance procedures, and evaluate how effective grounding contributes to personnel safety and equipment protection.	a. Class Discussion/ Video Presentation b. Quiz c. Hands-On Demonstration on proper Grounding technique with safety and compliance with industry standards.	a. Quizzes and Exams: Assessing ability to express numbers in scientific notation and apply unit prefixes. b. Practical Exercises: Assessing ability to apply knowledge in practical contexts	
11	**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 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 if applicable.

9 GRADING SYSTEM AND RUBRICS FOR GRADING

GRADING SYSTEM

Midterm Grade	
Midterm Examination	45%
Attendance/ Class Participation	10%
Quizzes	10%
Project	20%
Report	15%
TOTAL	100%

Final Term Grade	
Final Term Examination	45%
Attendance/Class Participation	10%
Quizzes	10%
Project	20%
Report	15%
TOTAL	100%

FINAL GRADE	
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:

Begg, R. D. (2018). *Power transmission and distribution.* Wiley.

O., P. A. W. (2015). *Overhead power lines: Planning, design, construction.* Institution of Engineering and Technology.

Short, T. A. (2014). *Electric distribution systems.* McGraw-Hill.

Dunlop, J. M. (2017). *Underground power lines: Design and construction.* Springer.

R., A. P. (2020). *Electricity pricing: Theory and practice.* Routledge.

Ph. D., A. G. (2019). *Substation design: Principles and practices.* Wiley.

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'2025 -08- 11

Noted:

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