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

ET 121A- AC CIRCUIT

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 ET121A
2 COURSE TITLE **AC CIRCUIT**
3 PREREQUISITE NONE
4 CREDITS 3 units

5 COURSE DESCRIPTION
This course deals with the single-phase AC circuits, equation of voltage, current, resistance, inductance, capacitance and impedance in series and parallel circuits. This includes complex quantities and vectors and other problem-solving activities.

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

Course Learning Outcomes (CLO)	Program Outcom					
	a	b	c	d	e	
At the end of the course, a student can:	✓	✓	✓	✓	✓	✓
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.						

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 AC Circuits** a. Basics of AC Voltage and Current b. Comparison with DC Circuits c. AC Waveforms d. Frequency and Period	At the end of the week, the students can: a. Understand the fundamental concepts of alternating current (AC) b. Differentiate between AC and DC circuits in terms of behavior and app c. Analyze and describe different types of AC waveforms (sine, square, triangular). d. Calculate frequency and period of AC signals and their significance.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Quiz b. Group activity	abcdefg
3	**Circuit Analysis Techniques** a. Ohm's Law in AC b. Kirchhoff's Laws c. Phasors and Complex Numbers d. Mesh and Nodal Analysis	At the end of the week, the students can: a. Apply Ohm's Law to AC circuits and b. Use Kirchhoff's Laws to analyze AC circuits effectively. c. Convert time-domain signals into pha numbers. d. Perform mesh and nodal analysis on AC circuits using phasors.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Quiz b. Group activity	abcdefg

4	**Impedance and Reactance** a. Inductive Reactance b. Capacitive Reactance c. Total Impedance Calculation d. Phase Relationship	At the end of the week, the students can: a. Explain inductive reactance and its effects in AC circuits. b. Describe capacitive reactance and its impact on circuit behavior. c. Calculate total impedance in series and parallel AC circuits. d. Analyze phase relationships betwee components.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Written or oral quiz b. Performance task c. Practical exam d. Practical installation project	abcdefg
5	**RLC Circuits** a. Series RLC Circuit b. Parallel RLC Circuit c. Applications of RLC d. Circuits	At the end of the week, the students can: a. Analyze the behavior of series RLC circuits and calculate resonant frequency. b. Examine parallel RLC circuits and determine their impedance characteristics. c. Understand the transient response of RLC circuits to step inputs. d. Explore applications of RLC circuits in filtering and tuning.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Short written quiz b. Group reporting c. Written assessment d. Practical assessment	abcdefg
6	**MIDTERM EXAM**				
7	**AC Power Analysis** a. Real, Reactive, and b. Apparent Power c. Power Factor	At the end of the week, the students can: a. Define and differentiate between reactive, and apparent power. b. Calculate and interpret power fact	d. Class discussion on current flow and bulb brightness. e. Interactive lecture with diagrams and physical models of circuits. f. Video Presentation	e. Short written quiz f. Group reporting g. Written assessment h. Practical assessment	abcdefg

	d. Power Triangle e. Maximum Power Transfer	in AC circuits. c. Utilize the power triangle to relate real, reactive, and apparent power. d. Apply the maximum power transfer theorem in AC circuits.			
8	**Resonance in AC Circuits** a. Series Resonance b. Parallel Resonance c. Quality Factor d. Applications of Resonance	At the end of the week, the students can: a. Analyze series resonance and its applications in AC circuits. b. Examine parallel resonance and its impact on circuit performance. c. Calculate and interpret the quality factor (Q) in resonant circuits. d. Explore practical applications of resonance in electronics.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Short quizzes b. Observation c. Practical assessment d. Evaluate students ability	abcdefg
9	**Transformers** a. Transformer Basics b. Turns Ratio c. Efficiency of Transforme d. Applications of Transformers	At the end of the week, the students can: a. Describe the operation and principles b. Calculate the turns ratio and its effect on voltage and current. c. Analyze transformer efficiency and losses. d. Identify real-world applications of transformers in AC systems.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Short written quiz b. Group reporting c. Written assessment d. Practical assessment	abcdefg

10	**AC Motors and Generators** a. Types of AC Motors b. Motor Operation Principles c. Generators d. Applications of Motors and Generators	At the end of the week, the students can: a. Differentiate between various types of AC motors (induction, synchronous). b. Understand the principles of operation for AC motors. c. Explain the working principles of AC generators. d. Explore applications in industrial and residential settings.	a. Class discussion on current flow and bulb brightness. b. Interactive lecture with diagrams and physical models of circuits. c. Video Presentation	a. Short written quiz b. Group reporting c. Written assessment d. Practical assessment	abcdefg
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 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.

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:

- ***AC Circuits*** *by Chad Davis, University of Oklahoma (2011)*
- ***Alternating-Current Circuits*** *(Physics LibreTexts) (2016)*
- ***Fundamentals of Electric Circuits*** *by Charles K. Alexander and Matthew N. O. Sadiku (2016)*
- ***Electrical Engineering: Principles and Applications*** *by Allan R. Hambley (2013)*
- ***Circuit Analysis: Theory and Practice*** *by David A. Neamen (2011)*
- ***AC Circuit Analysis*** *by John D. Ryder (1999)*
- ***Introduction to Electric Circuits*** *by Richard H. Dorf and James A. Svoboda(2015)*
- ***Engineering Circuit Analysis*** *by William H. Hayt and Jack E. Kemmerly (2018)*
- ***Fundamentals of AC Circuits*** *by Robert L. Boylestad (2012)*

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