



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



### AT 121– AUTOMOTIVE ELECTRICAL 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 AT 121

2 COURSE TITLE AUTOMOTIVE ELECTRICAL SYSTEM

3 PREREQUISITE AT 111

4 CREDITS 3 units

#### 5 COURSE DESCRIPTION

This course deals with the basic principles in applied electricity in automotive. It also includes the circuits in the electrical system of the automobile from body systems to engine systems. The course equips the student with an entry-level skill required by the industry as an automotive electrician.

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

##### Course Learning Outcomes (CLO)

| At the end of the course, a student can:  | Program Outcomes |   |   |   |   |   |   |
|---|------------------|---|---|---|---|---|---|
|   | a                | b | c | d | e | f | g |
| a. Understand SKSU-VGMO, Classroom Policies, Course Overview, Course Requirements and Grading System;   | ✓                | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. Demonstrate a comprehensive understanding of fundamental electrical theories, including Ohm's Law, and apply these principles to automotive systems.     | ✓                | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| c. Identify and describe the function of key electrical components and accurately use measurement tools like multimeters and oscilloscopes for diagnostics. | ✓                | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| d. Interpret and create wiring diagrams, applying appropriate color codes and symbols to ensure correct electrical connections in automotive systems.       | ✓                | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| e. Assess the performance of automotive batteries, performing testing and maintenance procedures to ensure reliability and longevity.                       | ✓                | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| f. Analyze and troubleshoot automotive light circuits, employing effective troubleshooting techniques to diagnose and resolve issues.       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| g. Diagnose and propose solutions for issues within starting and charging systems, employing systematic approaches to repair.               | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| h. Explain the operation of various ignition systems and demonstrate diagnostic and repair techniques to ensure optimal engine performance. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## 7 COURSE CONTENTS

| WEEK | CONTENT  | INTENDED LEARNING OUTCOMES( ILOs)  | TEACHING AND LEARNING ACTIVITIES (TLA)  | OUTCOMES-BASED ASSESSMENT (OBA)  | COURSE LEARNING OUTCOME S (CLOs) |
|------|--|--|---|--|----------------------------------|
| 1    | <b>Course Orientation</b><br>SKSU VMGO, Classroom Policies, Course Overview, Course Requirements, Grading System   | At the end of the week, the student can:<br>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    | <b>Electrical Theories/ Electrical Components and Meters</b><br><br>a) Basic electrical concepts (voltage, current, resistance)<br>b) Ohm's Law and its applications<br>c) Overview of key components (resistors, capacitors, diodes)<br>d) Use of multimeters and oscilloscopes | At the end of the week, the student can:<br>a) Explain fundamental electrical theories.<br>b) Apply Ohm's Law in practical scenarios.<br>c) Identify various electrical components.<br>d) Utilize multimeters for testing. | a. Lectures on theoretical concepts.<br>b. Group Discussions to explore real-world applications.<br>c. Quizzes to assess understanding of key principles.<br>d. Hands-On Workshops with multimeter usage.<br>e. Component Identification Exercises in small groups. | a. Quiz<br>b. participation  | abcdefg                          |
| 3    | <b>Wiring and Diagrams</b><br>a) Understanding wiring diagrams<br>b) Color codes and circuit symbols   | At the end of the week, the student can:<br>a) Interpret wiring diagrams accurately.   | a) Interactive Lectures on diagram reading.<br>b) Practice Assignments on wiring projects.  | a) Quiz results<br>b) Drawing a diagram<br>c) Hands-on application on electrical trainer | abcdefg                          |

|   |  |   |  |  |         |
|---|--|---|--|--|---------|
|   |  | b) Apply proper wiring techniques.  |  |  |         |
| 3 | <b>Automotive Batteries/Light Circuits</b> <ul style="list-style-type: none"> <li>a) Types and functions of batteries</li> <li>b) Battery testing and maintenance</li> <li>c) Design and function of automotive light circuits</li> <li>d) Troubleshooting techniques</li> </ul> | At the end of the week, the student can: <ul style="list-style-type: none"> <li>a) Assess automotive battery performance.</li> <li>b) Conduct maintenance procedures.</li> <li>c) Analyze light circuit functionality.</li> <li>d) Diagnose and fix common issues.</li> </ul> | <ul style="list-style-type: none"> <li>a) Lab Exercises on battery testing.</li> <li>b) Case Studies on battery issues.</li> <li>c) Hands-On Lab for circuit assembly.</li> <li>d) Troubleshooting Scenarios in groups.</li> </ul> | a) Quiz results<br>b) Hands-on application on electrical trainer | abcdefg |
| 4 | <b>Analog Instruments and Warning Lights</b> <ul style="list-style-type: none"> <li>a) Overview of analog instruments (gauges, indicators)</li> <li>b) Understanding warning light systems.</li> </ul>   | At the end of the week, the student can: <ul style="list-style-type: none"> <li>a) Explain the operation of analog instruments.</li> <li>b) Identify warning light malfunctions.</li> </ul>   | <ul style="list-style-type: none"> <li>a) Demonstration of instrument functionality.</li> <li>b) Group Projects on warning light systems.</li> </ul>   | a) Quiz results<br>b) Group activity output                      | abcdefg |
| 5 | <b>MIDTERM EXAM</b>  |   |  |  |         |

|         |  |   |   |  |         |
|---------|--|---|---|--|---------|
| 6       | <b>Starting Systems</b><br>a) Components of starting systems<br>b) Troubleshooting starting issues   | At the end of the week, the student can:<br><br>a) Diagnose problems in starting systems.<br>b) Propose effective solutions.  | a. Hands-On Training on starting system components.<br>b. Simulation Exercises for troubleshooting.   | a) output and activity results<br>b) quiz results        | abcdefg |
| 7       | <b>Charging Systems</b><br><br>a) Function of alternators and voltage regulators<br>b) Testing and diagnosing charging systems   | a) Evaluate charging system performance.<br>b) Conduct diagnostic tests.  | A. Lab Work on alternator testing.<br><br>B. Group Discussions on case studies.   | a) Activity passed<br>b) Hands-on application on trainer | abcdefg |
| 8 and 9 | <b>Electrical Accessories/ Ignition Systems</b><br><br>a) Overview of common electrical accessories<br>b) Installation and troubleshooting<br>c) Types of ignition systems (distributor, distributor-less)<br>d) Diagnostics and repair techniques | At the end of the week, the student can:<br><br>a) Install electrical accessories correctly.<br>b) Troubleshoot related issues.<br>c) Explain different ignition system types.<br>d) Diagnose ignition system problems. | a) Installation Workshops for accessories.<br>b) Peer Review of installation projects.<br>c) Hands-On Labs on ignition system repairs.<br>d) Group Presentations on system types. | a. quiz results<br>b. Hands-on application on trainer    | abcdefg |
| 10      | <b>FINAL EXAMINATION</b>   |   |   |  |         |

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. participate actively in all discussion;
3. submit all the projects and activities; and
4. 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%         |
| <b>TOTAL</b>                    | <b>100%</b> |

| Final Term Grade               |             | FINAL            |
|--------------------------------|-------------|------------------|
| GRADE                          |             |                  |
| Final Term Examination         | 45%         | Midterm Grade    |
| 50%                            |             |                  |
| Attendance/Class Participation | 10%         | Final Term Grade |
| 50%                            |             |                  |
| Quizzes                        | 10%         |                  |
| 100%                           |             |                  |
| Project                        | 20%         |                  |
| Report                         | 15%         |                  |
| <b>TOTAL</b>                   | <b>100%</b> | <b>TOTAL</b>     |

**Materials used:** Laptop, Powerpoint presentations and video clips  
Books, Online slides, Teacher-made slides ,

**References:**

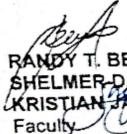
- DeLorenzo, D. (2019). Automotive Electricity and Electronics.  
Gann, D. (2022). Automotive Electrical and Electronic Systems.  
McGraw-Hill Education. (2020). Automotive Technology: A Systems Approach. McGraw-Hill.

Hargrove, J. (2021). Troubleshooting automotive electrical systems. *Automotive Service Excellence Review*, 12(3), 34-40.  
Smith, J. (2020). Understanding automotive electrical systems. *Journal of Automotive Technology*, 15(2), 45-54.  
Crouse, W. H., & Anglin, D. L. (2018). *Automotive Electrical Systems*. McGraw-Hill.  
McCarthy, D. (2022). Battery technology for electric vehicles. *Electric Vehicle Research Journal*, 8(1), 15-28.  
*Automotive Basics: Electrical Systems* (Auto Repair Guys, 2021)  
*Understanding Automotive Batteries* (Engineering Explained, 2018)  
*Wiring Diagrams Explained* (ChrisFix, 2019)  
*Automotive Electrical Troubleshooting* (Scotty Kilmer, 2020)  
*How Ignition Systems Work* (Engineering Explained, 2019)  
*Automotive Light Circuits* (Auto Repair Guys, 2020)  
*Understanding Electrical Components* (Hagerty, 2021)

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