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

AT 111– FUNDAMENTALS OF AUTOMOTIVE TECHNOLOGY

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;	✓	✓		✓		✓	

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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 111
2 **COURSE TITLE** FUNDAMENTALS OF AUTOMOTIVE TECHNOLOGY
3 **PREREQUISITE** None
4 **CREDITS** 3 units

5 **COURSE DESCRIPTION**
This course deals with the basic principles of thermodynamics, which serve as the fundamental of the gas cycle employed in the operation of the engine. It also deals with the construction, basic operation, functions of components parts of engine operation, and performance of gasoline and diesel engines.

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	h
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.	✓	✓	✓	✓	✓	✓	✓	✓

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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	**5S HOUSE KEEPING/WORKSHOP SAFETY RULES AND REGULATION** a) Foster an understanding of safety protocols in the automotive shop by emphasizing their importance in preventing accidents and injuries, and ensuring students recognize the critical role of safety in automotive work environments. b) Equip students to identify common hazards in automotive shops, including those associated with tools, equipment, chemicals, and vehicle maintenance, enabling them to work in a safer and more aware manner. c) Teach the correct use of personal protective equipment (PPE) such as gloves, goggles, and masks, highlighting their significance in ensuring personal safety and compliance with industry safety standards.	a) Recognize the significance of safety protocols in the automotive shop to prevent accidents and injuries. b) Identify common hazards present in the automotive work environment, including those associated with tools, equipment, chemicals, and vehicle maintenance c) Explain the proper use of personal protective equipment (PPE), such as gloves, goggles, and masks, and their role in ensuring personal safety. d) Demonstrate proper waste disposal methods, including the correct handling and disposal of hazardous materials (e.g., oil, batteries, chemicals) in accordance with local regulations. e) List the do's and don'ts of working in an automotive shop, outlining best practices for safe and effective work habits.	a. Video/power point presentation b. Individual participation in discussions c. Quiz d. Activity Roleplaying about job safety Composition Table Database	a. Quiz b. participation c. activity outputs	abcdefg

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	d) Instill proper waste disposal practices by educating students on the correct handling and disposal of hazardous materials, such as oils, batteries, and chemicals, in line with local environmental regulations. e) Outline and enforce the do's and don'ts of the automotive shop, helping students develop best practices for safe, effective, and ethical work habits in the automotive environment. f) Encourage students to assess the risks of neglecting safety measures, emphasizing the potential consequences, including accidents, legal liability, and environmental impact, and promoting a proactive approach to safety. *g)* Promote a culture of safety and responsibility by encouraging students to actively uphold and advocate for safety guidelines and procedures within the automotive shop, fostering a collaborative, safety-conscious environment.	f) Assess the implications of neglecting safety measures, including the potential for accidents, legal consequences, and environmental impact. g) Promote a culture of safety in the automotive shop by encouraging peers to adhere to safety guidelines and practices.			
3	**TOOLS AND EQUIPMENT** a) Introduce students to the various tools and equipment used in the automotive industry, including hand tools, power tools, diagnostic tools, and	a) List various tools and equipment used in the automotive industry, including hand tools (e.g., wrenches, screwdrivers), power tools (e.g., impact wrenches, drills), diagnostic tools (e.g., OBD-II scanners), and	a) Quiz on different tools and equipment its function and purpose	a) Quiz results b) Video presentation	abcdefg

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	specialized equipment, ensuring familiarity with their purpose and applications in repair and maintenance tasks. b) Teach the function and correct use of each tool and piece of equipment, helping students understand how each contributes to the successful completion of specific automotive repair, maintenance, and diagnostic tasks. c) Emphasize the importance of selecting the right tools and equipment for specific jobs, highlighting how appropriate tool selection enhances efficiency, precision, and safety in automotive work environments. d) Develop students' ability to properly handle and use tools and equipment in automotive settings, ensuring adherence to industry safety standards and best practices while performing maintenance or repair tasks. e) Promote awareness of proper maintenance requirements for tools and equipment, emphasizing the need for regular inspection, cleaning, and upkeep to ensure their longevity, reliability, and optimal performance.	specialized equipment (e.g., lifts, alignment machines). b) Describe the function of each tool and piece of equipment, detailing how they are used in automotive repair, maintenance, and diagnostics. c) Explain the importance of selecting the appropriate tool or equipment for specific tasks to ensure efficiency and safety. d) Demonstrate the proper handling and usage of different automotive tools and equipment, emphasizing safety precautions. e) Discuss the maintenance requirements for various tools and equipment to ensure longevity and optimal performance.	b) Group activity: making a video about how to use proper tool for specific work		

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	AUTOMOTIVE BODY DESIGN AND DESCRIPTION **ENGINE NOMENCLATURE** a) Introduce students to the major components of internal combustion engines, ensuring they can accurately list and identify key parts such as the cylinder, piston, crankshaft, camshaft, valves, and intake/exhaust systems. b) Explain the function of each engine component in the overall operation of the internal combustion engine, detailing how each part contributes to the combustion process and the generation of mechanical power. c) Illustrate the interrelationships between engine components, helping students understand how the various parts work together to efficiently convert fuel into mechanical energy for vehicle propulsion. **d)** Develop students' technical communication skills by encouraging the use of appropriate automotive terminology when discussing engine components, their functions, and the processes involved in engine operation.	a) List and identify the major components of an internal combustion engine, such as the cylinder, piston, crankshaft, camshaft, valves, and intake/exhaust systems. b) Describe the function of each engine component in the overall operation of the engine, including how they contribute to the combustion process and power generation. c) Illustrate the relationship between various engine components and how they work together to convert fuel into mechanical energy. d) Use appropriate terminology related to engine components and their functions when communicating about automotive technology.	a) Hands-on identification of engine parts and functions.	a) Quiz on engine components and functions	abcdefg

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	Electrical Systems a) Introduce students to the key components of automotive electrical systems, ensuring they can accurately identify and list parts such as the battery, alternator, starter motor, fuses, wiring harnesses, and sensors. b) Explain the function of each component in the automotive electrical system, emphasizing how these components work together to power various vehicle systems and ensure proper vehicle operation. c) Teach the basic principles of electricity as applied to automotive systems, including essential concepts like voltage, current, resistance, and how these affect the operation of circuits within a vehicle. d) Illustrate the flow of electricity through an automotive electrical system, helping students visualize how electrical energy is distributed and used to power systems such as ignition, lighting, and infotainment. e) Discuss common issues in automotive electrical systems and teach students how to identify symptoms and potential causes of electrical problems, as well as effective troubleshooting methods for	a) Identify and list the main components of automotive electrical systems including the battery, alternator, starter motor, fuses, wiring harnesses, and sensors. b) Explain the function of each component within the electrical system, detailing how they contribute to the overall operation of the vehicle. c) Describe the basic principles of electricity as they apply to automotive systems, including concepts such as voltage, current, resistance, and circuits. d) Illustrate the flow of electricity through the automotive electrical system and how it powers various vehicle functions (e.g., ignition, lighting, infotainment systems). e) Discuss common issues related to automotive electrical systems, including symptoms and potential troubleshooting methods.	a) Demonstration of basic electrical circuits	a) Practical assessment of circuit assembly.	abcdefg

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	diagnosing and resolving these issues.				
5	MIDTERM EXAM				
6	**Fuel Systems** a) Introduce students to the major components of automotive fuel systems, ensuring they can accurately identify and describe key parts such as the fuel tank, fuel pump, fuel filter, fuel injectors, and carburetors (if applicable). b) Explain the process of fuel delivery from the fuel tank to the engine, detailing how fuel is transported, mixed with air, and prepared for combustion in order to power the vehicle. c) Differentiate between carbureted and fuel injection systems, helping students understand the advantages and disadvantages of each system and how they impact vehicle performance and fuel efficiency. d) Illustrate the operation of the fuel system in the context of the	a) Identify and describe the major components of automotive fuel systems, including the fuel tank, fuel pump, fuel filter, fuel injectors, and carburetors (if applicable). b) Explain the process of fuel delivery, detailing how fuel is transported from the tank to the engine and how it is mixed with air for combustion. c) Differentiate between various types of fuel systems, such as carbureted systems versus fuel injection systems, and explain their respective advantages and disadvantages. d) Illustrate the fuel system operation within the context of the overall engine operation, including the role of fuel in the combustion process. e) Discuss common issues and troubleshooting techniques	a. Group project on fuel system components and functionality.	a. Group presentation on fuel systems.	abcdefg

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	engine's overall operation, emphasizing the role of fuel in the combustion process and how it contributes to power generation. e) Discuss common fuel system issues and troubleshooting techniques, equipping students with knowledge on how to identify, diagnose, and address problems such as fuel contamination, injector failure, and fuel pump malfunctions.	associated with automotive fuel systems, such as fuel contamination, injector failure, and fuel pump problems.			
7	**Transmission Systems** a) Introduce students to the main components of transmission systems, ensuring they can accurately identify key parts such as the gearbox, clutch, driveshaft, differential, and axles. b) Explain the function of each transmission system component, detailing how these components work together to transmit power from the engine to the wheels and facilitate vehicle movement. c) Differentiate between various types of transmission systems, including manual, automatic, and continuously variable transmissions (CVTs), and describe their operational principles and specific	a) Identify the main components of transmission systems, including the gearbox, clutch, driveshaft, differential, and axles. b) Explain the function of each component within the transmission system, detailing how they work together to transmit power from the engine to the wheels. c) Describe the difference between various types of transmission systems, such as manual, automatic, and continuously variable transmissions (CVTs), including their operational principles. d) Illustrate how the transmission system affects vehicle performance, including acceleration, speed control, and fuel efficiency.	A. Hands-on activity with different parts of transmissions.	A. Practical assessment on transmission operation.	abcdefg

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	advantages in different driving conditions. d) Illustrate how the transmission system affects vehicle performance, emphasizing the system's role in acceleration, speed control, and fuel efficiency, and how it interacts with the engine to optimize performance. e) Discuss common transmission-related issues and symptoms, such as slipping gears, grinding noises, and fluid leaks, and equip students with basic troubleshooting methods for diagnosing and resolving these problems.	e) Discuss common transmission-related issues and symptoms, along with basic troubleshooting methods for diagnosing problems.			
8	**Suspension and Steering Systems** a) Introduce students to the major components of suspension and steering systems, ensuring they can accurately identify parts such as springs, shock absorbers, struts, control arms, sway bars, steering wheels, steering columns, rack and pinion, tie rods, and power steering pumps. b) Explain the function of each component in both the suspension and steering systems, helping students understand how each part contributes to vehicle handling,	a) Identify the major components of suspension systems, including springs, shock absorbers, struts, control arms, and sway bars, as well as their respective functions. b) Identify the key components of steering systems, including the steering wheel, steering column, rack and pinion, tie rods, and power steering pump. c) Explain the function of each component in both the suspension and steering systems, detailing how they contribute to vehicle handling, stability, and ride comfort.	a. Group activity to inspect and analyze suspension systems..	a. Group evaluation based on system analysis.	abcdefg

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	stability, and ride comfort during operation. c) Describe the relationship between the suspension and steering systems, illustrating how they work together to provide control, improve vehicle safety, and enhance the overall driving experience. d) Teach students to recognize common issues related to suspension and steering systems, such as symptoms of wear, damage, or misalignment, and how these problems affect vehicle performance and safety. e) Equip students with basic troubleshooting techniques to diagnose and address issues in suspension and steering systems, ensuring they can identify and repair common problems like worn shock absorbers, loose tie rods, or faulty power steering systems.	d) Describe the relationship between the suspension and steering systems and how they work together to provide control and safety while driving. e) Discuss common issues related to suspension and steering systems, including symptoms of wear and damage, and outline basic troubleshooting techniques for diagnosing problems.			
9	**Braking Systems** a) Introduce students to the main components of brake systems, ensuring they can accurately identify and describe the role of key parts such as brake pads, rotors (discs), calipers, brake lines, the master cylinder, and the brake fluid reservoir. b) Explain the function of each component within the braking	a) Identify the main components of brake systems, including brake pads, rotors (discs), calipers, brake lines, master cylinder, and brake fluid reservoir. b) Explain the function of each component in the braking system and how they contribute to the overall stopping power of the vehicle.	a. Practical demonstration of brake inspection and maintenance.	a. Assessment of brake maintenance task.	abcdefg

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	system, highlighting how each contributes to the overall stopping power and control of the vehicle during braking. c) Teach the operation of both disc and drum brake systems, allowing students to understand their differences in design, functionality, and performance in various vehicle types. d) Illustrate the application of hydraulic principles in brake systems, helping students comprehend how force is amplified through brake fluid pressure to provide effective braking. e) Emphasize the importance of regular brake maintenance, covering the necessary procedures for inspecting, replacing, and adjusting brake components to ensure optimal safety and performance. f) Analyze common brake system issues, such as squeaking, pulling to one side, or a spongy brake pedal, and discuss their impact on vehicle safety and performance. g) Develop students' ability to troubleshoot brake system problems, teaching them basic diagnostic techniques and stressing the importance of	c) Describe the operation of both disc and drum brake systems, detailing the differences in design and functionality. d) Illustrate how hydraulic principles are applied in brake systems to amplify force and provide effective braking. e) Discuss the importance of regular maintenance for brake components, including inspection, replacement, and adjustment to ensure safety and performance. f) Analyze common issues related to braking systems, such as squeaking, pulling to one side, or a spongy brake pedal, and discuss their implications for vehicle safety. g) Recognize basic troubleshooting techniques for diagnosing brake system problems and the importance of addressing them promptly.			

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	addressing braking issues promptly to avoid safety risks.				
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 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

GRADE

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

FINAL

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

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

References:

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