



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**AUTOMOTIVE HYBRID & ALTERNATIVE FUEL TECHNOLOGIES
AMS3127 3 Credit Hours**

Student Level:

This course is open to students on the college level in either the freshman or sophomore year and to area high school vocational students who have interest in advancing their knowledge in the area of Hybrids and Alternative Fuel Technologies.

Catalog Description:

AMS 3127 - AUTOMOTIVE HYBRID AND ALTERNATIVE FUEL TECHNOLOGIES (3 hrs)

This class is designed to provide an advanced understanding of the dynamics involved in hybrid and alternative fuel vehicles as well as requiring basic competencies in the skills and knowledge necessary to diagnose and repair alternative fuel technology vehicles.

Prerequisites:

A passing grade in AMS3117 Electrical I and AMS3118 Electrical II, or passed the equivalent ASE Certification exam in Electrical and Electronic Systems.

Controlling Purpose:

This course is designed to help the student increase their knowledge, and provide an advanced understanding of the dynamics involved in Hybrid and Alternative Fuel Vehicles as well as requiring basic competencies in the skills and knowledge necessary to diagnose and repair alternative fuel technology vehicles.

Learner Outcomes:

Upon completion of the course, the student will be able to perform routine maintenance and repairs on hybrid and alternative fuel vehicles according to state, local, and federal government. Students will gain knowledge and experience in the service and repair of electric motors, regenerative braking, hybrid batteries and service, alternative fuels, and fuel cells.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may

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add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: Hybrid Vehicles
 Outcomes: This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of hybrid vehicles. Topics presented throughout the course cover hybrid vehicle systems and components, safety procedures, and troubleshooting using the latest diagnostic bi-directional communication equipment.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Interpret and identify hybrid electric vehicle components and systems.
						Identify location of high voltage circuit disconnect and safety procedures.
						Perform inspection of computerized engine control system sensors using a scan tool.
						Access and use service information to perform step-by-step diagnosis.

UNIT 2: Electric Vehicles (Zero Emission Vehicles)

Outcomes: This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of electric driven vehicles. Topics presented throughout the course cover motor fundamentals, high/low voltage systems, and use of capacitance testing of battery cells.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Interpret and Identify electric motor vehicle components and systems.
						Identify location of high voltage/ low voltage sides of the electronic motor systems.
						Perform inspection of battery state of charge using a capacitance tester.
						Access the vehicle communication network and determine malfunctions as necessary.

UNIT 3: Alternative Fuel Vehicles (CNG/ LPG)

Outcomes: This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of alternative fuel powered vehicles. Topics presented throughout the course cover liquefied petroleum gas, compressed natural gas, safety compliance, and environmental impacts of usage.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify CNG/LPG fuel characteristics and the differences between them and other alternative fuels.
						Perform safety systems tests on fuel system circuits in accordance with state, local, and federal guidelines.
						Identify appropriate technical terminology for CNG/LPG systems and components.
						List the potential environmental and economic benefits and costs of using natural gas.

UNIT 4: Regenerative Braking

Outcomes: This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of regenerative braking systems on alternative fuel vehicles. Topics presented throughout the course cover regenerative braking component identification, testing, inspection, and safety precautions necessary during service.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Locate all components involved in the regenerative braking system.
						Inspect and test switches, relays, solid state devices, and wires of the regenerative braking system.
						Use appropriate service information for the testing and inspection of failed components/systems.
						List the safety precautions necessary when performing service on a vehicle with regenerative braking.

UNIT 5: Fuel Cells

Outcomes: This course will enable the student to gain basic understanding and hands on experience utilizing industry standard procedures in the diagnosing and repair of fuel cell technologies. Topics presented throughout the course cover fuel cell sources, impacts, and safety within the transportation infrastructure.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Identify and explain how fuel cells differ from hybrids and alternative fuel vehicles in both components and operation.
						Explain the major source of energy used in a fuel cell vehicle.
						Identify future impacts to the environment of the fuel cell technology.
						Explain the difficulties in creating a safe fuel cell within the current fuel infrastructure in the United States.

Projects Required:

As assigned.

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

Tool Rental Fee

Textbook/Technical Manual

Notebook and writing utensil

Attendance Policy:

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Timeframe:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.