

## Automotive Technology I

Curriculum/Content Area: Applied Technology and Engineering (ATE)	Course Length: 1 Term
Course Title: Automotive Technology I (Advanced Standing with WCTC)	Date last reviewed: October 21, 2015
Prerequisites: None	Board approval date: November 17, 2015

### Desired Results

#### Course Description and Purpose

This course introduces students to the fundamentals of automotive technology and the skills necessary to service modern automobiles. This course serves as the introduction class to the automotives strand and gives a solid foundation in learning the major systems involved in automobiles and learning basic preventative maintenance and light repair tasks. This course rewards Advanced Standing credit for Waukesha County Technical College

Enduring Understandings (EU's):	Essential Questions (EQ's):
<ol style="list-style-type: none"> <li>1. There are a multitude of career opportunities that utilize the same skills as needed for working with automotive technology</li> <li>2. Automobiles utilize advanced technology that require specialized tools and skills in order to maintain, diagnose and repair.</li> <li>3. Knowing how to identify problems and utilizing diverse set of resources is essential in the workplace</li> <li>4. Safety is essential in all work environments.</li> <li>5. Individual automotive systems are interdependent with one another.</li> <li>6. Automotive and Transportation technology plays a vital role in the operation of other technologies and industries including manufacturing, construction, communication, health, safety and agriculture</li> <li>7. Measurement skills in electrical/electronics, mechanical and</li> </ol>	<ol style="list-style-type: none"> <li>1. What risks are associated with using hand and power tools?</li> <li>2. Why is it essential to develop and implement shop cleaning and preventative maintenance routines?</li> <li>3. What are the "greater" opportunities that exist in the automotive industry?</li> <li>4. What are some shared vehicle design characteristics?</li> <li>5. Why do vehicles need to be properly identified for servicing and what methods are used for identification?</li> <li>6. What are the complexities of the internal combustion engine and its relationship to the modern automobile?</li> <li>7. What are the modern automotive systems and what is their interdependence?</li> </ol>

hydraulic applications are necessary to efficiently repair vehicles	
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### Assessment Evidence

<p>Performance assessments: Project based assessments will be used in all units to assess student mastery. In addition other performance assessments will include lab reports/ portfolios, performance tests, demonstrations and employability review. All labs will be assessed using the rubric provided by NATEF (National Automotive Technicians Education Foundation).</p>	<p>Other assessments may include:</p> <ul style="list-style-type: none"> <li>● oral presentations</li> <li>● journals</li> <li>● self &amp; peer assessment tools</li> <li>● (rubric/checklists rating scales)</li> <li>● demonstrations</li> <li>● paper-and-pencil tests</li> <li>● laboratory reports</li> <li>● portfolio analysis</li> </ul>
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<b>UNITS</b>
<ol style="list-style-type: none"> <li>1. General Safety, Rules and Regulations</li> <li>2. Shop Safety, Maintenance and Housekeeping</li> <li>3. Career Opportunities</li> <li>4. Vehicle Design and Construction</li> <li>5. Vehicle Identification and Service Literature</li> <li>6. Hand Tools and Power Tools</li> <li>7. Fasteners, Gaskets and Seals</li> <li>8. Introduction to Internal Combustion Engine Principles and Operation</li> <li>9. Fluids, Lubrication and General Maintenance and Light Repair</li> <li>10. Introduction to Automotive Electricity, Batteries, Charging and Starting Systems</li> <li>11. Introduction to Wheels, Tires and Bearing System Operation, Construction, Repair</li> <li>12. Introduction to Cooling and Lubrication System Operation, Construction, Repair</li> </ol>

<b>Unit 1: General Safety, Rules and Regulations</b>
<b>Major Topics</b>

1. Safe shop practices
2. Safely operate power tools and equipment with all guards and safety features operational
3. MSDS information
4. Potential hazards in the shop/lab area according to right to know legislation
5. Personal protection equipment (PPE) when required
6. Safely operate compressed air tools, equipment, and nozzles
7. Keep all tools in safe working order
8. Never modify a tool or piece of equipment
9. Safely handle, store and dispose of waste shop materials
10. Lifting techniques
11. Shop ventilation techniques

### **Essential Questions**

- Why use the correct procedures for tools and shop equipment?
- Why are safe shop practices necessary to practice?
- How are power tools operated safely?
- Why is personal protection equipment crucial to personal safety?

### **Standards**

#### **Wisconsin Standards for Technology and Engineering**

TR1.a.6.h: Summarize how transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, health and safety and agriculture.

TR1.b.1.e: Recognize that transportation vehicles need to be cared for in order to prolong their useful life.

TR1.b.2.e: Explain that transportation vehicles have multiple components with different functions.

TR1.b.3.e: Explain that malfunctioning components must be repaired or replaced to restore intended operation.

TR1.b.4.m: Predict how a lack of maintenance can lead to degradation and premature failure.

TR1.b.5.m: Explain that transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control and support that must function together to make them work effectively.

TR1.c.10.h: Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).

#### **NATEF Standards**

[Elmbrook NATEF Course Alignment per Standards](#)

#### **Common Core State Standards**

[NATEF Standards Alignment to the Common Core State Standards \(CCSS\)](#)

### **Learning Targets:**

**I can...**

- recognize and implement shop safety policies and procedures.
- monitor and detect unsafe situations while working in the shop environment.
- hypothesize situations in the shop environment that could lead to injury or other accidents.

**Unit 2: Shop Safety, Maintenance and Housekeeping****Major Topics**

1. Shop cleaning material location and use
2. Tool room procedures and duties
3. Equipment inspection
4. Supplies and materials
5. Fasteners
6. Abrasives
7. Adhesives
8. Lubricants
9. Solvents/cleaners
10. Miscellaneous shop supplies
11. MSDS library update

**Essential Questions**

- What are shop cleaning supplies?
- Why is it important to have and clean the shop area to industry standards?
- How are shop supplies used and handled safely?
- Why are shop equipment inspections and maintenance important ?

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**Common Core State Standards**

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**Learning Targets:**

**I can...**

- create and implement policies and procedures for proper shop clean up.
- perform monthly safety inspections on various shop equipment.
- identify the location of housekeeping items and shop cleaning procedures and implement their use in the shop.
- develop and implement an inventory of shop materials and consumables and identify procedure for reordering and resupply

**Unit 3: Career Opportunities**

**Major Topics**

1. Titles used in the auto industry
2. Job duties associated with a job title
3. Technician classifications based on abilities (A-class, B-class, etc.)
4. Job opportunities outside automotive technician, other jobs in the field
5. ASE certifications offered

**Essential Questions**

- What are all the career opportunities within the automotive industry?
- What does it take to become an automotive technician?
- What are the possible job opportunities for the automotive profession?
- What are the continued development opportunities for the automotive professional?

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**Common Core State Standards**

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**Learning Targets:**

**I can...**

- design a training plan for a career as an automotive technician.
- recognize that there are a multitude of career options stemming from the automotive industry.
- explain certifications and testing required to become an automotive technician.

**Unit 4: Vehicle Design and Construction**

**Major Topics**

1. Vehicle design variations
2. Drivetrain layout
3. Chassis design
4. Fuel type
5. Body classification
6. Vehicle subsystems and functions
7. Purpose of the fundamental automotive systems

**Essential Questions**

What are the major design variations?  
 What is the purpose of the fundamental parts of a vehicle?  
 Where are the most important parts of a vehicle located?  
 Where are the most important parts of a vehicle located?

## Standards

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## Learning Targets:

### I can...

- compare and contrast the different types of vehicle chassis, bodies and driveline types.
- classify the automobile into subsystems, assemblies and parts.
- identify and explain the basic function of automobile subsystems.
- prepare a report on various subsystems found in a motor vehicle.

## Unit 5: Vehicle Identification and Service Literature

### Major Topics

1. Vehicle Identification Number (VIN) locations
2. Placement of letters and numbers to decode a VIN
3. Emission label
4. Vehicle certification label
5. engine size and family using VIN and/or emission label
6. Vehicle production date
7. Complete a repair order
8. What is service information
9. What providers are commonly used for service information
10. Technical Service Bulletins
11. Engines Specifications
12. Service Precautions
13. Shop Flat Rate Manuals and Cost Estimation
14. Specifications and procedures for a particular repair operation

### **Essential Questions**

- What do all the letters and numbers in a vehicle's serial number mean?
- Where are the labels located on a motor vehicle?
- What is the information contained in the labels?
- What is a repair order?
- Why is it important to have the right information submitted on a repair order?
- Why is service information essential to success in servicing automotive technology?
- How are flat rates used to calculate costs for a particular job?
- What resources can be used outside of manufacturer provided service information?

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### **NATEF Standards**

[Elmbrook NATEF Course Alignment per Standards](#)



## Common Core State Standards

[NATEF Standards Alignment to the Common Core State Standards \(CCSS\)](#)

### Learning Targets:

#### I can...

- analyze and interpret VIN numbers, labels and specifications to properly identify a vehicle for servicing.
- utilize electronic service media for OEM and Aftermarket service information
- identify and locate pertinent service information.
- research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.

## Unit 6: Hand Tools and Power Tools

### Major Topics

1. Proper care and maintenance of hand tools
2. Tools required to complete a task or job
3. Tool usage to safely perform a task
4. Tools classification: general duty, specialty or specific
5. Tool inventory by size, drive, or application
6. Most commonly used Power tools
7. Personal protection techniques while operating power tools and equipment
8. Operation of power tool and equipment safety
9. Procedures regarding damaged or broken equipment

### Essential Questions

- What are hand tools?
- How are hand tools classified?
- Why is tool care and maintenance important?
- What is the best way to utilize hand tools in the automotive profession
- Why is organization and inventory important?
- What are power tools?
- What is shop equipment?
- What is the proper care and maintenance of power tools and shop equipment?
- What is the selection process to select the right power tool to perform a task?
- How are power tools operated?
- What are the safety precautions when using shop equipment and power tools?

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### **Common Core State Standards**

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### **Learning Targets:**

#### **I can...**

- Devise a plan for proper hand and power tool usage.
- Construct a tool organization system for appropriate lab tasks.
- Define hand tools and criticize hand tool quality.

## **Unit 7: Fasteners, Gaskets and Seals**

### **Major Topics**

1. Various types of fasteners used in the automobile
2. Strengths and weaknesses of each fastening method
3. Size a SAE, USS and ISO metric bolt
4. Repair threads using chasers, restorers, coil and solid inserts
5. Tap and die
6. Tools used with fasteners
7. Sealing techniques based on individualized automotive applications
8. Gaskets/seals used in automotive applications

### **Essential Questions**

- What are the correct sealing methods used in service operations?
- How are fasteners used?
- What tools are used with fasteners?
- How are fasteners classified?
- What are the repair procedures associated with fasteners?

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## Learning Targets:

### I can...

- perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
- distinguish between different fastening and joining methods, and provide rationale for its uses.
- compare and contrast identifying markings of different types of fasteners.
- manipulate snap rings, drift pins and various clips.
- implement tapping, threading, installation of Heli-Coil and other thread repair procedures.

## Unit 8: Introduction to Internal Combustion Engines and Principles of Operation

### Major Topics

1. Internal combustion engine system designs
2. Operation of major engine components and sub-assemblies
3. Theory and applications of automotive engines
4. General industry accepted terms and classifications for automotive engines

### Essential Questions

- What is an internal combustion engine?
- How does an internal combustion engine operate?
- What are the major components of an automotive engine?

### Standards

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### Learning Targets:

#### I can...

- identify engine classifications and design variations.

- name major components of an internal combustion engine.
- explain how internal combustion engine operates.
- compare and contrast engine theory and operational variations.

## Unit 9: Fluids, Lubrication and General Preventative Maintenance

### Major Topics

1. Service locations on a vehicle
2. Vehicle fluid level
3. Fluid types for each specific application
4. Recycle used fluids according to local, state and federal guidelines
5. Filters and other required periodic maintenance items according to published maintenance schedules

### Essential Questions

What are fluids?

- How are fluids handled, contained and stored?
- What fluids are used with motor vehicles?
- What is lubrication?
- How is general maintenance performed on motor vehicles?

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## Common Core State Standards

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### Learning Targets:

#### I can...

- justify the differences that exist between severe and normal service intervals in an automobile.
- execute routine fluid servicing.
- explain the characteristics of fluids that are beyond their useful life cycle.
- hypothesize the damage that could occur if fluids are not changed regularly.
- research, develop and implement a fluid and filter recycling program.

## Unit 10: Introduction to Automotive Electricity, Batteries, Charging and Starting Systems

### Major Topics

1. What parts are in Automotive Electricity, Batteries, Charging and Starting Systems?
2. What are the operating principles of the Automotive Electricity, Batteries, Charging and Starting Systems?
3. What leads to Automotive Electricity, Batteries, Charging and Starting System failure?
4. What tools and procedures are necessary for Battery and Electrical system testing and replacement?

### Essential Questions

- What is electricity?
- How does electricity work?
- Where are electronic components located?
- What equipment is used to test and diagnose electrical components and systems?
- How does a battery work?
- What are the safety precautions when working with electrical components?

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**Learning Targets:**

**I can...**

- identify Battery, Electrical, Charging and Starting system components.
- explain the operating principles and characteristics of the Battery, Electrical, Charging and Starting system
- perform NATEF tasks related to the Battery, Electrical, Charging and Starting

**Unit 11: Introduction to Tires, Wheels and Bearing System Operation, Testing, Repair**

**Major Topics**

1. Tires, Wheels and Bearing System Components and Construction
2. Tires, Wheels and Bearing System Operating Principles
3. Tires, Wheels and Bearing System Maintenance

**Essential Questions**

What parts are a part of the Tires, Wheels and Bearing system?  
What are the operating principles of the Tires, Wheels and Bearing system?  
What leads to Tires, Wheels and Bearing system failure?  
What tools and procedures are necessary for Tires, Wheels and Bearing system testing and replacement?

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### **Learning Targets:**

#### **I can...**

- identify Tires, Wheels and Bearing system components.
- explain the operating principles and characteristics of the Tires, Wheels and Bearing system
- inspect, diagnose, test and replace (if needed) the components of the Tires, Wheels and Bearing system
- perform NATEF tasks related to the Tires, Wheels and Bearing system

## **Unit 12: Introduction to Cooling and Lubrication Systems**

### **Major Topics**

1. Cooling and Lubrication System Components and Construction
2. Cooling and Lubrication System Operating Principles
3. Cooling and Lubrication System Maintenance

### **Essential Questions**



- What is an internal combustion cooling system?
- How does the cooling system operate?
- Why is a cooling system necessary on today's motor vehicles.?
- Why does the engine need a lubrication system?
- Why is it important to service cooling and lubrication systems?
- What are the differences between coolant types?
- What is the difference between lubrication oil types?

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## Learning Targets:

### I can...

- identify Cooling and Lubrication system components.
- explain the operating principles and characteristics of the Cooling and Lubrication system
- inspect, diagnose, test and replace (if needed) the components of the Cooling and Lubrication system
- perform NATEF tasks related to the Cooling and Lubrication system

Unit Title	IAT	AT I	AT II	AA
General Safety	x	x	x	x
Shop Safety, Maintenance and Housekeeping	x	x	x	x
Career Opportunities	x	x	x	x
Vehicle Design and Construction	x	x	x	x
Vehicle Identification and Service Literature	x	x	x	x
Hand and Power Tools	x	x	x	x
Introduction to Internal Combustion Engine Principles and Operation	x			
Introduction to Fluids, Lubrication and General Maintenance and Light Repair	x			
Introduction to Automotive Electricity, Batteries, Charging and Starting Systems	x			
Introduction to Cooling and Lubrication System Operation, Testing and Repair	x			
Battery and Electrical System Operation, Testing, Repair		x		x
Fluids, Lubrication and General Maintenance and Light Repair		x	x	x
Internal Combustion Engine and Powertrain System Operation, Testing and Repair		x	x	x
Charging System Operation, Testing and Repair		x		
Starting System Operation, Testing and Repair		x		
Cooling and Lubrication System Operation, Testing and Repair		x		
Tires, Wheels and Bearing System Operation, Testing and Repair		x		x
Steering and Suspension System Operation, Testing and Repair			x	x
Steering and Suspension Alignment System, Operation, Testing and Repair				x
Exhaust and Emission System Operation, Testing and Repair		x		x
Brake System Operation, Testing and Repair			x	x

Ignition System Operation, Testing and Repair			x	x
Fuel Injection and Delivery System Operation, Testing and Repair			x	x
Computer and Sensor System Operation, Testing and Repair			x	x
Automatic Transmission System Operation, Testing and Repair				x
Manual Transmission System Operation, Testing and Repair				x
Hybrid System Operation, Testing and Repair				x
Heating, Ventilation and Air Conditioning System Operation, Testing and Repair				x