

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT 100: Automotive Technology 100



Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills. As an Automotive Service Excellence (ASE) program certified by the National Automotive Technicians Education Foundation (NATEF), students gain knowledge and skills through a combination of theoretical study and hands-on lab work, including brake systems, engine performance diagnosis, suspension and steering, electronic control systems, and on-board computerized engine control systems diagnosis on automobiles and light trucks. This program is the first step in preparing an individual for a career in the technical repair field. Over the course of the program, students will work on skills to help them obtain their New York State Inspection License post-graduation. They will also be provided with internship experiences to apply and improve their knowledge and skills. Students can earn a Career and Technical Endorsement on their diplomas by successfully passing a written and performance-based assessment. Students also have the opportunity to participate in the industry-standard ASE NATEF technical assessments for Maintenance and Light Repair (MLR), as well as optional NATEF assessments for additional certifications.

Course Description

This course is the foundation for Automotive Technology pathway. Students will explore the career options available in the Automotive Technology field as well as the requirements for work as a professional service technician and develop personal short and long-term goals for professional growth. The course emphasizes workplace safety and includes the first steps toward OSHA certification. Classroom and shop activities simulate automotive service industry operations through the use of training aids and shop vehicles. Completion of the course will give students the basic skills for maintenance and repair of an automobile and prepare students for AUT 200: Automotive Technology 200.

Pre-Requisites

N/A

Course Objectives

Upon successful completion of this course, students will:

1. Know the available career options in the field of Automotive Technology.
2. Develop a career plan based on aptitudes and interests.
3. Demonstrate the importance of personal and workplace safety.
4. Use basic automotive tools and equipment.
5. Apply automotive mathematics and measurements.
6. Understand basic automotive systems.
7. Understand automotive service information.
8. Use automotive fasteners, gaskets, seals, and sealants.
9. Understand basic vehicle maintenance and fluid service.
10. Understand tire, wheel, and wheel bearing fundamentals.
11. Develop and improve skills working on basic automotive maintenance.
12. Begin to prepare for ASE certification.

Integrated Academics

N/A

Equipment and Supplies

- **School will provide:** Textbook, up-to-date automotive shop tools, supplies and safety equipment.
- **Student will provide:** Leather work boots or shoes (steel/composite toe preferred), and long work pants with no holes that cover the top of the shoe or boot.

Textbook

Duffy, James E. *Modern Automotive Technology, 8th Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2014.

Grading

- 20% Daily Grade (punctuality, preparedness, participation, and behavior)
- 20% Quizzes
- 20% Tests
- 40% Quality of Hands-On Work

Additional Course Policies

N/A

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Introduction and Class Expectations• Careers and Certification• Automotive Shop Safety• Automotive Tools and Equipment
2	<ul style="list-style-type: none">• Automotive Mathematics and Measurement• Introduction to Automotive Systems• Service Information and Service Orders
3	<ul style="list-style-type: none">• Fasteners, Gaskets, Seals, and Sealants• Vehicle Maintenance and Fluid Service
4	<ul style="list-style-type: none">• Tires, Wheels, and Bearings• Review and Preparation for Certification and Final Examination

NOTE: This curriculum is aligned to the 2017 NATEF MLR (Maintenance and Light Repair) Task List as indicated by the Priority Task designation:

P-1 – 95% of the items from the MLR Task List are taught in the curriculum.

P-2 – 80% of the items from the MLR Task List are taught in the curriculum.

P-3 – 50% of the items from the MLR Task List are taught in the curriculum.

**Syracuse City School District
Career and Technical Education Program
Scope and Sequence
AUT 100: Automotive Technology 100**



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 Introduction and Class Expectations Careers and Certification	<ul style="list-style-type: none"> What are the expectations for the automotive technology classroom and shop? What are some of the career paths within the automotive technology field? What skills are needed for a successful automotive technology career? How much education is needed to pursue various careers in the automotive technology? What types of license or certifications are required to gain employment in the automotive technology field? What is the role of the automotive technician in the automotive industry? What are the steps to finding an automotive technology-related job? What behaviors does an employee need to advance in a career? Why are successful job-seeking skills required in a competitive marketplace? How does an automotive technician convey professionalism in the workplace? 	<ul style="list-style-type: none"> List rules for general classroom and shop safety. Explain and follow classroom procedures. List the factors to be considered when developing personal career goals. Identify and research the different career opportunities that are available under the umbrella of automotive technology. Describe different types of skills needed for a successful automotive technology career. List automotive technology jobs available at various educational levels. Summarize the requirements and process for obtaining a NYS Inspection License and ASE Certification. Explain the role and duties of an automotive technician. Describe the components of a successful job application process. Set up an online professional portfolio. List actions needed to advance in a career. Explain the importance of professionalism and ethics in the workplace. Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. 	Written <ul style="list-style-type: none"> Quiz on Class Expectations Assignment on Careers in Automotive Technology Automotive Technology Career Research Project and Presentation with Rubric Performance <ul style="list-style-type: none"> Teacher Observation Class Expectations Checklist 	Career Ready Practices CRP 1,2,4,7,8,10,11 Cluster Standards TD 1,6 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,7 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,5,6,7 Math
Weeks 4-7 Automotive Shop Safety	<ul style="list-style-type: none"> Why is safety important in the auto industry? What do I need to know to keep myself and others safe in the shop? What is personal protective equipment (PPE)? Why should technicians follow OSHA guidelines when performing service on an 	<ul style="list-style-type: none"> Identify general shop safety rules and procedures. Utilize safe procedures for handling of tools and equipment. Identify proper placement of floor jacks and jack stands. Identify proper procedures for safe lift operation. Utilize proper ventilation procedures for working within the shop area. Identify marked safety areas. 	Written <ul style="list-style-type: none"> Assignment on PPE Quizzes Self-Assessment S/P2 (Safety and Pollution Prevention) Exams ASE Task Sheets Performance	Career Ready Practices CRP 1,2,3,4,5,8,11,12 Cluster Standards TD 4,5 Pathway Standards TD-MTN 1,2	ELA 9-10R 1,2,4,7 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,6 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	automobile? <ul style="list-style-type: none"> What is a SDS and what information does it contain? What are Right-to-Know regulations? 	<ul style="list-style-type: none"> Identify the location and the types of fire extinguishers and other fire safety equipment. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. Identify the location and use of eye wash stations. Identify the location of the posted evacuation routes. Use required personal protective equipment (PPE) including safety glasses, ear protection, gloves, and shoes during shop activities. Identify and wear appropriate clothing for shop activities. Secure hair and jewelry for shop activities. Demonstrate awareness of the safety aspects of high voltage circuits (e.g., high intensity discharge (HID) lamps, ignition systems and injection systems). Explain the role of OSHA in shop safety. Locate and demonstrate knowledge of safety data sheets (SDS). Identify and practice safe use, storage, and disposal of chemicals. Summarize Right-to-Know regulations including hazardous materials and blood-borne pathogens. 	<ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 		
Weeks 8-10 Automotive Tools and Equipment	<ul style="list-style-type: none"> Why is it important to use the correct tool for the application? Why is using a quality tool important? What determines the measurement system to be used? Why is using precision measurement tools an important part of the profession? Why is maintenance of tools important? 	<ul style="list-style-type: none"> Identify hand and power tools and their usage in automotive applications. List safety rules for hand and power tools. Select the right tool for a given job. Demonstrate safe handling and use of appropriate tools. Identify standard and metric designation tools. Demonstrate proper use of commonly used measuring tools. Demonstrate proper use of precision measuring tools, including micrometers, dial-indicators, and dial-calipers. Demonstrate proper cleaning, storage, and maintenance of all tools and equipment. 	Written <ul style="list-style-type: none"> Review Assignments on Technical Vocabulary and Industry Acronyms Research Project and Presentation on Power Tool and Equipment Safety Quizzes Self-Assessment ASE Task Sheets Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,3,4,7,8,11,12 Cluster Standards TD 4,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,7 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,5,6,7 Math N-Q.A.1 N-Q.A.3 7.EE.3
Weeks 11-12 Automotive	<ul style="list-style-type: none"> How is mathematics used in the automotive industry? 	<ul style="list-style-type: none"> Identify the practical applications of math in auto repair and maintenance. 	Written <ul style="list-style-type: none"> Assignments on 	Career Ready Practices CRP 1,2,4,8,11	ELA 9-10R 1,2,4 9-10W 2,4,5

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Mathematics and Measurement	<ul style="list-style-type: none"> • What is the English system of measurement? • What is the relationship between various English system units of measurement? • What is the metric system of measurement? • What is the relationship between various metric system units of measurement? • What common tools are used for measurement in the automotive industry? 	<ul style="list-style-type: none"> • Demonstrate problem-solving techniques involving whole numbers, fractions, and decimals, using addition, subtraction, multiplication, and division. • Demonstrate techniques for converting fractions to decimals and decimals to fractions. • Describe the English systems of measuring length weight, and volume. • Describe the relationships between various English system units of measurement. • Demonstrate problem-solving techniques for various English system measuring problems. • Demonstrate measuring techniques using common English system measuring tools. • Describe the metric system of measuring length, weight, and volume. • Describe the relationships between various metric system units of measurement. • Demonstrate problem-solving techniques for various metric system measuring problems. • Demonstrate measuring techniques using common metric system measuring tools. • Demonstrate problem-solving techniques using percentages. • Demonstrate techniques for reading and interpreting graphs. • Demonstrate techniques for using a calculator. 	<p>Mathematical Operations and Measurement</p> <ul style="list-style-type: none"> • Quizzes • Self-Assessment <p>Performance</p> <ul style="list-style-type: none"> • Measurement Task: English and Metric Measurement • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist 	<p>Cluster Standards TD 2</p> <p>Pathway Standards TD-MTN 1</p>	<p>9-10SL 1,2,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4 WHST 2,4</p> <p>Math 6.NS.1 5.NF.1 5.NF.2 5.MD.1 N-Q.1 N-Q.3 F-IF.4 6.RP.3c 6.RP.3d</p>
Weeks 13-18 Introduction to Automotive Systems	<ul style="list-style-type: none"> • How do automotive systems work together to keep a car functioning well? • How do different engines components work? • What is the difference between a part, an assembly, and a system? • What is the function of the vehicle's body and frame? • How does the engine provide power for propulsion and electrical systems? • How does the computer system control various auto assemblies? • How does the fuel system provide the correct mixture of air and fuel to the engine? • What is the importance of the electrical system? • What is the function of the 	<ul style="list-style-type: none"> • Identify the operation and functions of automotive systems and basic engine components. • Explain how automotive systems and basic engine components relate to each other. • Explain the major events that have influenced the development of the automobile during the last 40 years. • Differentiate between an automotive part, an assembly, and a system. • Identify and describe primary parts and assemblies within major automotive systems, including frame, body, and chassis, fuel system, engine, computer system, fuel system, electrical system, cooling and lubrication systems, exhaust and emission control systems, drive train systems, suspension, steering, and brake systems, and accessory and safety systems. • Explain the electronic interaction of major automotive systems or circuits. • Describe and compare major automobile design variations. 	<p>Written</p> <ul style="list-style-type: none"> • Assignments on Technical Vocabulary and Industry Acronyms • Automotive Systems Identification Diagram • Research Project and Presentation on the History of the Automobile by Decade • Quizzes • Self-Assessment • ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4, WHST 2,4,5,6,7</p> <p>Math 6.G.2 6.RP.3d 7.RP.1 N-Q.1 N-Q.3 7.EE.3 A-REI.2 A-CED.4 5.NF.1 5.NF.2</p>

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	cooling system? <ul style="list-style-type: none"> Why is the lubrication system important? Why do modern cars have emission control systems? What is the connection between the drive train systems, the engine, and the drive wheels? How do suspension, steering, and brake systems control vehicle handling? What kinds of accessories and safety systems are standard in today's cars? 	<ul style="list-style-type: none"> Identify and locate the most important systems used to operate both conventional and hybrid passenger vehicles. Explain how the body and frame support, stop, and enclose a vehicle. Explain how the engine provides power for both propulsion and electrical systems. Explain how the computer system uses electronic and electrical devices to monitor and control various auto assemblies. Explain how the fuel system provides the correct mixture of air and fuel for efficient and complete combustion. Explain the importance of the electrical systems in operating the electrical-electronic circuits, components, and devices. Describe how the cooling system maintains a constant operating temperature for improved combustion efficiency. Explain how the lubrication system reduces friction between moving parts inside the engine. Explain how the emission control systems reduce air pollution produced by the vehicle. Explain how the drive train systems transfer turning force from the engine crankshaft and/or the motor-generator to the drive wheels. Describe how suspension, steering, and brake systems support and control vehicle handling, maneuvering, and deceleration. Explain how current automotive accessory and safety systems increase passenger comfort, safety, security, and convenience. 			
Weeks 19-20 Service Information and Service Orders	<ul style="list-style-type: none"> What information does a service manual provide? What are the advantages of using computer-based service manuals? What kinds of information are needed on a service order? 	<ul style="list-style-type: none"> Describe and demonstrate how to use different types of service manuals. Locate and use the service manual index and contents sections. Explain the different kinds of information and illustrations used in a service manual. Describe the three basic types of troubleshooting charts found in service manuals. Explain and demonstrate how to use computer-based service information. Describe the advantages of using computer-based service information over service manuals in finding technical information. Describe the information needed on a service order. Demonstrate use of the three C's (concern, cause, and correction). 	Written <ul style="list-style-type: none"> Assignments on Technical Vocabulary and Industry Acronyms Service Manual Scavenger Hunt Quizzes Self-Assessment ASE Task Sheets Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,7 Math 7.EE.3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> Complete a service order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. Explain how repair costs can be estimated. 			
Weeks 21-24 Fasteners, Gaskets, Seals, and Sealants	<ul style="list-style-type: none"> What kinds of fasteners are used on today's vehicles? What is bolt size? What is the difference between a flat washer and a lock washer? What is tensile strength, or grade of a fastener? What are torque specifications? What is a bolt or nut tightening sequence? How is a thread repair insert used? What is the function of gaskets and seals? 	<ul style="list-style-type: none"> Identify commonly used automotive fasteners, including bolts, nuts, washers, and screws. Define the terms bolt and nut. List and explain the four basic dimensions of a bolt. Describe the difference between a flat washer and a lock washer. Explain tensile strength, or grade of a fastener. Explain torque specifications and where to find them. Explain the sequence for tightening a bolt or nut. Select and use fasteners properly. Describe six ways to remove broken fasteners. Describe the proper methods for repairing thread damage. Perform fastener and thread repair (e.g. remove broken bolt, restore internal and external threads, repair internal threads with thread insert). P-1 Remove, select, and install gaskets, seals, and sealants correctly. Install engine covers using gaskets, seals, and sealers as required. P-1 Describe five rules for working with seals. Summarize safety rules relating to fasteners, gaskets, seals, and sealants. 	<p>Written</p> <ul style="list-style-type: none"> Assignments on Technical Vocabulary and Industry Acronyms Bolt Information Diagram Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,4,7,8,11</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4,7 WHST 2,4,7</p> <p>Math 7.EE.3 6.G.1 7.RP.2c</p>
Weeks 25-32 Vehicle Maintenance and Fluid Service	<ul style="list-style-type: none"> What is the importance of preventive maintenance? How are preventive maintenance procedures determined for a particular vehicle? What is a service interval? What kinds of fluids are required for preventive maintenance? What steps does lubrication service typically involve? What are the steps in an oil change? What automotive items are required to be recycled? 	<ul style="list-style-type: none"> Explain the importance of preventive maintenance and give examples. Explain how the design of a vehicle determines what preventive maintenance procedures must be followed. Explain how a vehicle and its systems can be defined by deciphering its VIN. Explain what a service interval is and where to find that information for a specific vehicle. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Describe six general inspection points that should be checked during vehicle maintenance. List and explain the use of five different lubricants. Describe the differences between the fluids required for preventive maintenance and how to 	<p>Written</p> <ul style="list-style-type: none"> Assignments on Technical Vocabulary and Industry Acronyms Chart of Fluid Types Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,3,4,5,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4,7 WHST 2,4,7</p> <p>Math N-Q.1 N-Q.3</p>

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<p>select the correct one for a particular vehicle.</p> <ul style="list-style-type: none"> • Describe how to check a car's fluid levels and locate fluid leaks, including engine oil, engine coolant, power steering fluid, transmission fluid, brake fluid, and battery condition. • Describe how to replace engine oil and oil filter. • Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. P-1 • Check fluid level in a transmission or a transaxle equipped with a dip-stick. P-1 • Check fluid level in a transmission or a transaxle not equipped with a dip-stick. P-1 • Check transmission fluid condition; check for leaks. P-2 • Inspect transmission for leakage at external seals, gaskets, and bushings. P-1 • Drain and replace transmission fluid and filter(s); use proper fluid type per manufacturer specification. P-1 • Identify components of the lubrication and cooling systems. P-1 • Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1 • Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core and galley plugs; determine necessary action. P-1 • Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1 • Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. P-1 • Remove, inspect, and replace thermostat and gasket/seal. P-1 • Inspect power steering fluid level and condition. P-1 • Inspect for power steering fluid leakage. P-1 • List four automotive items that should be recycled. • Demonstrate safe practices while working with vehicle fluids. 			
Weeks 33-37 Tire, Wheels, and Bearings	<ul style="list-style-type: none"> • How do tires and wheels affect the operation of a vehicle? • How can tire wear patterns indicate tire problems? 	<ul style="list-style-type: none"> • Describe different types of tire construction and identify tire markings. • Identify the parts of a tire and wheel assembly. • Describe different methods of tire construction. 	Written <ul style="list-style-type: none"> • Assignments on Technical Vocabulary and Industry 	Career Ready Practices CRP 1,2,3,4,7,8,11,12	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	<ul style="list-style-type: none"> Where is information on tire-pressure specifications found? What might happen if tires are not rotated at manufacturer recommended intervals? What is the difference between static and dynamic balance? What is a tire-pressure monitoring system (TPMS) sensor? What precautions should be taken when dismounting TPMS tires? What is the difference between air loss from the tire and air loss from the wheel? How can tires be repaired? 	<ul style="list-style-type: none"> Explain types and sizes of tires. Describe tire ratings and designations. Describe different types of wheels. Inspect tire condition; identify wear patterns; check for correct size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. P-1 Rotate tires according to manufacturer's recommendations including vehicles equipped with TPMS. P-1 Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. P-1 Dismount, inspect, and remount tire on wheel equipped with TPMS sensor. P-1 Inspect tire and wheel assembly for air loss; determine necessary action. P-1 Repair tire following vehicle manufacturer approved procedure. P-1 Identify indirect and direct TPMS; calibrate system; verify operation of instrument panel lamps. P-1 	<p>Acronyms</p> <ul style="list-style-type: none"> Tire Specifications Diagram Tire Research Project and Presentation Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>Literacy RST 1,2,4,7 WHST 2,4,5,6,7</p> <p>Math 7.EE.3 7.RP.1</p>
<p>Weeks 38-40</p> <p>Review and Preparation for Certification and Final Examination</p>	<ul style="list-style-type: none"> What were the main learning goals for this past year in automotive technology? 	<ul style="list-style-type: none"> Review knowledge and skills from the year in preparation for ASE Certification and Final Examination. Complete the written and performance assessments demonstrating a thorough knowledge of automotive technology. 	<p>Written</p> <ul style="list-style-type: none"> Review Assignments on Technical Vocabulary and Industry Acronyms Review Quizzes Self-Assessment ASE Certification Exams <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Certification Exams 	<p>Career Ready Practices CRP 1,2,4,6,7,11</p> <p>Cluster Standards TD 1,2,4,5,6</p> <p>Pathway Standards TD-MTN 1,2</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4,5,6,7 WHST 2,4,7</p> <p>Math</p>

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Course Description

This course is the second in the four-year Automotive Technology pathway. Students will continue to explore the career options available in the Automotive Technology field as well as the requirements for work as a professional service technician and develop personal short and long-term goals for professional growth. The course emphasizes safety in the operation and repair of the automotive steering, suspension, and brake systems. Classroom and shop activities simulate automotive service industry operations through the use of training aids and shop vehicles. Completion of the course will give students the basic skills for the maintenance, and repair of automotive steering, suspension and brake systems and will prepare students for AUT 300: Automotive Technology 300.

Pre-Requisites

AUT 100: Automotive Technology 100

Course Objectives

Upon successful completion of this course, students will:

1. Develop a career plan based on aptitudes and interests.
2. Demonstrate the importance of personal and workplace safety.
3. Use automotive mathematics and measurements.
4. Use automotive service information.
5. Develop and improve skills working on automotive steering, suspension, and brake systems.
6. Understand wheel and wheel bearing fundamentals.
7. Perform automotive alignments.
8. Prepare for ASE steering and suspension and ASE brake certifications.

Integrated Academics

N/A

Equipment and Supplies

- **School will provide:** Textbook, up-to-date automotive shop tools, supplies and safety equipment.
- **Student will provide:** Leather work boots or shoes (steel/composite toe preferred), and long work pants with no holes that cover the top of the shoe or boot.

Textbook

Duffy, James E. *Modern Automotive Technology, 8th Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2014.

Grading

20%	Daily Grade (punctuality, preparedness, participation, and behavior)
20%	Quizzes
20%	Tests
40%	Quality of Hands-On Work

Additional Course Policies

N/A

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Class Expectations• Careers and Certification• Safety Review• Steering and Suspension<ul style="list-style-type: none">○ Basic Steering and Suspension Systems○ Steering Systems
2	<ul style="list-style-type: none">• Steering and Suspension<ul style="list-style-type: none">○ Suspension Systems○ Wheel Alignment
3	<ul style="list-style-type: none">• Brakes<ul style="list-style-type: none">○ Basic Braking Systems○ Hydraulic System○ Drum Brakes
4	<ul style="list-style-type: none">• Brakes<ul style="list-style-type: none">○ Disc Brakes○ Power Assist Units○ Related Systems – Wheel Bearings, Parking Brakes, Electrical○ Electronic Brakes and Traction and Stability Control Systems• Review and Preparation for Certification and Final Examination

NOTE: This curriculum is aligned to the 2017 NATEF MLR (Maintenance and Light Repair) Task List as indicated by the Priority Task designation:

P-1 – 95% of the items from the MLR Task List are taught in the curriculum.

P-2 – 80% of the items from the MLR Task List are taught in the curriculum.

P-3 – 50% of the items from the MLR Task List are taught in the curriculum.

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
AUT 200: Automotive Technology 200



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-2 Class Expectations Careers and Certification	<ul style="list-style-type: none"> What are the expectations for the automotive technology classroom and shop? What are some of the career paths within the automotive technology field? What are the steps to finding an automotive technology-related job? Why are successful job-seeking skills required in a competitive marketplace? How does an automotive technician convey professionalism in the workplace? 	<ul style="list-style-type: none"> Explain the rules for general classroom and shop safety. Explain and follow classroom procedures. Identify and research a specific career opportunity of interest including the required skills, education, and certifications. Compare the requirements and process for obtaining ASE Certification with individual progress toward that goal. Describe the components of a successful job application process. Update an online professional portfolio with a cover letter and resume. Demonstrate professionalism and ethics in the workplace. Complete an employability profile. 	Written <ul style="list-style-type: none"> Quiz on Class Expectations Automotive Technology Career Research Project and Presentation with Rubric Online Portfolio Employability Profile Performance <ul style="list-style-type: none"> Teacher Observation Class Expectations Checklist 	Career Ready Practices CRP 1,2,4,7,8,10,11 Cluster Standards TD 1,6 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,7 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,5,6,7 Math
Week 3 Safety Review	<ul style="list-style-type: none"> Why is safety important in the auto industry? What do I need to know to keep myself and others safe in the shop? What is personal protective equipment (PPE)? Why should technicians follow OSHA guidelines when performing service on an automobile? What is a SDS and what information does it contain? What are Right-to-Know regulations? 	<ul style="list-style-type: none"> Review and follow general shop safety rules and procedures. Utilize safe procedures for handling of tools and equipment. Use proper placement of floor jacks and jack stands. Use proper procedures for safe lift operation. Utilize proper ventilation procedures for working within the lab/shop area. Identify and follow marked safety areas. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. Explain the use of eye wash stations. Identify posted evacuation routes. Use required personal protective equipment (PPE) including safety glasses, ear protection, gloves, and shoes during shop activities. Identify and wear appropriate clothing for shop activities. Secure hair and jewelry for shop activities. Demonstrate awareness of the safety aspects of high voltage circuits (e.g., high intensity discharge (HID) lamps, ignition systems and injection systems). Explain the role of OSHA in shop safety. 	Written <ul style="list-style-type: none"> Review Assignment on PPE, OSHA, Right-to-Know Quizzes Self-Assessment S/P2 (Safety and Pollution Prevention) Exams ASE Task Sheets Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,3,4,5,8,11,12 Cluster Standards TD 4,5 Pathway Standards TD-MTN 1,2	ELA 9-10R 1,2,4,7 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,6 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> Demonstrate use of safety data sheets (SDS). Practice safe use, storage, and disposal of chemicals. Summarize Right-to-Know regulations including hazardous materials and blood-borne pathogens. Follow safety rules for hand and power tools. 			
Weeks 4-5 Steering and Suspension: Basic Steering and Suspension Systems	<ul style="list-style-type: none"> What are the components of suspension and steering systems? How do suspension and steering systems affect drivability and safety? 	<ul style="list-style-type: none"> Identify suspension and steering system components and configurations. P-1 Locate and interpret vehicle and major component identification numbers. Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control). P-3 	Written <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms Quizzes Self-Assessment Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,7 Math 7.G.2
Weeks 6-11 Steering and Suspension: Steering Systems	<ul style="list-style-type: none"> What are the components of the steering system? How do steering systems affect drivability and safety? How are steering system components diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Identify typical steering system components and their functions. Identify the basic types of steering linkage systems. Identify the components in a manual rack and pinion steering arrangement and describe their function. Describe the similarities and differences between parallelogram, worm and roller, and rack and pinion steering linkage systems. Explain the difference between active and passive restraint systems. Identify the major parts of a typical air bag system. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. P-1 Safely inspect, diagnose and service an air bag assembly. Inspect power steering fluid level and condition. P-1 Inspect for power steering fluid leakage. P-1 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-1 Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. P-2 	Written <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms Quizzes Self-Assessment ASE Task Sheets Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,7 Math 7.G.2 6.RP.3c A-CED.4 N-Q.1 N-Q.3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> • Remove, inspect, replace, and/or adjust power steering pump drive belt. P-1 • Inspect and replace power steering hoses and fittings. P-2 • Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper. P-1 • Inspect electric power steering assist system. P-2 • Identify hybrid vehicle power steering system electrical circuits and safety precautions. P-2 			
Weeks 12-17 Steering and Suspension: Suspension Systems	<ul style="list-style-type: none"> • What are the components of the suspension system? • How does the suspension system affect drivability and safety? • How are suspension system components diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> • Explain the basic towing, lifting, jacking, and service precautions that must be followed when servicing air springs and other electronic suspension components. • Identify suspension system components and configurations. P-1 • Identify the three basic types of rear suspensions and explain their effects on traction and tire wear. • Identify the various types of springs, their functions, and their locations in the rear-axle housing. • Explain the function of electronic suspension components including air compressors, sensors, control modules, air shocks, electronic shock absorbers, and electronic struts. • Perform a general front-end inspection. • Inspect tie rod ends (sockets), tie rod sleeves, and clamps. P-1 • Inspect upper and lower control arms, bushings, and shafts. P-1 • Inspect and replace rebound bumpers. P-1 • Inspect track bar, strut rods/radius arms, and related mounts and bushings. P-1 • Inspect upper and lower ball joints (with or without wear indicators). P-1 • Inspect suspension system coil springs and spring insulators (silencers). P-1 • Inspect suspension system torsion bars and mounts. P-1 • Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. P-1 • Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings. P-2 • Inspect front strut bearing and mount. P-1 • Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. P-1 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,7 Math 7.RP.3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. P-1 Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. P-1 			
Weeks 18-21 Steering and Suspension: Wheel Alignment	<ul style="list-style-type: none"> How do wheel alignments affect drivability and tire performance? How do tires and wheels affect the operation of a vehicle? 	<ul style="list-style-type: none"> Explain the benefits of accurate wheel alignment. Explain the importance of correct wheel alignment angles. Identify the purposes of steering axis inclination in diagnosing alignment problems. Identify the purposes of turning radius, or toe-out in turns, in understanding alignment dynamics when the vehicle is moving. Describe the various types of equipment that can be used to align the wheels of a vehicle. Describe how alignment angles can be changed on a vehicle. Explain the difference between two-wheel and four-wheel alignment procedures. Perform pre-alignment inspection and measure vehicle ride height. P-1 Describe alignment angles (camber, caster, and toe). P-1 Perform an alignment. Identify and explain steering sensor calibration requirements needed after an alignment. 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6
				Cluster Standards TD 2,5	Literacy RST 1,2,4,7 WHST 2,4,7
				Pathway Standards TD-MTN 1	Math 7.G.4
Week 22 Brakes: Basic Braking Systems	<ul style="list-style-type: none"> How do advancements on today's vehicles enhance driver safety? How do different braking systems affect vehicle control when stopping? How have electronics affected today's braking systems? How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Explain the basic principles of braking, including kinetic and static friction, friction materials, application pressure, and heat dissipation. Describe the operation of drum and disc brakes. Identify brake system components and configuration. P-1 Explain the function of brake system components. Describe the properties of brake fluid. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). P-1 Install wheel and torque lug nuts. P-1 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Brakes Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6
				Cluster Standards TD 2,5	Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7
				Pathway Standards TD-MTN 1	Math 7.EE.3 8.EE.7b
Weeks 23-24 Brakes: Hydraulic System	<ul style="list-style-type: none"> How do advancements on today's vehicles enhance driver safety? How do different braking systems affect vehicle control when stopping? 	<ul style="list-style-type: none"> Describe the components of a hydraulic brake system and their operation, including brake lines and hoses, master cylinders, system control valves, and safety switches. Describe proper brake pedal height, travel, and feel. P-1 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Brakes Quizzes 	Career Ready Practices CRP 1,2,4,7,8,11,12	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6
				Cluster Standards TD 2,5	Literacy RST 1,2,4,7,8

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	<ul style="list-style-type: none"> How have electronics affected today's braking systems? How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Check master cylinder for external leaks and proper operation. P-1 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings/supports. P-1 Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. P-1 Identify components of hydraulic brake warning light system. P-3 Bleed and/or flush brake system. P-1 Test brake fluid for contamination. P-1 	<ul style="list-style-type: none"> Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Pathway Standards TD-MTN 1</p>	<p>WHST 2,4,5,6,7</p> <p>Math 6.G.1 7.EE.3 8.EE.7b</p>
<p>Weeks 25-28</p> <p>Brakes: Drum Brakes</p>	<ul style="list-style-type: none"> How do advancements on today's vehicles enhance driver safety? How do different braking systems affect vehicle control when stopping? How have electronics affected today's braking systems? How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Identify the major components of a typical drum brake and describe their functions. Explain the difference between duo-servo and non-servo drum brakes. Recognize conditions that adversely affect the performance of drums, shoes, linings, and related hardware. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. P-1 Refinish brake drum and measure final drum diameter; compare with specification. P-1 Remove, clean, inspect and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1 Inspect wheel cylinders for leaks and proper operation; remove and replace as necessary. P-2 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. P-1 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Brakes Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7</p> <p>Math 8.EE.7b</p>
<p>Weeks 29-32</p> <p>Brakes: Disc Brakes</p>	<ul style="list-style-type: none"> How do advancements on today's vehicles enhance driver safety? How do different braking systems affect vehicle control when stopping? How have electronics affected today's braking systems? How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Identify disc brake components and three types of calipers used. Describe five types of problems associated with disc brakes. Describe the procedure for removing and replacing disc brakes. Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action. P-1 Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. P-1 Remove, inspect, and/or replace brake pads 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Brakes Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation 	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6</p> <p>Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7</p> <p>Math</p>

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> and retaining hardware; determine necessary action. P-1 • Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks. P-1 • Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. P-1 • Remove and reinstall/replace rotor. P-1 • Refinish rotor on vehicle; measure final rotor thickness and compare with specification. P-1 • Refinish rotor off vehicle; measure final rotor thickness and compare with specification. P-1 • Retract and re-adjust caliper piston on an integral parking brake system. P-2 • Check brake pad wear indicator; determine necessary action. P-1 • Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation. P-1 	<ul style="list-style-type: none"> • Teacher Checklist • ASE Task Sheets 		
Weeks 33-34 Brakes: Power Assist Units	<ul style="list-style-type: none"> • How do advancements on today's vehicles enhance driver safety? • How do different braking systems affect vehicle control when stopping? • How have electronics affected today's braking systems? • How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> • Describe the operation and components of both vacuum-assist and hydraulic-assist braking units. • Check brake pedal travel with, and without, engine running to verify proper power booster operation. P-2 • Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-1 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7 Math
Weeks 35-36 Brakes: Related Systems – Wheel Bearings, Parking Brakes, Electrical	<ul style="list-style-type: none"> • How do advancements on today's vehicles enhance driver safety? • How do different braking systems affect vehicle control when stopping? • How have electronics affected today's braking systems? • How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> • Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. P-1 • Describe the operation of both rear disc/drum (auxiliary drum) parking brakes and caliper-actuated parking brakes. • Check parking brake components for wear, binding, and corrosion; clean, lubricate, adjust, and/or replace as needed. P-2 • Check parking brake operation and parking brake indicator light system operation; determine necessary action. P-1 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> • Check operation of brake stop light system. P-1 • Replace wheel bearing and race. P-2 • Inspect and replace wheel studs. P-1 	<ul style="list-style-type: none"> • Teacher Observation • Teacher Checklist • ASE Task Sheets 		
Weeks 37-38 Brakes: Electronic Brakes and Traction and Stability Control Systems	<ul style="list-style-type: none"> • How do advancements on today's vehicles enhance driver safety? • How do different braking systems affect vehicle control when stopping? • How have electronics affected today's braking systems? • How are different brake systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> • Explain how antilock brake systems work to bring a vehicle to a controlled stop. • Describe the differences between an integrated and a nonintegrated antilock brake system. • Describe the major components of both two-wheel and four-wheel antilock brake systems. • Explain the best procedure for finding ABS faults. • List the precautions that should be followed whenever working on an antilock brake system. • Identify traction control/vehicle stability control system components. P-3 • Describe the operation of the major components of automatic traction and stability control systems. • Describe the operation of a regenerative braking system. P-3 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 9-10R 1,2,4,5 9-10W 2,4,5,6,7 9-10SL 1,2,4,5,6 9-10L 1,2,3,6 Literacy RST 1,2,4,7,8 WHST 2,4,5,6,7 Math 7.EE.3 8.EE.7b
Weeks 39-40 Review and Preparation for Certification and Final Examination	<ul style="list-style-type: none"> • What were the main learning goals for this past year in automotive technology? 	<ul style="list-style-type: none"> • Review knowledge and skills from the year in preparation for ASE Certification and Final Examination. • Complete the written and performance assessments demonstrating a thorough knowledge of automotive technology. 	Written <ul style="list-style-type: none"> • Review Assignments on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Certification Exams Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Certification Exams 	Career Ready Practices CRP 1,2,4,6,7,11 Cluster Standards TD 1,2,4,5,6 Pathway Standards TD-MTN 1,2	ELA 9-10R 1,2,4,5 9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6 Literacy RST 1,2,4,5,6,7 WHST 2,4,7 Math

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT 300: Automotive Technology 300



Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills. As an Automotive Service Excellence (ASE) program certified by the National Automotive Technicians Education Foundation (NATEF), students gain knowledge and skills through a combination of theoretical study and hands-on lab work, including brake systems, engine performance diagnosis, suspension and steering, electronic control systems, and on-board computerized engine control systems diagnosis on automobiles and light trucks. This program is the first step in preparing an individual for a career in the technical repair field. Over the course of the program, students will work on skills to help them obtain their New York State Inspection License post-graduation. They will also be provided with internship experiences to apply and improve their knowledge and skills. Students can earn a Career and Technical Endorsement on their diplomas by successfully passing a written and performance-based assessment. Students also have the opportunity to participate in the industry-standard ASE NATEF technical assessments for Maintenance and Light Repair (MLR), as well as optional NATEF assessments for additional certifications.

Course Description

This course is the third in of the four-year Automotive Technology pathway. Students will explore automotive electrical theory, diagnosis, and repair. Students will also complete the OSHA 10-hour course training leading to OSHA general certification. Classroom and shop activities simulate automotive service industry operations through the use of training aids and shop vehicles. The course also emphasizes job readiness through student participation in job shadowing opportunities. Students will be assessed through the NOCTI Written and Performance Assessments and will have an opportunity to take the tests for ASE certification in Automotive Electrical. Completion of the course will give students the basic knowledge and skills for the operation, maintenance, and repair of automotive electrical, and engine performance systems and prepare students for AUT 400: Automotive Technology 400.

Pre-Requisites

AUT 100: Automotive Technology 100
AUT 200: Automotive Technology 200

Course Objectives

- Upon successful completion of this course, students will
1. Develop and improve skills working on automotive electrical diagnosis and repair.
 2. Develop and improve skills working on automotive engine performance diagnosis and repair.
 3. Use automotive measurements and calculations.
 4. Use automotive service information.
 5. Demonstrate the importance of career readiness.
 6. Apply knowledge and skills in a work-based job shadow experience.
 7. Prepare for ASE certification in Automotive Electrical and Automotive Engine Performance.
 8. Continue to prepare for NYS Inspection certification.

Integrated Academics

1 CTE Integrated Math Credit

Equipment and Supplies

- **School will provide:** Required and up to date automotive shop equipment and supplies.
- **Student will provide:** Leather work boots or shoes (steel/composite toe preferred), and long work pants with no holes that cover the top of the shoe or boot.

Textbook

Duffy, James E. *Modern Automotive Technology, 8th Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2014.

Grading

- 40% Daily Grade (punctuality, preparedness, willingness to learn, and behavior)
- 10% Quizzes
- 10% Tests
- 40% Quality of Work

Additional Course Policies

N/A

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Class Expectations• Careers and Certification• Safety Review• OSHA Training• Drive Train and Axle Technology
2	<ul style="list-style-type: none">• Electrical<ul style="list-style-type: none">○ Basic Electrical Systems○ Battery Service
3	<ul style="list-style-type: none">• Electrical<ul style="list-style-type: none">○ Starting System○ Charging System
4	<ul style="list-style-type: none">• Electrical: Lighting, Instrument Cluster, Driver Information, And Body Electrical Systems• Job Shadow• Review and Preparation for Certification and Final Examination

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P-1 – 95% of the items from the MLR Task List are taught in the curriculum.

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**Syracuse City School District
Career and Technical Education Program
Scope and Sequence
AUT 300: Automotive Technology 300**



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-2 Class Expectations Careers and Certification	<ul style="list-style-type: none"> What are the expectations for the automotive technology classroom and shop? What career paths within the automotive technology field? What are the steps to finding an automotive technology-related job? Why are successful job-seeking skills required in a competitive marketplace? How does an automotive technician convey professionalism in the workplace? 	<ul style="list-style-type: none"> Explain the rules for general classroom and shop safety. Explain and follow classroom procedures. Research a specific career opportunity of interest including the required skills, education, and certifications. Compare the requirements and process for obtaining ASE Certification with individual progress toward that goal. Review the components of a successful job application process. Update an online professional portfolio with a cover letter and resume. Demonstrate professionalism and ethics in the workplace. Complete an employability profile. 	Written <ul style="list-style-type: none"> Quiz on Class Expectations Automotive Technology Career Research Project and Presentation with Rubric Online Professional Portfolio Employability Profile Performance <ul style="list-style-type: none"> Teacher Observation Class Expectations Checklist 	Career Ready Practices CRP 1,2,4,7,8,10,11 Cluster Standards TD 1,6 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,4,5,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,5,6,7 Math
Week 3-4 Safety Review OSHA Training	<ul style="list-style-type: none"> Why is safety important in the auto industry? What do I need to know to keep myself and others safe in the shop? What is personal protective equipment (PPE)? Why should technicians follow OSHA guidelines when performing service on an automobile? What is a SDS and what information does it contain? What are Right-to-Know regulations? 	<ul style="list-style-type: none"> Review and follow general shop safety rules and procedures. Utilize safe procedures for handling of tools and equipment. Use proper placement of floor jacks and jack stands. Use proper procedures for safe lift operation. Utilize proper ventilation procedures for working within the lab/shop area. Identify and follow marked safety areas. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. Explain the use of eye wash stations. Identify posted evacuation routes. Use required personal protective equipment (PPE) including safety glasses, ear protection, gloves, and shoes during shop activities. Identify and wear appropriate clothing for shop activities. Secure hair and jewelry for shop activities. Demonstrate awareness of the safety aspects of high voltage circuits (e.g., high intensity discharge (HID) lamps, ignition systems and injection systems). Explain the role of OSHA in shop safety. Demonstrate use of safety data sheets (SDS). Practice safe use, storage, and disposal of chemicals. Summarize Right-to-Know regulations including 	Written <ul style="list-style-type: none"> Review Assignment on PPE, OSHA, Right-to-Know Quizzes Self-Assessment ASE Task Sheets OSHA 10-Hour Module Assessments Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,3,4,5,8,11,12 Cluster Standards TD 4,5 Pathway Standards TD-MTN 1,2	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,6,7 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		hazardous materials and blood-borne pathogens. • Follow safety rules for hand and power tools. • Complete OSHA 10-Hour General Industry training.			
Weeks 5-10 Drive Train and Axle Technology	<ul style="list-style-type: none"> • How do automotive systems work together to keep a car functioning well? • What is the standard procedure for properly maintaining the drive train and axles? • Why do diagnostic procedures need to be followed? • What is the function of the differential in an automotive vehicle? • What condition is generally accepted as the first hint of differential troubles? • What type of axle housing is most often used? • Why are automotive axle housings vented? 	<ul style="list-style-type: none"> • Identify drive train components and configuration. P-1 • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 • Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification. P-1 • Check fluid condition; check for leaks. P-2 • Identify manual drive train and axle components and configuration. P-1 • Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification. P-1 • Check for hydraulic system leaks. P-1 • Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. P-2 • Identify the components of front- and rear-wheel-drive axles describe their operation. • Inspect, remove, and/or replace bearings, hubs, and seals. P-2 • Explain the difference between CV joints and universal joints. • Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. P-2 • Inspect locking hubs. P-3 • Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. P-2 • Explain the difference between the transfer, open, and limited slip differentials. • Clean and inspect differential case; check for leaks; inspect housing vent. P-1 • Check and adjust differential case fluid level; use proper fluid type per manufacturer specification. P-1 • Drain and refill differential housing. P-1 • Inspect and replace drive axle wheel studs. P-1 • Identify the differences, advantages, and disadvantages of four- and all-wheel drive. • Explain the purpose of a viscous clutch in all-wheel drive. • Name the major components of a conventional four-wheel drive system. • Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. P-2 • Inspect replace and/or align power train mounts. P-2 • Describe the operational characteristics of a 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math 7.RP.3c 7.EE.3 6.G.1 7.RP.2c 7.G.4 8.EE.7b

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		continuously variable transmission (CVT). P-3 • Describe the operational characteristics of a hybrid vehicle drive train. P-3			
Weeks 11-14 Electrical: Basic Electrical Systems	<ul style="list-style-type: none"> • What impact does the electrical system have on other systems of the automobile? • How has the use of electrical and battery components in automobiles evolved? • How are electrical systems diagnosed and repaired or replaced? • What are the implications for future battery usage (hybrids)? • Why is it important to understand the role of computer software in automotive electrical systems? 	<ul style="list-style-type: none"> • Identify electrical/electronic system components and configuration. P-1 • Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). P-1 • Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins. P-1 • Use wiring diagrams to trace electrical/electronic circuits. P-1 • Demonstrate proper use of a Digital Volt Ohm Meter (DVOM) or Digital Multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1 • Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-1 • Use a test light to check operation of electrical circuits. P-2 • Use fused jumper wires to check operation of electrical circuits. P-2 • Measure key-off battery drain (parasitic draw). P-1 • Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1 • Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair). P-1 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math A-REI.2 A-CED.4 5.NF.1 5.NF.2
Weeks 15-19 Electrical: Battery Service	<ul style="list-style-type: none"> • What impact does the electrical system have on other systems of the automobile? • How has the use of electrical and battery components in automobiles evolved? • How are electrical systems diagnosed and repaired or replaced? • What are the implications for future battery usage (hybrids)? • Why is it important to understand the role of computer software in automotive electrical systems? 	<ul style="list-style-type: none"> • Identify different types of batteries used in cars and trucks. • Perform battery state-of-charge test; determine necessary action. P-1 • Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action. P-1 • Maintain or restore electronic memory functions. P-1 • Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. P-1 • Perform slow/fast battery charge according to manufacturer's recommendations. P-1 • Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. P-1 • Identify safety precautions for high-voltage systems on electric, hybrid electric, and diesel vehicles. P-2 • Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery. P-1 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,7,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math A-REI.2 A-CED.4 5.NF.1 5.NF.2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. P-2 			
Weeks 20-24 Electrical: Starting System	<ul style="list-style-type: none"> What impact does the electrical system have on other systems of the automobile? How has the use of electrical and battery components in automobiles evolved? How are electrical systems diagnosed and repaired or replaced? What are the implications for future battery usage (hybrids)? Why is it important to understand the role of computer software in automotive electrical systems? 	<ul style="list-style-type: none"> Perform starter current draw test; determine necessary action. P-1 Perform starter circuit voltage drop tests; determine necessary action. P-1 Inspect and test starter relays and solenoids; determine necessary action. P-2 Remove and install starter in a vehicle. P-1 Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action. P-2 Demonstrate knowledge of an automatic idle-stop/start-stop system. P-3 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Electrical Theory Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,6 11-12L 1,2,3,6</p> <p>Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7</p> <p>Math A-REI.2 A-CED.4 5.NF.1 5.NF.2</p>
Weeks 25-30 Electrical: Charging System	<ul style="list-style-type: none"> What impact does the electrical system have on other systems of the automobile? How has the use of electrical and battery components in automobiles evolved? How are electrical systems diagnosed and repaired or replaced? What are the implications for future battery usage (hybrids)? Why is it important to understand the role of computer software in automotive electrical systems? 	<ul style="list-style-type: none"> Explain the purpose and identify the major components of the charging system. Explain the purposes of the major parts of an AC generator. Explain half- and full-wave rectification and how they relate to AC generator operation. Identify the different types of AC voltage regulators. Perform charging system output test using electrical test equipment; determine necessary action. P-1 Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. P-1 Remove, inspect, and/or replace generator (alternator). P-2 Perform charging circuit voltage drop tests; determine necessary action. P-2 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Electrical Theory Quizzes Self-Assessment ASE Task Sheets <p>Performance</p> <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,6 11-12L 1,2,3,6</p> <p>Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7</p> <p>Math A-REI.2 A-CED.4 5.NF.1 5-NF.2 F-TF.5</p>
Weeks 31-33 Electrical: Lighting, Instrument Cluster, Driver Information, And Body Electrical Systems	<ul style="list-style-type: none"> What impact does the electrical system have on other systems of the automobile? How has the use of electrical and battery components in automobiles evolved? How are electrical systems diagnosed and repaired or replaced? 	<ul style="list-style-type: none"> Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. P-1 Aim headlights. P-2 Identify system voltage and safety precautions associated with high-intensity discharge headlights. P-2 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. P-1 Remove and reinstall door panel. P-1 Describe the operation of keyless entry/remote-start systems. P-3 	<p>Written</p> <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms PBL Project on Electrical Theory Quizzes Self-Assessment ASE Task Sheets <p>Performance</p>	<p>Career Ready Practices CRP 1,2,4,7,8,11,12</p> <p>Cluster Standards TD 2,5</p> <p>Pathway Standards TD-MTN 1</p>	<p>ELA 11-12R 1,2,4,7 11-12W 2,4,5,6,7 11-12SL 1,2,6 11-12L 1,2,3,6</p> <p>Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7</p> <p>Math A-REI.2 A-CED.4</p>

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	<ul style="list-style-type: none"> • What are the implications for future battery usage (hybrids)? • Why is it important to understand the role of computer software in automotive electrical systems? 	<ul style="list-style-type: none"> • Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators. P-1 • Verify windshield wiper and washer operation; replace wiper blades. P-1 	<ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 		5.NF.1 5.NF.2
Weeks 35-37 Job Shadow	<ul style="list-style-type: none"> • How can I prepare myself to follow my career choice? • Why are successful job-seeking skills required in a competitive marketplace? • How does an automotive technician convey professionalism in the workplace? • Why are job shadow experiences necessary? • How does a job shadow experience contribute to a professional portfolio? • What were your areas of improvement and challenges during the job shadow experience? 	<ul style="list-style-type: none"> • Apply job search techniques to seek out, evaluate and obtain job shadow opportunities. • Communicate with industry/potential employers through the job shadow experience. • Apply knowledge and skills from the classroom to workplace situations. • Explain how various automotive professionals work together for the common goal of customer service. • Explain the importance of professionalism and ethics in the workplace. • Comply with workplace policies and regulations. • Communicate effectively both verbally and in writing with coworkers and customers. • Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. • Analyze and resolve problems that arise in completing assigned tasks. • Update online professional portfolio and employability profile. 	Written <ul style="list-style-type: none"> • Self-Assessment • Reflection Summary: Job Shadow Experience • Online Professional Portfolio • Employability Profile Performance <ul style="list-style-type: none"> • Job Shadow Checklist • Teacher Checklist 	Career Ready Practices CRP 1,2,4,8,10,11,12 Cluster Standards TD 6 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math
Weeks 38-40 Review and Preparation for Certification and Final Examination	<ul style="list-style-type: none"> • What were the main learning goals for this past year in automotive technology? 	<ul style="list-style-type: none"> • Review knowledge and skills from the program in preparation for ASE Certification, Final Examination and NOCTI Assessment. • Complete the written and performance assessments demonstrating a thorough knowledge of automotive technology. 	Written <ul style="list-style-type: none"> • Self-Assessment • ASE Certification Exams • NOCTI Written Assessment Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Certification Exams • NOCTI Performance Assessment 	Career Ready Practices CRP 1,2,4,8,11 Cluster Standards TD 1,2,4,5,6 Pathway Standards TD-MTN 1,2	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,5,6,7 WHST 2,4,7 Math

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT 400: Automotive Technology 400



Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills. As an Automotive Service Excellence (ASE) program certified by the National Automotive Technicians Education Foundation (NATEF), students gain knowledge and skills through a combination of theoretical study and hands-on lab work, including brake systems, engine performance diagnosis, suspension and steering, electronic control systems, and on-board computerized engine control systems diagnosis on automobiles and light trucks. This program is the first step in preparing an individual for a career in the technical repair field. Over the course of the program, students will work on skills to help them obtain their New York State Inspection License post-graduation. They will also be provided with internship experiences to apply and improve their knowledge and skills. Students can earn a Career and Technical Endorsement on their diplomas by successfully passing a written and performance-based assessment. Students also have the opportunity to participate in the industry-standard ASE NATEF technical assessments for Maintenance and Light Repair (MLR), as well as optional NATEF assessments for additional certifications.

Course Description

This course is the last in the four-year Automotive Technology pathway. Students will explore Automotive Engine Performance theory, diagnosis, and repair and participate in job internships and career preparation. Classroom and shop activities simulate automotive service industry operations through the use of training aids and shop vehicles. Students will be assessed using the NOCTI Written and Performance Assessments and will have the opportunity to test for NYS Inspection licensure and ASE certification in Automotive Engine Performance. Completion of the course will prepare students for continuing education and careers in the field of Automotive Technology.

Pre-Requisites

AUT 100: Automotive Technology 100
AUT 200: Automotive Technology 200
AUT 300: Automotive Technology 300

Course Objectives

Upon successful completion of this course, students will

1. Use automotive measurements and calculations.
2. Use automotive service information
3. Develop and improve skills working on automotive engine performance, diagnosis, and repair.
4. Apply knowledge and skills in a work-based job internship.
5. Prepare for ASE certification in Automotive Engine Performance.
6. Prepare for NYS Inspection certification.

Integrated Academics

1 CTE Integrated English Credit

Equipment and Supplies

- **School will provide:** Required and up to date automotive shop equipment and supplies.
- **Student will provide:** Leather work boots or shoes (steel/composite toe preferred), and long work pants with no holes that cover the top of the shoe or boot

Textbook

Duffy, James E. *Modern Automotive Technology, 8th Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2014.

Grading

- 40% Daily Grade (punctuality, preparedness, willingness to learn, and behavior)
- 10% Quizzes
- 10% Tests
- 40% Quality of Work

Additional Course Policies

N/A

Course Calendar

Quarter	Units of Study
1	<ul style="list-style-type: none">• Class Expectations• Careers and Certification• Safety Review• OSHA Training• Engine Performance
2	<ul style="list-style-type: none">• Engine Performance (Continued)
3	<ul style="list-style-type: none">• Engine Performance (Continued)• Engine Performance: Heating and Air Conditioning
4	<ul style="list-style-type: none">• Internships• Review of All Automotive Systems: Maintenance and Repair• Certification and Final Examinations

NOTE: This curriculum is aligned to the 2017 NATEF MLR (Maintenance and Light Repair) Task List as indicated by the Priority Task designation:

- P-1 – 95% of the items from the MLR Task List are taught in the curriculum.
- P-2 – 80% of the items from the MLR Task List are taught in the curriculum.
- P-3 – 50% of the items from the MLR Task List are taught in the curriculum.

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
AUT 400: Automotive Technology 400



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-2 Class Expectations Careers and Certification	<ul style="list-style-type: none"> What are the expectations for the automotive technology classroom and shop? What career paths within the automotive technology field? What are the steps to finding an automotive technology-related job? Why are successful job-seeking skills required in a competitive marketplace? How does an automotive technician convey professionalism in the workplace? 	<ul style="list-style-type: none"> Explain the rules for general classroom and shop safety. Explain and follow classroom procedures. Compare the requirements and process for obtaining ASE Certification with individual progress toward that goal. Review the components of a successful job application process. Prepare a professional cover letter, and resume in preparation for job applications or post-secondary training. Update an online professional portfolio with a cover letter and resume. Demonstrate professionalism and ethics in the workplace. Complete an employability profile. Describe advantages and disadvantages of small business ownership and employment. Identify and address the needs of all customers, providing helpful, courteous, and knowledgeable service and advice as needed. 	Written <ul style="list-style-type: none"> Quiz on Class Expectations Automotive Technology Career Research Project and Presentation with Rubric Online Professional Portfolio Employability Profile Performance <ul style="list-style-type: none"> Teacher Observation Class Expectations Checklist 	Career Ready Practices CRP 1,2,4,7,8,10,11 Cluster Standards TD 1,6 Pathway Standards TD-MTN 1	ELA 11-12R 11-12W 11-12SL 11-12L Literacy RST 1,2,4,7 WHST 2,4,5,6,7 Math
Week 3-4 Safety Review OSHA Training	<ul style="list-style-type: none"> Why is safety important in the auto industry? What do I need to know to keep myself and others safe in the shop? What is personal protective equipment (PPE)? Why should technicians follow OSHA guidelines when performing service on an automobile? What is an SDS and what information does it contain? What are Right-to-Know regulations? 	<ul style="list-style-type: none"> Review and follow general shop safety rules and procedures. Utilize safe procedures for handling of tools and equipment. Use proper placement of floor jacks and jack stands. Use proper procedures for safe lift operation. Utilize proper ventilation procedures for working within the lab/shop area. Identify and follow marked safety areas. Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. Explain the use of eye wash stations. Identify posted evacuation routes. Use required personal protective equipment (PPE) including safety glasses, ear protection, gloves, and shoes during shop activities. Identify and wear appropriate clothing for shop activities. Secure hair and jewelry for shop activities. Demonstrate awareness of the safety aspects of high voltage circuits (e.g., high intensity discharge 	Written <ul style="list-style-type: none"> Review Assignment on PPE, OSHA, Right-to-Know Quizzes Self-Assessment ASE Task Sheets OSHA 10-Hour Module Assessments Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,3,4,5,8,11,12 Cluster Standards TD 4,5 Pathway Standards TD-MTN 1,2	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7 WHST 2,4,6 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		(HID) lamps, ignition systems and injection systems). <ul style="list-style-type: none"> • Explain the role of OSHA in shop safety. • Demonstrate use of safety data sheets (SDS). • Practice safe use, storage, and disposal of chemicals. • Summarize Right-to-Know regulations including hazardous materials and blood-borne pathogens. • Follow safety rules for hand and power tools. • Complete OSHA 10-Hour General Industry training. 			
Weeks 5-25 Engine Performance	<ul style="list-style-type: none"> • Why is it important to have an engine operating at peak performance? • How do I use technical manuals to understand vehicle systems? • How are engine components diagnosed and repaired or replaced? • Why are the lubrication and cooling systems so important? • Why is proper air/fuel important to a vehicle's performance? • What is being done to improve emissions for our future? 	<ul style="list-style-type: none"> • Describe the various ways in which engines can be classified. • Explain the advantages and disadvantages of inline and V-type engine designs. • Explain what takes place during each stroke of the four-stroke cycle. • Define important engine measurements and performance characteristics, including bore and stroke, displacement, compression ratio, engine efficiency, torque, and horsepower. • Explain the basics of diesel, stratified, and Miller-cycle engine operation. • Explain how to evaluate the condition of an engine. • List and describe nine abnormal engine noises. • Describe the purpose of the major engine performance controls. • Describe open/closed loop, the Malfunction Indicator Lamp (MIL) and On-Board Diagnostics (OBD). • Describe the use of monitored systems in OBD to diagnose problems. • Describe warm up cycle and trip counter in OBD. • Explain engine misfire and determine the causes. • Describe Adaptive Strategy, Adaptive Memory, and OBD monitors. • Diagnose OBD faults. • Identify the parts of an ignition system. • Perform a visual inspection of ignition system components, primary wiring, and secondary wiring to locate obvious trouble areas. • Test the components of the primary and secondary ignition circuits using test equipment such as a voltmeter, ohmmeter, and test light. • Determine cause of ignition system failure. • Perform a no-start diagnosis and determine the cause of the condition. • Diagnose engine misfiring on electronic ignition (EI) equipped engines. • Explain the difference in point of injection in throttle body or port injection systems. • Describe the difference between a sequential fuel 	Written <ul style="list-style-type: none"> • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets Performance <ul style="list-style-type: none"> • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math 7.RP.2 A-REI.2 A-CED.4 5.NF.1 5.NF.2 N-Q.1 N-Q.3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<p>injection (SFI) system and a multiport fuel injection (MFI) system.</p> <ul style="list-style-type: none"> • Explain the design and function of major electronic fuel injection (EFI) components. • Describe the inputs used by the computer to control the idle air control and idle air control by-pass air motors. • Explain how the computer supplies the correct air-fuel ratio. • Explain why the manifold vacuum is connected to the pressure regulator in an MFI system. • Describe the operation of the pressure regulator in a return-less EFI system. • Describe the operation of direct gasoline injection systems and the operation of the injection systems used in light- and medium-duty diesel engines. • Test and diagnose switch-type input sensors, variable resistance-type input sensors, and generating-type input sensors. • Test and diagnose output devices (actuators). • Perform active tests of actuators using scan tool. • Diagnose emission related Diagnostic Trouble Codes (DTCs). • Describe five types of exhaust gasses. • Describe Positive Crankcase Ventilation (PCV) operation. • Explain Evaporative Emission Control System (EVAP) diagnosis. • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 • Perform engine absolute manifold pressure tests (vacuum/boost); document results. P-2 • Perform cylinder power balance test; document results. P-2 • Perform cylinder cranking and running compression tests; document results. P-2 • Perform cylinder leakage test; document results. P-2 • Verify engine operating temperature. P-1 • Remove and replace spark plugs; inspect secondary ignition components for wear and damage. P-1 • Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable. P-1 • Describe the use of the OBD monitors for repair verification. P-1 • Replace fuel filter(s) where applicable. P-2 • Inspect, service, or replace air filters, filter housings, and intake duct work. P-1 			

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		<ul style="list-style-type: none"> Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. P-1 Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action. P-1 Check and refill diesel exhaust fluid (DEF). P-2 Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action. P-2 			
Weeks 26-30 Engine Performance: Heating and Air Conditioning	<ul style="list-style-type: none"> Why is it important to have an engine operating at peak performance? How do I use technical manuals to understand vehicle systems? How are engine components diagnosed and repaired or replaced? Why are the lubrication and cooling systems so important? Why is proper air/fuel important to a vehicle's performance? What is being done to improve emissions for our future? 	<ul style="list-style-type: none"> Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. P-1 Identify heating, ventilation, and air conditioning (HVAC) components and configuration. P-1 Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action. P-1 Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. P-2 Inspect A/C condenser for airflow restrictions; determine necessary action. P-1 Inspect engine cooling and heater systems hoses and pipes; determine necessary action. P-1 Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action. P-1 Identify the source of A/C system odors. P-2 	Written <ul style="list-style-type: none"> Assignment on Technical Vocabulary and Industry Acronyms Quizzes Self-Assessment ASE Task Sheets Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,11,12 Cluster Standards TD 2,5 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math 7.EE.3
Weeks 31-38 Internships Review of All Automotive Systems: Maintenance and Repair	<ul style="list-style-type: none"> How can I prepare myself to follow my career choice? Why are successful job-seeking skills required in a competitive marketplace? How does an automotive technician convey professionalism in the workplace? Why are internships necessary? How does an internship experience contribute to a professional portfolio? What were your areas of improvement and challenges during the internship experience? What were the main learning goals for this past 	<ul style="list-style-type: none"> Apply job search techniques to seek out, evaluate and obtain internship opportunities. Communicate with industry/potential employers through the internship experience. Apply knowledge and skills from the classroom to workplace situations. Explain how various automotive professionals work together for the common goal of customer service. Explain the importance of professionalism and ethics in the workplace. Comply with workplace policies and regulations. Communicate effectively both verbally and in writing with coworkers and customers. Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. Analyze and resolve problems that arise in completing assigned tasks. Update online professional portfolio and employability profile. 	Written <ul style="list-style-type: none"> Self-Assessment Reflection Summary: Internship Experience Online Professional Portfolio Employability Profile ASE Task Sheets Performance <ul style="list-style-type: none"> Internship Checklist Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Task Sheets 	Career Ready Practices CRP 1,2,4,8,10,11,12 Cluster Standards TD 6 Pathway Standards TD-MTN 1	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 Literacy RST 1,2,4,7,8,9 WHST 2,4,6,7 Math

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	year in automotive technology	<ul style="list-style-type: none"> Review knowledge and skills from the program in preparation for ASE Certification, Final Examination and NOCTI Assessment. 			
Weeks 38-40 Certification and Final Examinations	<ul style="list-style-type: none"> What were the main learning goals for this past year in automotive technology? 	<ul style="list-style-type: none"> Complete the written and performance assessments demonstrating a thorough knowledge of automotive technology. 	Written <ul style="list-style-type: none"> Self-Assessment ASE Certification Exams NOCTI Written Assessment Performance <ul style="list-style-type: none"> Safety Checklist Procedure Checklist Teacher Observation Teacher Checklist ASE Certification Exams NOCTI Performance Assessment 	Career Ready Practices CRP 1,2,4,8,11	ELA 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6
				Cluster Standards TD 1,2,4,5,6	Literacy RST 1,2,4,5,6,7 WHST 2,4,7
				Pathway Standards TD-MTN 1,2	Math