Syracuse City School District
Career and Technical Education Program
Automotive Technology Pathway
Summary Overview

Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills aligned with the standards and priorities set by the ASE (Automotive Service Excellence) Education Foundation. Students will 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 assessments. Students also have the opportunity to participate in the industry-standard ASE technical assessments for Maintenance and Light Repair (MLR), as well as optional ASE assessments for additional certifications.

Level	Quarter	Units of Study
1 9th Grade	**1**	• Introduction and Class Expectations • Careers and Certification • Automotive Shop Safety • Automotive Tools and Equipment • Work-Based Learning: Career Coaching
	2	• Automotive Mathematics and Measurement • Introduction to Automotive Systems • Service Information and Service Orders • Work-Based Learning: Career Coaching, Field Trip
	3	• Fasteners, Gaskets, Seals, and Sealants • Vehicle Maintenance and Fluid Service • Work-Based Learning: Career Coaching
	4	• Tires, Wheels, and Bearings • Work-Based Learning: Career Coaching, Field Trip • ASE Certification and Final Assessments

**2
10th Grade**
	1	• Class Expectations
		• Careers and Certification
		• Safety Review
		• Review of Tires, Wheels, and Bearings
		• Review of Engines and Engine Components
		• Brakes
		  ○ Basic Braking Systems
		  ○ Hydraulic System
		  ○ Drum Brakes
		• Work-Based Learning: Career Coaching

	2	• Brakes
		  ○ Disc Brakes
		  ○ Power Assist Units
		  ○ Related Systems – Wheel Bearings, Parking Brakes, Electrical
		  ○ Electronic Brakes and Traction and Stability Control Systems
		• Work-Based Learning: Career Coaching, Field Trip

	3	• Steering and Suspension
		  ○ Basic Steering and Suspension Systems
		  ○ Steering Systems
		• Work-Based Learning: Career Coaching

	4	• Steering and Suspension
		  ○ Suspension Systems
		  ○ Wheel Alignment
		• Work-Based Learning: Career Coaching, Field Trip
		• ASE Certification and Final Assessments

Level	Quarter	Units of Study
3 11th Grade	**1**	• Class Expectations • Careers and Certification • Safety Review • OSHA Training • Review of Steering and Suspension Systems • Introduction to Diesel Engines • Drive Train and Axle Technology • Work-Based Learning: Career Coaching

	2	• Review of Automotive Mathematics and Measurement
		• Electrical Energy and Mathematics Fundamentals
		• Electrical
		  ○ Basic Electrical Systems
		  ○ Battery Service
		• Work-Based Learning: Career Coaching, Field Trip

	3	• Electrical
		  ○ Starting System
		  ○ Charging System
		• Work-Based Learning: Career Coaching

	4	• Electrical: Lighting, Instrument Cluster, Driver Information, and Body Electrical Systems • Work-Based Learning: Career Coaching, Field Trip • ASE Certification and Final Assessments
4 12th Grade	**1**	• Class Expectations • Careers and Certification • Safety Review • OSHA Training • Review of Automotive Electrical Systems • Work-Based Learning: Career Coaching • Engine Performance
	2	• Engine Performance (Continued) • Work-Based Learning: Career Coaching, Job Shadow
	3	• Engine Performance (Continued) • Engine Performance: Heating and Air Conditioning • Work-Based Learning: Career Coaching
	4	• Work-Based Learning: Career Coaching, Internship • Review of All Automotive Systems: Maintenance and Repair • ASE Certification and Final Assessments

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT100: Automotive Technology 100

Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills aligned with the standards and priorities set by the ASE (Automotive Service Excellence) Education Foundation. Students will 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 assessments. Students also have the opportunity to participate in the industry-standard ASE technical assessments for Maintenance and Light Repair (MLR), as well as optional ASE 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 AUT200: Automotive Technology 200.

Work-Based Learning

Students will be connected with automotive technology professionals in the community through Career Coaching, and field trips which could lead to further opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their work-based learning experiences throughout the program to document the development of their skills.

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. Review requirements and prepare for ASE Entry Level(A0) 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

Johanson, Chris. *Modern Automotive Technology Shop Manual, Ninth Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2016.

VanGelder, Kirk. *Fundamentals of Automotive Technology, Second Edition*. Burlington, MA: CDX Automotive, Jones and Bartlett Learning, 2018. Online.

Grading

30% Employability Skills Assessment (punctuality, preparedness, participation, and behavior)
30% Assignments and Quizzes
30% Lab Work and Effort
10% Tests and Exams

Additional Course Policies

- Be on time and meet all deadlines. Being on time and meeting deadlines are a major part of being a professional.
- Produce your best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing your own and others' work, as well as diligently working on your own projects.
- Seek help when needed.
- Be attentive, ask questions if you do not understand something, and offer your opinions.

Course Calendar

Quarter	Units of Study
1	• Introduction and Class Expectations • Careers and Certification • Automotive Shop Safety • Automotive Tools and Equipment • Work-Based Learning: Career Coaching
2	• Automotive Mathematics and Measurement • Introduction to Automotive Systems • Service Information and Service Orders • Work-Based Learning: Career Coaching, Field Trip
3	• Fasteners, Gaskets, Seals, and Sealants • Vehicle Maintenance and Fluid Service • Work-Based Learning: Career Coaching
4	• Tires, Wheels, and Bearings • Work-Based Learning: Career Coaching, Field Trip • ASE Certification and Final Assessments

NOTE: This curriculum is aligned to the 2022 ASE 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
AUT100: 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**	• 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?	• 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 with a resume. • 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** • Quiz on Class Expectations • Assignment on Careers in Automotive Technology • Self-Assessment of Skills and Abilities • Career Interest Inventory • Automotive Technology Career Research Project and Presentation with Rubric • Professional Portfolio with Resume **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,5,6,7 **Math**
Weeks 4-7 **Automotive Shop Safety**	• 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	• 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** • Assignment on PPE • Quizzes • Self-Assessment • S/P2 (Safety and Pollution Prevention) Exams • Professional Portfolio • 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** 9-10RST 1,2,4,7 9-10WHST 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
	when performing service on an automobile? • What is a SDS and what information does it contain? • What are Right-to-Know regulations?	• 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.	• Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		
Weeks 8-10 **Automotive Tools and Equipment** **Work-Based Learning: Career Coaching**	• 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? • What can be learned from automotive professionals?	• 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. • Participate in Career Coaching process.	**Written** • Review Assignments on Technical Vocabulary and Industry Acronyms • Research Project and Presentation on Power Tool and Equipment Safety • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Professional Portfolio **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,5,6,7 **Math**
Weeks 11-12			**Written**	**Career Ready Practices** CRP 1,2,4,8,11	**ELA** 9-10R 1,2,4

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
Automotive Mathematics and Measurement	• How is mathematics used in the automotive industry? • 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?	• Identify the practical applications of math in auto repair and maintenance. • 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.	• Assignments on Mathematical Operations and Measurement • Quizzes • Self-Assessment • Professional Portfolio **Performance** • Measurement Task: English and Metric Measurement • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist		9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6
				Cluster Standards TD 2	**Literacy** 9-10RST 1,2,4 9-10WHST 2,4
				Pathway Standards TD-MTN 1	**Math**
Weeks 13-18 **Introduction to Automotive Systems**	• How do automotive systems work together to keep a car functioning well? • How do different engines components work? • How does a four-stroke engine operate? • 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?	• 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 step-by-step the four strokes of an engine. • 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, 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.	**Written** • 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 • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation	**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** 9-10RST 1,2,4, 9-10WHST 2,4,5,6,7
				Pathway Standards TD-MTN 1	**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
	• 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 cooling system? • 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?	• Describe and compare major automobile design variations. • 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.	• Teacher Checklist • ASE Task Sheets		
Weeks 19-20 **Service Information and Service Orders** **Work-Based Learning: Career Coaching, Field Trip**	• 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? • What can be learned from automotive professionals?	• 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.	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Service Manual Scavenger Hunt • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Field Trip Reflection • Professional Portfolio **Performance**	**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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **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
		• Demonstrate use of the three C's (concern, cause, and correction). • 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. • Participate in Career Coaching process. • Participate in Field Trip to local automotive business.	• Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		
Weeks 21-24 **Fasteners, Gaskets, Seals, and Sealants**	• 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?	• 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. • 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.	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Bolt Information Diagram • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets	**Career Ready Practices** CRP 1,2,4,7,8,11 **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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **Math**
Weeks 25-32 **Vehicle Maintenance and Fluid Service** **Work-Based Learning: Career Coaching**	• 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?	• 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 such as fluid type, internal combustion engine operation, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). P-1 • Describe six general inspection points that should be checked during vehicle maintenance.	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Chart of Fluid Types • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist	**Career Ready Practices** CRP 1,2,3,4,5,7,8,11,12 **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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **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
	• What can be learned from automotive professionals?	• List and explain the use of five different lubricants. • Describe the differences between the fluids required for preventive maintenance and how to select the correct one for a particular vehicle. • 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 • Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle equipped with a dipstick. P-1 • Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle not equipped with a dipstick. P-3 • Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. P-1 • Identify lubrication and cooling system component and configurations. P-1 • Inspect engine assembly for fuel, oil, coolant, and other leaks. 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, heater core and galley plugs. P-1 • Inspect and test coolant; drain and recover coolant; flush and/or refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1 • Inspect, replace, and/or 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-2 • Inspect for power steering fluid leakage. P-2 • List four automotive items that should be recycled. • Demonstrate safe practices while working with vehicle fluids. • Participate in Career Coaching Process.	• ASE Task Sheets		
Weeks 33-37 **Tires, Wheels, and Bearings**	• How do tires and wheels affect the operation of a vehicle?	• 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** • Assignments on Technical Vocabulary	**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
Work-Based Learning: Career Coaching, Field Trip	• How can tire wear patterns indicate tire problems? • 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? • What can be learned from automotive professionals?	• Explain types and sizes of tires. • Describe tire ratings and designations. • Describe different types of wheels. • Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, 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 (with/without TPMS); balance wheel and tire assembly. P-1 • Inspect tire and wheel assembly for air loss; determine needed action. P-1 • Repair tire following vehicle manufacturer approved procedure. P-1 • Identify indirect and direct TPMS; calibrate/relearn system; verify operation of instrument panel lamps. P-1 • Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS). P-1 • Perform Road Force balance/match mounting. P-3 • Participate in Career Coaching Process. • Participate in Field Trip to local automotive business.	and Industry Acronyms • Tire Specifications Diagram • Tire Research Project and Presentation • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Field Trip Reflection • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets	**Cluster Standards** TD 2,5 **Pathway Standards** TD-MTN 1	**Literacy** 9-10RST 1,2,4,7 9-10WHST 2,4,5,6,7 **Math**
Weeks 38-40 **ASE Certification and Final Assessments**	• What were the main learning goals for this past year in automotive technology?	• Review knowledge and skills from the year in preparation for ASE Entry Level Certification (A0) and Final Examination. • Complete the written and performance final assessments demonstrating a thorough knowledge of automotive technology.	**Written** • Review Assignments on Technical Vocabulary and Industry Acronyms • Review Quizzes • Self-Assessment • ASE Entry Level Certification (A0) Exam • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Entry Level Certification (A0) Exam	**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** 9-10RST 1,2,4,5,6,7 9-10WHST 2,4,7 **Math**

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT200: Automotive Technology 200

Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills aligned with the standards and priorities set by the ASE (Automotive Service Excellence) Education Foundation. Students will 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 assessments. Students also have the opportunity to participate in the industry-standard ASE technical assessments for Maintenance and Light Repair (MLR), as well as optional ASE assessments for additional certifications.

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 AUT300: Automotive Technology 300.

Work-Based Learning

Students will be connected with automotive technology professionals in the community through Career Coaching, and field trips which could lead to further opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their work-based learning experiences throughout the program to document the development of their skills.

Pre-Requisites

AUT100: 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. Review requirements and prepare for ASE Suspension and Steering (A4) and ASE Brake (A5) 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

Johanson, Chris. *Modern Automotive Technology Shop Manual, Ninth Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2016.

VanGelder, Kirk. *Fundamentals of Automotive Technology, Second Edition*. Burlington, MA: CDX Automotive, Jones and Bartlett Learning, 2018. Online.

Grading

30% Employability Skills Assessment (punctuality, preparedness, participation, and behavior)
30% Assignments and Quizzes
30% Lab Work and Effort
10% Tests and Exams

Additional Course Policies

- Be on time and meet all deadlines. Being on time and meeting deadlines are a major part of being a professional.
- Produce your best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing your own and others' work, as well as diligently working on your own projects.
- Seek help when needed.
- Be attentive, ask questions if you do not understand something, and offer your opinions.

Course Calendar

Quarter	Units of Study

1	• Class Expectations
	• Careers and Certification
	• Safety Review
	• Review of Tires, Wheels, and Bearings
	• Review of Engines and Engine Components
	• Brakes
	  ○ Basic Braking Systems
	  ○ Hydraulic System
	  ○ Drum Brakes
	• Work-Based Learning: Career Coaching

2	• Brakes
	  ○ Disc Brakes
	  ○ Power Assist Units
	  ○ Related Systems – Wheel Bearings, Parking Brakes, Electrical
	  ○ Electronic Brakes and Traction and Stability Control Systems
	• Work-Based Learning: Career Coaching, Field Trip

3	• Steering and Suspension
	  ○ Basic Steering and Suspension Systems
	  ○ Steering Systems
	• Work-Based Learning: Career Coaching

4	• Steering and Suspension
	  ○ Suspension Systems
	  ○ Wheel Alignment
	• Work-Based Learning: Career Coaching, Field Trip
	• ASE Certification and Final Assessments

NOTE: This curriculum is aligned to the 2022 ASE 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
AUT200: 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
Week 1 **Class Expectations** **Careers and Certification**	• 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?	• 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** • Quiz on Class Expectations • Automotive Technology Career Research Project and Presentation with Rubric • Online Portfolio • Employability Profile **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,5,6,7 **Math**
Week 2 **Safety Review**	• 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?	• 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).	**Written** • Review Assignment on PPE, OSHA, Right-to-Know • Quizzes • Self-Assessment • S/P2 (Safety and Pollution Prevention) Exams • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 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
		• 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.			
Week 3 **Review of Tires, Wheels, and Bearings**	• How do tires and wheels affect the operation of a vehicle? • How can tire wear patterns indicate tire problems? • 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?	• 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. • Explain types and sizes of tires. • Describe tire ratings and designations. • Describe different types of wheels. • Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, 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 (with/without TPMS); balance wheel and tire assembly. P-1 • Inspect tire and wheel assembly for air loss; determine needed action. P-1 • Repair tire following vehicle manufacturer approved procedure. P-1 • Identify indirect and direct TPMS; calibrate/relearn system; verify operation of instrument panel lamps. P-1 • Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS). P-1 • Perform Road Force balance/match mounting. P-3	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Tire Specifications Diagram • Tire Research Project and Presentation • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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 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** 9-10RST 1,2,4,7 9-10WHST 2,4,5,6,7 **Math**
Week 4 **Review of Engines and Engine Components**	• How do different engines components work? • How does a four-stroke engine operate? • How does the engine provide power for propulsion and electrical systems? • How does the fuel system provide the	• Identify basic engine components. • Explain how basic engine components relate to each other. • Explain the four strokes of an engine. • Identify and describe primary parts and assemblies within the engine, fuel system, electrical system, and drive train systems. • Explain how the engine provides power for both propulsion and electrical systems.	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Engine System Identification Diagram • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance**	**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** 9-10RST 1,2,4, 9-10WHST 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
	correct mixture of air and fuel to the engine? • What is the connection between the drive train systems, the engine, and the drive wheels? • What is the function of the cooling system? • Why is the lubrication system important?	• Explain how the fuel system provides the correct mixture of air and fuel for efficient and complete combustion. • 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 drive train systems transfer turning force from the engine crankshaft and/or the motor-generator to the drive wheels.	• Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		
Week 5 **Brakes: Basic Braking Systems**	• 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?	• 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 configurations. 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	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7 **Math**
Weeks 6-7 **Brakes: Hydraulic System**	• 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?	• Describe the components of a hydraulic brake system and their operation, including brake lines and hoses, master cylinders, system control valves, and safety switches. • Demonstrate understanding of hydraulic principals (Pascal's law). P-1 • Describe proper brake pedal height, travel, and feel. P-1 • Check master cylinder for proper operation. P-1 • Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and 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 replace fluid in the brake system. P-1 • Test brake fluid for contamination. P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7 **Math**
Weeks 8-11 **Brakes: Drum Brakes**	• How do advancements on today's vehicles enhance driver safety?	• Identify the major components of a typical drum brake and describe their functions.	**Written**	**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

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
Work-Based Learning: Career Coaching	• 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? • What can be learned from automotive professionals?	• 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-2 • Refinish brake drum and measure final drum diameter; compare with specification. P-3 • 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-3 • Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. 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-3 • Participate in Career Coaching process.	• Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		9-10L 1,2,3,6
				Cluster Standards TD 2,5	**Literacy** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7
				Pathway Standards TD-MTN 1	**Math**
Weeks 11-14 **Brakes: Disc Brakes**	• 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?	• 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 and wear. P-1 • Inspect caliper mounting and slides/pins for proper operation, wear, and damage. P-1 • Remove, inspect, and/or replace brake pads and retaining hardware. P-1 • Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads against rotor; inspect for leaks. P-1 • Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout. P-1 • Remove and reinstall/replace rotor. P-1 • Refinish rotor on vehicle; measure final rotor thickness and compare with specification. P-3 • Refinish rotor off vehicle; measure final rotor thickness and compare with specification. P-3 • Retract and re-adjust caliper piston on an integrated parking brake system. P-2 • Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation. P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7
				Pathway Standards TD-MTN 1	**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
Weeks 15-16 **Brakes: Power Assist Units**	• 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?	• 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/hydraulic/electric). P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7 **Math**
Weeks 17-18 **Brakes: Related Systems – Wheel Bearings, Parking Brakes, Electrical**	• 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?	• Remove, clean, inspect, repack/replace, and install wheel bearings; remove and install bearing races; replace seals; install hub and adjust bearings. P-3 • 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 (including electric parking brakes); check parking brake indicator light system operation. P-2 • Check operation of brake stop light system. P-1 • Replace wheel bearing and race. P-2 • Inspect and replace wheel studs. P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 2,4,5,6,7 **Math**
Weeks 19-20 **Brakes: Electronic Brakes and Traction and Stability Control Systems** **Work-Based Learning: Career Coaching, Field Trip**	• 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? • What can be learned from automotive professionals?	• 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 electronic brake control system components and describe function (ABS, TCS, ESC). P-2 • Describe the operation of the major components of automatic traction and stability control systems. • Describe the operation of a regenerative braking system. P-3 • Participate in Career Coaching process. • Participate in Field Trip to local automotive business.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • PBL Project on Brakes • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Field Trip Reflection • Professional Portfolio **Performance** • 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** 9-10RST 1,2,4,7,8 9-10WHST 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
Weeks 21-22 **Steering and Suspension: Basic Steering and Suspension Systems**	• What are the components of suspension and steering systems? • How do suspension and steering systems affect drivability and safety?	• Identify suspension and steering system components and configurations. P-1 • Locate and interpret vehicle and major component identification numbers. • Describe the function of electronically controlled suspension and steering control systems and components, (i.e. active suspension, and stability control). P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **Math**
Weeks 23-27 **Steering and Suspension: Steering Systems** **Work-Based Learning: Career Coaching**	• 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? • What can be learned from automotive professionals?	• 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 such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). P-1 • Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed. P-1 • Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. P-2 • 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 tie rod ends (sockets) and bellows boots. P-1 • Drain and replace power steering system fluid; use proper fluid type per manufacturer specification. P-2 • Remove, inspect, replace, and/or adjust power steering pump drive belt. P-1 • Inspect and replace power steering hoses and fittings. P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Professional Portfolio **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **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
		• Inspect, remove, and/or replace power steering hoses and fittings. P-2 • Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper. P-2 • Inspect electric power steering system. P-2 • Inspect tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion). P-2 • Participate in Career Coaching process.			
Weeks 28-33 **Steering and Suspension: Suspension Systems**	• 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?	• 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 upper and/or lower control arms, bushings, and shafts. P-2 • Inspect and replace rebound/jounce bumpers. P-3 • Inspect track bar, strut rods/radius arms, and related mounts and bushings. P-2 • Inspect upper and/or lower ball joints (with or without wear indicators). P-2 • Inspect suspension system coil springs and spring insulators. P-2 • Inspect torsion bars and mounts. P-3 • Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. P-2 • Inspect, remove, and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount. P-2 • Inspect components of suspension systems (Coil, Leaf, and Torsion). P-1 • Inspect components of electronically controlled suspension systems. P-2 • Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. P-2 • Inspect front and rear wheel bearings. P-1	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets **Performance** • 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** 9-10RST 1,2,4,7 9-10WHST 2,4,7 **Math**
Weeks 34-37		• Explain the benefits of accurate wheel alignment.	**Written**	**Career Ready Practices** CRP 1,2,4,8,11,12	**ELA** 9-10R 1,2,4,5

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
Steering and Suspension: Wheel Alignment **Work-Based Learning: Career Coaching, Field Trip**	• How do wheel alignments affect drivability and tire performance? • How do tires and wheels affect the operation of a vehicle?	• 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 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; measure vehicle ride height. P-2 • Describe four-wheel alignment angles (camber, caster, and toe) and effects on vehicle handling/tire wear. P-1 • Perform an alignment. • Identify and explain steering sensor calibration requirements needed after an alignment. • Participate in Career Coaching process. • Participate in Field Trip to local automotive business.	• Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Field Trip Reflection • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		9-10W 2,4,5 9-10SL 1,2,6 9-10L 1,2,3,6
				Cluster Standards TD 2,5	**Literacy** 9-10RST 1,2,4,7 9-10WHST 2,4,7
				Pathway Standards TD-MTN 1	**Math**
Weeks 39-40 **ASE Certification and Final Assessments**	• What were the main learning goals for this past year in automotive technology?	• Review knowledge and skills from the year in preparation for ASE Suspension and Steering (A4) and ASE Brake (A5) Certifications and Final Examination. • Complete the written and performance final assessments demonstrating a thorough knowledge of automotive technology.	**Written** • Review Assignments on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Suspension and Steering (A4) and ASE Brake (A5) Certifications **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Certification Exams	**Career Ready Practices** CRP 1,2,4,6,7,11	**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 1,2,4,5,6	**Literacy** 9-10RST 1,2,4,5,6,7 9-10WHST 2,4,7
				Pathway Standards TD-MTN 1,2	**Math**

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT300: Automotive Technology 300

Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills aligned with the standards and priorities set by the ASE (Automotive Service Excellence) Education Foundation. Students will 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 assessments. Students also have the opportunity to participate in the industry-standard ASE technical assessments for Maintenance and Light Repair (MLR), as well as optional ASE 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 work-based learning opportunities. Students will be assessed through the Precision Exam: Automotive Service Fundamentals and will have an opportunity to take the tests for ASE Automatic Transmission/Transaxle (A2), ASE Manual Transmission (A3) and ASE Electrical/Electronic Systems (A6) Certifications. 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 AUT400: Automotive Technology 400.

Work-Based Learning

Students will be connected with automotive technology professionals in the community through Career Coaching, and field trips which could lead to further opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their work-based learning experiences throughout the program to document the development of their skills.

Pre-Requisites

AUT100: Automotive Technology 100
AUT200: 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 experience.
7. Review requirements and prepare for ASE Automatic Transmission/Transaxle (A2), ASE Manual Transmission (A3) and ASE Electrical/Electronic Systems (A6) Certifications.
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

Johanson, Chris. *Modern Automotive Technology Shop Manual, Ninth Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2016.

VanGelder, Kirk. *Fundamentals of Automotive Technology, Second Edition*. Burlington, MA: CDX Automotive, Jones and Bartlett Learning, 2018. Online.

Grading

30% Employability Skills Assessment (punctuality, preparedness, participation, and behavior)
30% Assignments and Quizzes
30% Lab Work and Effort
10% Tests and Exams

Additional Course Policies

- Be on time and meet all deadlines. Being on time and meeting deadlines are a major part of being a professional.
- Produce your best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing your own and others' work, as well as diligently working on your own projects.
- Seek help when needed.
- Be attentive, ask questions if you do not understand something, and offer your opinions.

Course Calendar

Quarter	Units of Study
1	• Class Expectations • Careers and Certification • Safety Review • OSHA Training • Review of Steering and Suspension Systems • Introduction to Diesel Engines • Drive Train and Axle Technology • Work-Based Learning: Career Coaching

2	• Review of Automotive Mathematics and Measurement
	• Electrical Energy and Mathematics Fundamentals
	• Electrical
	  ○ Basic Electrical Systems
	  ○ Battery Service
	• Work-Based Learning: Career Coaching, Field Trip

3	• Electrical
	  ○ Starting System
	  ○ Charging System
	• Work-Based Learning: Career Coaching

4	• Electrical: Lighting, Instrument Cluster, Driver Information, and Body Electrical Systems • Work-Based Learning: Career Coaching, Field Trip • ASE Certification and Final Assessments

NOTE: This curriculum is aligned to the 2022 ASE 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
AUT300: 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
Week 1 **Class Expectations** **Careers and Certification**	• 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?	• 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 professional portfolio with a cover letter and resume. • Demonstrate professionalism and ethics in the workplace. • Complete an employability profile.	**Written** • Quiz on Class Expectations • Automotive Technology Career Research Project and Presentation with Rubric • Professional Portfolio • Employability Profile **Performance** • 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** 11-12RST 1,2,4,7 11-12WHST 2,4,5,6,7 **Math**
Week 2 **Safety Review** **OSHA Training**	• 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?	• 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).	**Written** • Review Assignment on PPE, OSHA, Right-to-Know • Quizzes • Self-Assessment • ASE Task Sheets • OSHA 10-Hour Module Assessments • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7 11-12WHST 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
		• 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.			
Week 3 **Review of Steering and Suspension Systems**	• What are the components of suspension and steering systems? • How do suspension and steering systems affect drivability and safety? • How are steering and suspension system components diagnosed and repaired or replaced? • How do wheel alignments affect drivability and tire performance? • How do tires and wheels affect the operation of a vehicle?	• 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-2 • Describe and demonstrate common repair or replacement of steering and suspension system components. • Perform pre-alignment inspection and measure vehicle ride height. P-2 • Perform an alignment.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • Professional Portfolio **Performance** • 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 1,2,4,5 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,4,7 **Math**
Weeks 4-5 **Introduction to Diesel Engines**	• What are the basic diesel engine components? • What are the key differences between gasoline and diesel engines? • How do basic diesel engine components relate to each other? • What are the four strokes of a diesel engine? • Why are diesel engines used in commercial vehicles? • How does the ignition process occur in a diesel engine?	• Identify basic diesel engine components. • Identify the key differences between gasoline and diesel engines. • Explain how basic diesel engine components relate to each other. • Explain the four strokes of a diesel engine. • Explain why diesel engines are used in commercial vehicles. • Explain how the ignition process occurs in a diesel engine.	**Written** • Assignments on Technical Vocabulary and Industry Acronyms • Diesel Engine System Identification Diagram • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • 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 1,2,4,5 11-12W 2,4,5,6,7 11-12SL 1,2,4,5,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4, 11-12WHST 2,4,5,6,7 **Math**
Weeks 6-10 **Drive Train and Axle Technology** **Work-Based Learning: Career Coaching**	• 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?	• Identify automatic transmission and transaxle components and configurations. P-1 • Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). P-1	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment	**Career Ready Practices** CRP 1,2,4,8,11,12 **Cluster Standards** TD 2,5 **Pathway Standards**	**ELA** 11-12R 1,2,4,7 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4,7,8,9 11-12WHST 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
	• 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? • What can be learned from automotive professionals?	• Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed. P-1 • Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle equipped with a dipstick. P-1 • Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle not equipped with a dipstick. P-3 • Identify the components of front- and rear-wheel-drive axles describe their operation. • Explain the difference between CV joints and universal joints. • Explain the difference between the transfer, open, and limited slip differentials. • 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. • Demonstrate knowledge of transmission/transaxle gear reduction/multiplication operation using driving, driven, and held member (power flow) principles. P-3 • Demonstrate knowledge of hydraulic principles (Pascal's Law) in a transmission/transaxle. P-3 • Inspect external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. P-2 • Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. P-1 • Demonstrate understanding of relearn procedures. P-2 • Inspect, replace and/or align power train mounts. P-3 • Describe the operational characteristics of a continuously variable transmission (CVT). P-3 • Describe the operational characteristics of a hybrid vehicle drive train. P-2 • Identify manual drive train and axle components and configurations. P-1 • Check fluid condition; check for leaks. P-2 • Drain and refill manual transmission/transaxle; use proper fluid type per manufacturer specification. P-1 • Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification. P-3	• Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets	TD-MTN 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
		• Describe the operational characteristics of an electronically controlled manual transmission/transaxle. P-2 • Inspect and/or remove/replace bearings, hubs, and seals. P-2 • Inspect and/or service/replace shafts, yokes, boots, and universal/CV joints. P-2 • Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. P-2 • Inspect differential housing; check for leaks; inspect housing vent. P-1 • Check and adjust differential housing fluid level; use proper fluid type per manufacturer specification. P-1 • Drain and refill differential housing; using proper fluid type per manufacturer specification. P-1 • Inspect and replace drive axle wheel studs. P-2 • Identify concerns related to variations in tire circumference and/or final drive ratios. P-3 • Participate in Career Coaching process.			
Weeks 11-12 **Review of Automotive Mathematics and Measurement** **Electrical Energy and Mathematics Fundamentals**	• How is mathematics used in the automotive industry? • What are the English and metric systems of measurement? • What are the relationships between various English and metric system units of measurement? • What common tools are used for measurement in the automotive industry? • How is electricity measured? • What is Ohm's Law? • What is Watt's Law? • What is the difference between direct and alternating current? • What is a series circuit? • What is a parallel circuit?	• Identify the practical applications of math in auto repair and maintenance. • 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 and metric systems of measuring length weight, and volume. • Describe the relationships between various English and metric system units of measurement. • Demonstrate problem-solving techniques for various English and metric system measuring problems. • Demonstrate measuring techniques using common English and metric system measuring tools. • Define basic electrical terms for measuring electricity including ampere, volt, ohm, watt, joule and kilowatt-hour. • Apply mathematical formulas used regularly in the electrical industry including Ohm's Law and Watt's Law (basic power formula). • Explain the difference between direct current and alternating current. • Describe the makeup of series and parallel electrical circuits.	**Written** • Assignments on Mathematical Operations and Measurement • Quizzes • Self-Assessment • Professional Portfolio **Performance** • Measurement Task: English and Metric Measurement • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist	**Career Ready Practices** CRP 1,2,4,8,11 **Cluster Standards** TD 2 **Pathway Standards** TD-MTN 1	**ELA** 11-12R 1,2,4 11-12W 2,4,5 11-12SL 1,2,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4 11-12WHST 2,4 **Math**
Weeks 13-15 **Electrical:**	• What impact does the electrical system have on	• Research vehicle service information such as fluid type, vehicle service history, service precautions,	**Written**	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,2,4,7 11-12W 2,4,5,6,7

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
Basic Electrical Systems	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?	technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). P-1 • Identify electrical/electronic system components and configurations. P-1 • Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed. P-1 • Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). P-1 • Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1 • Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-1 • Describe types of test lights; use appropriate test light to check operation of electrical circuits per service information. P-2 • Use fused jumper wires to check operation of electrical circuits per service information. P-2 • Use wiring diagrams to trace electrical/electronic circuits. P-1 • Measure key-off battery drain (parasitic draw). P-2 • Inspect and test fusible links, circuit breakers, and fuses. P-1 • Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair). P-2	• Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets	 **Cluster Standards** TD 2,5 **Pathway Standards** TD-MTN 1	11-12SL 1,2,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 16-19 **Electrical: Battery Service** **Work-Based Learning: Career Coaching, Field Trip**	• 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	• Identify different types of batteries used in cars and trucks. • Perform battery state-of-charge test; determine needed action. P-1 • Confirm proper battery capacity, size, type, and application for vehicle; perform battery capacity and load test. P-1 • Maintain or restore electronic memory functions as recommended by manufacturer. P-2 • Inspect and clean battery; fill battery cells (if applicable); check battery cables, connectors, clamps, and hold-downs. P-1 • Perform battery charging according to manufacturer's recommendations. P-1 • Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. P-1	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • FieldTrip Reflection • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation	**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** 11-12RST 1,2,4,7,8,9 11-12WHST 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
	automotive electrical systems? • What can be learned from automotive professionals?	• Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery. P-2 • Participate in Career Coaching process. • Participate in Field Trip with local automotive business.	• Teacher Checklist • ASE Task Sheets		
Weeks 20-24 **Electrical: Starting System**	• 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?	• Perform starter current draw test. P-1 • Perform starter circuit voltage drop tests. P-1 • Inspect and test starter relays and solenoids. P-2 • Remove and install starter in a vehicle. P-3 • Inspect and test switches, connectors, and wires of starter control circuits. P-2 • Demonstrate knowledge of an automatic idle-stop/start-stop system. P-2	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 25-30 **Electrical: Charging System** **Work-Based Learning: Career Coaching**	• 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? • What can be learned from automotive professionals?	• 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. P-1 • Inspect, adjust, and/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-3 • Perform charging circuit voltage drop tests. P-2 • Participate in Career Coaching process.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets • Career Coaching Self-Assessment • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 31-34			**Written**	**Career Ready Practices**	**ELA**

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
Electrical: Lighting, Instrument Cluster, Driver Information, And Body Electrical Systems	• 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?	• 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 • Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators as required. P-1 • Demonstrate understanding of vehicle comfort, convenience, access, safety, and related systems operation. P-3 • Remove and reinstall door panel. P-2 • Describe the operation of keyless entry/remote-start systems. P-3 • Describe disabling and enabling procedures for supplemental restraint system (SRS); verify indicator lamp operation. P-2 • Verify windshield wiper and washer operation; replace wiper blades. P-1	• Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets	CRP 1,2,4,7,8,11,12 **Cluster Standards** TD 2,5 **Pathway Standards** TD-MTN 1	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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 35-37 **Work-Based Learning: Career Coaching, Field Trip**	• What can be learned from automotive professionals? • How can experiences and opportunities be valuable in preparing for a career? • Why are successful job-seeking skills required in a competitive marketplace? • How does an automotive technician convey professionalism in the workplace?	• Participate in Career Coaching process. • Apply job search techniques to seek out and evaluate possible job shadow and internship opportunities for the following year • Communicate with industry/potential employers. • Explain how various automotive professionals work together for the common goal of customer service. • 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. • Update professional portfolio and employability profile.	**Written** • Self-Assessment • Career Coaching Self-Assessment • Field Trip Reflection • Professional Portfolio • Employability Profile **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 38-40 **ASE Certification and Final Assessments**	• What were the main learning goals for this past year in automotive technology?	• Review knowledge and skills from the program in preparation for ASE Automatic Transmission/Transaxle (A2), ASE Manual Transmission (A3) and ASE Electrical/Electronic Systems (A6) Certifications • Review knowledge and skills from the program in preparation for Precision Exam: Automotive Service Fundamentals. • Review knowledge and skills from the program in preparation for Final Examination. • Complete the written and performance final assessments demonstrating a thorough knowledge of automotive technology.	**Written** • Self-Assessment • ASE Automatic Transmission/ Transaxle (A2), ASE Manual Transmission (A3) and ASE Electrical/ Electronic Systems (A6) Certification Exams • Precision Exam: Automotive Service Fundamentals • Final Examination **Performance**	**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** 11-12RST 1,2,4,5,6,7 11-12WHST 2,4,7 **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
			• Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Automatic Transmission/ Transaxle (A2), ASE Manual Transmission (A3) and ASE Electrical/ Electronic Systems (A6) Certification Exams • Precision Exam: Automotive Service Fundamentals • Final Examination		

Syracuse City School District
Career and Technical Education Program
Course Syllabus
AUT400: Automotive Technology 400

Program Overview

Automotive Technology is a four-year pathway designed to provide students with basic mechanical knowledge and skills aligned with the standards and priorities set by the ASE (Automotive Service Excellence) Education Foundation. Students will 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 assessments. Students also have the opportunity to participate in the industry-standard ASE technical assessments for Maintenance and Light Repair (MLR), as well as optional ASE 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 through the Precision Exam: Automotive Service Fundamentals and will have an opportunity to take the tests for ASE Engine Repair (A1), ASE Heating and Air Conditioning (A7) and ASE Engine Performance (A8) Certifications. Students who successfully complete the course will also be eligible to test for NYS Inspection licensure. Completion of the course will prepare students for continuing education and careers in the field of Automotive Technology.

Work-Based Learning

Students will be connected with automotive technology professionals in the community through Career Coaching, job shadowing, and internships which could lead to further opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their work-based learning experiences throughout the program to document the development of their skills.

Pre-Requisites

AUT100: Automotive Technology 100
AUT200: Automotive Technology 200
AUT300: 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. Review requirements and prepare for ASE Engine Repair (A1), ASE Heating and Air Conditioning (A7) and ASE Engine Performance (A8) Certifications.
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

Johanson, Chris. *Modern Automotive Technology Shop Manual, Ninth Edition*. Tinley Park, IL: Goodheart-Willcox Co. Inc., 2016.
VanGelder, Kirk. *Fundamentals of Automotive Technology, Second Edition*. Burlington, MA: CDX Automotive, Jones and Bartlett Learning, 2018. Online.

Grading

30% Employability Skills Assessment (punctuality, preparedness, participation, and behavior)
30% Assignments and Quizzes
30% Lab Work and Effort
10% Tests and Exams

Additional Course Policies

- Be on time and meet all deadlines. Being on time and meeting deadlines are a major part of being a professional.
- Produce your best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing your own and others' work, as well as diligently working on your own projects.
- Seek help when needed.
- Be attentive, ask questions if you do not understand something, and offer your opinions.

Course Calendar

Quarter	Units of Study
1	• Class Expectations • Careers and Certification • Safety Review • OSHA Training • Review of Automotive Electrical Systems • Work-Based Learning: Career Coaching • Engine Performance
2	• Engine Performance (Continued) • Work-Based Learning: Career Coaching, Job Shadow
3	• Engine Performance (Continued) • Engine Performance: Heating and Air Conditioning • Work-Based Learning: Career Coaching
4	• Work-Based Learning: Career Coaching, Internship • Review of All Automotive Systems: Maintenance and Repair • ASE Certification and Final Assessments

NOTE: This curriculum is aligned to the 2022 ASE 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
AUT400: 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
Week 1 **Class Expectations** **Careers and Certification**	• 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?	• 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 professional portfolio with 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** • Quiz on Class Expectations • Automotive Technology Career Research Project and Presentation with Rubric • Professional Portfolio • Employability Profile **Performance** • 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 11-12SL 1,2,6 11-12L 1,2,3,6 **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,4,5,6,7 **Math**
Week 2-3 **Safety Review** **OSHA Training**	• 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?	• 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** • Review Assignment on PPE, OSHA, Right-to-Know • Quizzes • Self-Assessment • ASE Task Sheets • OSHA 10-Hour Module Assessments • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7 11-12WHST 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). • 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 4-7 **Review of Automotive Electrical Systems** **Work-Based Learning: Career Coaching**	• What impact does the electrical system have on other systems of the automobile? • How are electrical systems diagnosed and repaired or replaced? • Why is it important to understand the role of computer software in automotive electrical systems? • What can be learned from automotive professionals?	• Identify electrical/electronic system components and configurations. P-1 • Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). P-1 • Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1 • Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-1 • Describe types of test lights; use appropriate test light to check operation of electrical circuits per service information. P-2 • Use fused jumper wires to check operation of electrical circuits per service information. P-2 • Use wiring diagrams to trace electrical/electronic circuits. P-1 • Measure key-off battery drain (parasitic draw). P-2 • Inspect and test fusible links, circuit breakers, and fuses. P-1 • Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair). P-2 • Participate in Career Coaching process.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Project on Electrical Theory • Quizzes • Career Coaching Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 8-25 **Engine Performance and Repair** **Work-Based Learning: Career Coaching, Job Shadow**	• 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?	• 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 how to evaluate the condition of an engine. • List and describe nine abnormal engine noises.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Career Coaching Self-Assessment • Job Shadow Reflection • ASE Task Sheets • Professional Portfolio **Performance** • Safety Checklist	**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** 11-12RST 1,2,4,7,8,9 11-12WHST 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
	• Why is proper air/fuel important to a vehicle's performance? • What is being done to improve emissions for our future? • What can be learned from automotive professionals?	• 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. • 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 injection (SFI) system and a multiport fuel injection (MFI) system. • 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).	• Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Task Sheets		

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
		• Describe five types of exhaust gasses. • Describe Positive Crankcase Ventilation (PCV) operation. • Explain Evaporative Emission Control System (EVAP) diagnosis. • Demonstrate understanding of proper engine cooling system operation. P-1 • Demonstrate understanding of camshaft timing including engines equipped with variable valve timing (VVT) systems. P-1 • Identify computerized control system components and configurations. P-1 • Identify ignition system components and configurations. P-1 • Remove and replace spark plugs; inspect secondary ignition components for wear and damage. P-2 • Identify fuel, air induction, and exhaust system components and configurations. P-1 • Replace fuel filter(s) where applicable. P-2 • Inspect, service, or replace air filters, filter housings, and intake duct work. P-1 • Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields. P-1 • Inspect condition of exhaust system hangers, brackets, clamps, and heat shields. P-1 • Check and refill diesel exhaust fluid (DEF). P-3 • Identify emission control system components and configurations. P-1 • Inspect, test, and service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses. P-2 • Inspect engine assembly for fuel, oil, coolant, and other leaks. P-1 • Install engine covers using gaskets, seals, and sealers as required. P-2 • Demonstrate understanding of the procedure for verifying engine mechanical timing. P-2 • Inspect engine mounts. P-2 • Identify service precautions related to service of the internal combustion engine of a hybrid electric vehicle. P-2 • Identify cylinder head and valve train components and configurations. P-1 • Identify engine block assembly components and configurations. P-1 • Identify causes of engine overheating P-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
		• Identify type of water pumps (belt driven, chain driven, and electric). P-3 • Participate in Career Coaching process. • Participate in Job Shadow with local automotive business.			
Weeks 26-30 **Engine Performance: Heating and Air Conditioning** **Work-Based Learning: Career Coaching**	• 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? • What can be learned from automotive professionals?	• Research vehicle service information, including refrigerant/oil/fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). P-1 • Identify heating, ventilation, and air conditioning (HVAC) components and configurations. P-1 • Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed. P-1 • Identify steps of an A/C performance test. P-2 • Identify abnormal operating noises in the A/C system. P-3 • Visually inspect A/C system for signs of leaks. P-1 • Identify and interpret heating and air conditioning problems. P-1 • Inspect and/or replace A/C compressor drive belts, pulleys, and tensioners. P-1 • Inspect for proper A/C condenser airflow. P-2 • Inspect evaporator housing condensation drain. P-1 • Inspect engine cooling and heater systems hoses and pipes. P-1 • Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets. P-1 • Identify the source of HVAC system odors. P-2 • Demonstrate awareness of the need to recover, recycle, and handle refrigerants using proper equipment and procedures. P-1 • Participate in Career Coaching process.	**Written** • Assignment on Technical Vocabulary and Industry Acronyms • Quizzes • Career Coaching Self-Assessment • ASE Task Sheets • Professional Portfolio **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 2,4,6,7 **Math**
Weeks 31-37 **Work-Based Learning: Career Coaching, Internship** **Review of All Automotive Systems: Maintenance and Repair**	• How can experiences and opportunities be valuable in preparing for a career? • 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?	• 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.	**Written** • Self-Assessment • Reflection Summary: Internship Experience • Professional Portfolio • Employability Profile • ASE Task Sheets **Performance** • 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** 11-12RST 1,2,4,7,8,9 11-12WHST 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
	• How does an internship experience contribute to a professional portfolio? • What were the areas of improvement and challenges during the internship experience?	• 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 professional portfolio and employability profile. • Review knowledge and skills from the program in preparation for ASE Certification, Precision Exam: Automotive Service Fundamentals, and Final Examination.			
Weeks 38-40 **ASE Certification and Final Assessments**	• What were the main learning goals for this past year in automotive technology?	• Review knowledge and skills from the program in preparation for ASE Engine Repair (A1), ASE Heating and Air Conditioning (A7) and ASE Engine Performance (A8) Certification Exams. • Review knowledge and skills from the program in preparation for Precision Exam: Automotive Service Fundamentals. • Review knowledge and skills from the program in preparation for Final Examination. • Complete the written and performance final assessments demonstrating a thorough knowledge of automotive technology.	**Written** • Self-Assessment • Professional Portfolio • ASE Engine Repair (A1), ASE Heating and Air Conditioning (A7) and ASE Engine Performance (A8) Certification Exams • Precision Exam: Automotive Service Fundamentals • Final Examination **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • ASE Engine Repair (A1), ASE Heating and Air Conditioning (A7) and ASE Engine Performance (A8) Certification Exams • Precision Exam: Automotive Service Fundamentals • Final Examination	**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** 11-12RST 1,2,4,5,6,7 11-12WHST 2,4,7 **Math**