



Scope and Sequence Curriculum Outline

Career Program: Diesel Technology II

DOE Code: 5624

Career Cluster: Transportation

Recommended Grade Levels: 12

Prerequisites: Diesel Technology I

High School Credits: 3 per semester (6 total per school year)

Additional Information: Counts as a Directed Elective or Elective for the General, Core 40, Academic Honors and Technical Honors diplomas

Program Description: Diesel Technology II expands on the classroom and laboratory experiences from Diesel Technology I and focuses on all phases of diagnostic techniques and repair of diesel electrical systems used to power tractor trailers, electrical generators, construction and farm machinery, and similar equipment. Utilization of analog and digital meters, wiring diagrams, and other diagnostic tools are stressed as students are introduced to automotive electrical theory, batteries, charging systems, starting systems, wiring repairs, lighting systems, and accessories. Upon completion of this program, students are prepared for entry-level employment in the diesel technology industry. Students may also continue their education in 2 and 4-year degree programs at the postsecondary level.

Alignment: Indiana Department of Education Academic Standards Course Framework, NATEF (National Automotive Technicians Education Foundation) program accreditation standards, ASE (National Institute for Automotive Service Excellence) student certification, Vincennes University (dual credit agreement), and *Diesel Technology* (Goodheart-Willcox) textbook materials.

Companion Documents: WCC Diesel Technology II Program Syllabus; WCC High School Pathway Plan; WCC Program Description Guide

Curriculum Content Summary:

- Workplace Competency
- Career Development
- Engines

Content	Indiana DOE Standards	Knowledge & Skills <i>(based on ASE/NATEF)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Workplace Competency</p> <p>Core Standard I Students demonstrate employability skills to prepare for diesel service careers or additional training opportunities</p>	<p>DSTII-1.1 Allocate the appropriate resources for task completion</p> <p>DSTII-1.2 Demonstrate effective interpersonal skills</p> <p>DSTII-1.3 Develop leadership skills</p> <p>DSTII-1.4 Establish positive relationships with people from diverse backgrounds</p> <p>DSTII-1.5 Research, analyze, and use data for work assignments</p> <p>DSTII-1.6 Apply effective critical thinking, decision making, and problem-solving techniques</p> <p>DSTII-1.7 Implement quality assurance measures and safeguards</p> <p>DSTII-1.8 Read and interpret written materials</p> <p>DSTII-1.9 Apply written communication skills</p> <p>DSTII-1.10 Demonstrate effective listening and speaking skills</p> <p>DSTII-1.11 Perform appropriate mathematical calculations correctly</p> <p>DSTII-1.12 Exhibit a responsible work ethic</p> <p>DSTII-1.13 Demonstrate accepted standards for ethical behavior</p>	<ul style="list-style-type: none"> • Reports to work daily on time; able to take directions and is motivated to accomplish tasks • Demonstrates honesty, integrity and reliability • Contributes to the success of the team, assists others and requests help when needed • Works well with all customers and coworkers • Negotiates solutions to interpersonal and workplace conflicts • Contributes ideas and initiative • Communicates (written and verbal) effectively with customers and coworkers • Reads and interprets workplace documents; writes clearly and concisely • Analyzes and resolves problems that arise in completing assigned tasks • Organizes and implements a productive work plan • Uses scientific, technical, engineering and mathematics principles and reasoning to accomplish assigned tasks • Identifies and addresses the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed • Utilize safe procedures for handling of tools and equipment • 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 • Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities • Identify and wear appropriate clothing for lab/shop activities • Locate and demonstrate knowledge of safety data sheets (MSDS) • Demonstrate proper cleaning, storage, and maintenance of tools and equipment • Identify information needed and the service requested on a repair order • Review vehicle service history • Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction 	<ul style="list-style-type: none"> • Work in a live shop environment on a daily basis • Teamwork to diagnose and perform repair equipment • Team leadership to diagnose and repair equipment • Research service procedures in AllData and Mitchell Truck Pro Series databases • Tool and equipment demonstrations • Parts identification • Complete work Orders/Job Sheets • Safety lessons and demonstrations • SkillsUSA membership • Skill competitions • Student Ambassadors • NTHS 	<p>2 weeks to introduce</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • Chapter tests • Participation/Lab performance • Work Ethic Certification • Essential Skills Evaluation • Technical Skills Evaluation • Classroom work • Weekly participation

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<p>DOMAIN Career Development</p> <p>Core Standard 2 Students construct personal goals to structure successful paths recognized by business and industry</p>	<p>DSTII-2.1 Evaluate employment and career pathway opportunities related to established career interest(s)</p> <p>DSTII-2.2 Create a continuing education plan that identifies further education and training options</p> <p>DSTII-2.3 Prepare for exams leading to certifications recognized by business and industry</p> <p>DSTII-2.4 Develop skills needed to enter the workforce</p> <p>DSTII-2.5 Evaluate resources that keep workers current in the career field</p> <p>DSTII-2.6 Demonstrate skills and attitudes needed for lifelong learning</p> <p>DSTII-2.7 Apply effective money management strategies</p>	<ul style="list-style-type: none"> • Creates a resume for entry level work • Completes mock interviews with industry representatives • Prepares for certification exams • Demonstrates skills needed for employment and lifelong learning 	<ul style="list-style-type: none"> • Resumes • Co-op opportunities for some students • Field trips to Caterpillar and Cummins • Company speakers • Postsecondary speakers • SkillsUSA membership • Skill competitions • Student Ambassadors • NTHS 	<p>2 weeks to introduce</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • ASE certifications • Cummins certifications • Participation/Lab performance • Work Ethic Certification • Essential Skills Evaluation • Technical Skills Evaluation • Weekly participation • Classroom work

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<p>DOMAIN Engines</p> <p>Core Standard 3 Students analyze all components of Diesel electrical systems to determine corrective actions needed for diagnosis and repair</p>	<p>DSTII-3.1 Demonstrate an understanding of personal and shop safety practices</p> <p>DSTII-3.2 Identify various types of fasteners and their grades</p> <p>DSTII-3.3 Take both standard and metric measurements with various types of measuring devices</p> <p>DSTII-3.4 Explain how a modern Diesel battery works</p> <p>DSTII-3.5 Explain how a modern starting motor works</p> <p>DSTII-3.6 Demonstrate an understanding of how a modern charging system works</p> <p>DSTII-3.7 Demonstrate an understanding of how a modern lighting system works</p> <p>DSTII-3.8 Utilize modern automotive testing equipment</p> <p>DSTII-3.9 Diagnose common electrical problems in a modern vehicle</p> <p>DSTII-3.10 Interpret a modern wiring diagram</p> <p>DSTII-3.11 Diagnose and repair electrical and electronic fuel systems</p> <p>DSTII-3.12 Diagnose and repair electrical and electronic components of the lubrication systems</p> <p>DSTII-3.13 Analyze and repair electrical and electronic components of the heating/cooling system</p> <p>DSTII-3.14 Assess and repair electrical and electronic components of the intake and exhaust Systems</p> <p>DSTII-3.15 Diagnose electrical and electronic components that effect engine performance</p> <p>DSTII-3.16 Inspect and repair electrical and electronic components of the pneumatic/hydraulic braking systems</p> <p>DSTII-3.17 Organize, research, and implement a complete preventive maintenance and inspection (P.M.I.)</p>	<ul style="list-style-type: none"> • Listen to and verify operator's concern, review past maintenance documents, and record condition on appropriate document • Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm • Inspect vibration damper • Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment • Check engine oil level and condition; check dipstick seal • Inspect engine mounts for looseness and deterioration • Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running) • Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing • Check fuel tanks, mountings, lines, caps, and vents • Drain water from fuel system • Service water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system • Check exhaust system mountings for looseness and damage • Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped • Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks • Inspect turbocharger for leaks; check mountings and connections • Service or replace air filter as needed; check and reset air filter restriction indicator • Inspect and service crankcase ventilation system • Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter • Check operation of fan clutch • Inspect radiator (including air flow restriction, leaks, and damage) and mountings • Inspect fan assembly and shroud • Pressure test cooling system and radiator cap • Inspect coolant hoses and clamps • Inspect coolant recovery system. 	<ul style="list-style-type: none"> • Engine component demonstrations • Parts identification • Training engine tear down and reassembly • Component measurement and testing, such as crankshafts, connecting rods, and pistons • Valve adjustment procedures • Cylinder head torque procedures • Piston installation • Engine performance testing and diagnosis • Electronic diagnosis using computerized diagnostic equipment • Trainer truck lab work • Customer diagnosis and repair work 	<p>32 weeks to introduce</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • ASE certifications • Cummins certifications • Participation/Lab performance • Chapter tests • Lab based performance tests • Technical Skills Evaluation • Weekly participation • Classroom work • Dual credit

		<ul style="list-style-type: none"> • Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point) • Service coolant filter • Inspect water pump • Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs • Take an engine oil sample for analysis • Inspect key condition and operation of ignition switch • Check warning indicators • Check instruments; record oil pressure and system voltage • Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems) • Inspect battery box(es), cover(s), and mountings • Inspect battery hold-downs, connections, cables, and cable routing; service as needed • Check/record battery state-of-charge (open circuit voltage) and condition • Perform battery test (load and/or capacitance) • Inspect starter, mounting, and connections • Engage starter; check for unusual noises, starter drag, and starting difficulty • Inspect alternator, mountings, cable, wiring, and wiring routing; determine needed action • Perform alternator output tests 			
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