Diesel Technology
Supplemental Program Resources

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Introduction

This document provides supplemental information for the Diesel Technology program of study. It may be updated or revised as the base program of study, or complementary programs, are updated, added, or removed. Please contact the appropriate Education Programs Professional with any questions.

The Program of Study includes the approved courses, complementary courses, alignment(s) to industry, postsecondary options, and additional information.

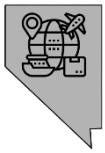
The Equipment List for the Diesel Technology program of study is included and, if applicable, additional items used only in the complementary course(s) are noted.

The Crosswalks and Alignments connect and support the Diesel Technology standards for the Transportation, Distribution and Logistics program of study. Complementary course standards are not listed in the crosswalks and alignments.

Program of Study Information

The following program of study information sheet as well as the program structure tables for the courses are provided to be able to print separately for handouts. The information provided is based on the best available information at the time of this document and will be updated as appropriate.

Diesel Technology



The Diesel Technology program provides students with fundamental diesel systems theory, service, and repair. It will introduce the operational and scientific nature of diesel systems. It will provide students with a basic knowledge of diesel systems and operating principles. Areas of study include engines, steering and suspension, preventative maintenance, hydraulics, electrical systems, and braking systems.

Transportation, Distribution, and Logistics Career Cluster

Transportation, Distribution, and Logistics® is focused on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.

Postsecondary Options

Associate Degrees

- Automotive Technology: Heavy-Line Specialist, CA (CSN)
- Diesel Heavy Equipment Master Technician, AAS (CSN)
- Transportation Technologies, Diesel Technician, AAS (TMCC)
- Diesel Technology, AAS (GBC)

NEVADA Department of Education

Learning that works for America CTE®

For additional information on this cluster, please contact:
cteinfo@doe.nv.gov

Website: https://doe.nv.gov/offices/craleo/cte

Required Courses

Diesel Technology I
Diesel Technology II
Diesel Technology II Lab

Complementary Courses

Diesel Technology Advanced Studies
Diesel Applied Concepts
CTE Work Experience – Transportation, Distribution, and Logistics
Industry-Recognized Credential – Diesel Technology

Work-Based Learning Opportunities

Job Shadowing / Internship / CTE Work Experience/ School-based Enterprise/ Apprenticeship Ready Programs

Career and Technical Student Organization

SkillsUSA

SkillsUSA NEVADA

State Recognized Industry Certifications

Refer to the Governor's Office of Workforce Innovation's Nevada Industry Recognized Credential List

Aligned to Industry

Occupation	Median Wage Per year	Annual Openings	% Growth
Diesel Service Technicians and Mechanics	$48,690	28,500	4.0%
Automotive Service Technicians and Mechanics	$47,270	73,300	1.0%
Heavy Vehicle and Mobile Equipment Service Technician	$53,770	259,900	8.0%
Material Moving Machine Operators	$38,380	105,700	7.0%
Industrial Machinery Mechanics, Machinery Maintenance Workers, and Millwrights	$59,380	53,200	14.0$
Heavy and Tractor -Trailer Truck Drivers	$48,310	259.900	4.0%

Source U.S. Bureau of Labor Statistics 2022

Program Structure for Diesel Technology

The core course sequencing is provided in the following table. Complementary Courses are available and provided later in this document. The following courses provide a completed program of study. The Lab is a complementary course available concurrently with the Diesel Technology II course.

Core Course Sequence (R) with Lab Course(s) (C)

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
R	Diesel Technology I	DIESEL TECH I	47.0605	20	107	G	1.00	12	20107G1.0012
R	Diesel Technology II	DIESEL TECH II	47.0605	20	107	G	1.00	22	20107G1.0022
C	Diesel Technology II LAB	DIESEL TECH II L	47.0605	20	107	E	1.00	22	20107E1.0022

The complementary courses are provided in the following table. **The qualifying program of study must be completed prior to enrolling in the complementary course(s)**. A program does not have to utilize the complementary courses for students to complete their program of study.

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
C	Diesel Technology Advanced Studies	DIESEL TECH AS	47.0605	20	107	E	1.00	11	20107E1.0011
C	Diesel Applied Concepts	DIESEL CONCEPTS	47.0605	20	107	E	1.00	11	20107E1.0011
C	Industry Recognized Credential - Diesel Technology	IRC DIESEL TECH	47.0605	20	999	E	1.00	11	20999E1.0011
C	CTE Work Experience - Transportation, Distribution, and Logistics	WORK EXPER TRANS	99.0016	20	998	G	1.00	11	20998G1.0011

CIP Code – Classification of Instructional Programs (CIP) Codes

SCED – School Courses for the Exchange of Data that populates the State Infinite Campus System and the System for Accountability Information in Nevada (SAIN)

Course Descriptions

Diesel Technology I

Prerequisite: None

This course provides students with fundamental diesel systems theory, service, and repair. It will introduce the operational and scientific nature of diesel systems. It will provide students with a basic knowledge of diesel systems such as fuel systems, air induction, exhaust and engine break cooling systems and lubrication requirements and procedures. It also includes fundamental concepts of drivetrains, general electrical systems and fundamentals of tires, wheels, steering, and suspension. The students will study the technological nature of diesel-powered equipment. The proper and safe use of tools and precision test equipment will be emphasized throughout the course.

Diesel Technology II

Prerequisite: Diesel Technology I

This course is a continuation of Diesel Technology I. This course is designed to provide intermediate students with knowledge of diesel systems operating principles and the applications of diesel power. Areas of study may include diesel engine repair such as cylinder head and valve train service evaluation and repair, fundamental concepts of hydraulics and hydraulic systems, general electronic systems hydraulic brake system, wheel bearing service and repair and steering systems. In addition, preventative maintenance inspection and service concepts will be practiced. Practical application of safe work habits and the correct use of tools, shop equipment, and precision test instruments will be emphasized throughout the course. The appropriate use of technology and industry-standard equipment is an integral part of this course.

Diesel Technology II LAB

Prerequisite: Concurrent enrollment in Diesel Technology II

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth lab experience that applies the processes, concepts, and principles as described in the classroom instruction. The coursework will encourage students to explore and develop advanced skills in their program area. The appropriate use of technology and industry-standard equipment is an integral part of this course.

Diesel Technology Advanced Studies

Prerequisite: Completion of Diesel Technology Program of Study

This course is offered to students who have completed all content standards in the Diesel Technology program of study and desire to pursue advanced study through investigation and in-depth research. Students are expected to work independently or in a team and consult with their supervising teacher for guidance. The supervising teacher will give directions, monitor, and evaluate the students' topic of study. Coursework may include various work-based learning experiences such as internships and job shadowing, involvement in a school-based enterprise, completion of a capstone project, and/or portfolio development. This course may be repeated for additional instruction and credit.

Diesel Applied Concepts

Prerequisite: Completion of Diesel Technology Program of Study

This course is offered to students who have completed all content standards in the Diesel Technology program of study. This course provides diesel technology students with in-depth study and skill development as applied to diesel engines. It includes lubrication systems, cooling systems service and repair, air induction and exhaust systems, fuel supply systems, and an introduction to diesel emissions. In addition, applications in drive train repair, electric and electronic systems, brake systems and suspension, steering and chassis service, hydraulic systems, and heating, ventilation and air conditioning (HVAC) systems are developed. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course students will have received advanced level skills to move into employment or continue in postsecondary education.

Industry-Recognized Credential – Diesel Technology

Prerequisite: Completion of Diesel Technology Program of Study

This course is offered to students who have completed all content standards in the Diesel Technology program of study and desire to pursue an Industry-Recognized Credential that aligns with the standards and skills associated with the Diesel Technology Program of Study. This course is designed to expand the students' opportunities to pursue certification aligned with employment standards in the industry aligned with this program of study. The supervising teacher will provide instruction aligned with the certification requirements, monitor progress toward certification, and provide the students with appropriate testing or certification opportunities associated with the intended Industry-Recognized Credential that is the subject of the course. This course may be repeated for additional instruction and credit.

CTE Work Experience – Transportation, Distribution, and Logistics

Prerequisite: Completion of Level 2 course in the qualifying program of study

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth CTE work experience that applies the processes, concepts, and principles as described in the classroom instruction. This course will encourage students to explore and develop advanced skills through work-based learning directly related to the program of study. The course must follow NAC 389.562, 389.564, 389.566 regulations.

Equipment List

This recommended list is based upon a classroom size of 25 students. All costs are estimated and may be adjusted once verified and justified by districts with current quotes. No specific equipment vendor or brand names are endorsed due to various possibilities, but school districts should consult with stakeholders to ensure industry-recognized equipment and software are purchased. The intent of this list is to provide school districts with guidance on the equipment needed to implement the state standards for a Diesel Technology program.

CTE Classroom Equipment **Total: $1,560**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
2	Storage Cabinets (36” x 12” x 72”) (lockable)	$400	$800
1	Eyewash Station	$300	$300
2	Fire Extinguisher	$130	$260
1	Sink with Soap Dispenser	$100	$100
1	First Aid Kit	$100	$100

Program Equipment **Total: $147,845**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Computers	$1,000	$25,000
1	Teacher Computer (enhanced memory/storage, download capable)	$1,500	$1,500
1	Technology Storage/Charging System	$2,000	$2,000
2	Test Engines	$20,000	$40,000
1	Start-up Tool Kit (including all basic hand and power tools for instruction and storage)	$20,000	$20,000
1	Brake Lathe	$7.000	$7,000
1	Tire Changer	$6,400	$6,400
1	Wheel Balancer	$6,200	$6,200
1	Air System (including air compressor and air hoses, air lines, regulator and water extractors, air transformer/regulators)	$6,000	$6,000
1	Car Lift – 4 Post	$4,000	$4,000
1	Car Lift – 2 Post	$3,000	$3,000
1	Heating, Ventilation, and Air Conditioning (HVAC) Reclaimer/Recycler for R-1234 YF Refrigerant R-134 A	$2,500	$2,500
1	Pressure Washer	$2,200	$2,200
2	Scissor Lifts	$1,800	$3,600

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QTY	ITEM DESCRIPTION	UNIT	TOTAL
1	Parts Cleaner	$1,800	$1,800
1	Oil Filter Crusher	$1,700	$1,700
1	Hydraulic Jack	$1,675	$1,675
2	Gas Tungsten Arc Welders (GTAW)	$1,600	$3,200
1	Diagnostic Scan Tool	$1,500	$1,500
1	Engine Lift	$1,100	$1,100
2	Engine Stands	$1,000	$2,000
1	Starting, Charging, and Battery Storage Charger	$1,000	$1,000
1	Flammable Materials Storage Cabinet	$1,000	$1,000
1	Frame Jack – 6-ton	$900	$900
1	Clutch Aligner Set	$900	$900
1	Oxyacetylene (Oxy-Fuel) Welders/Cutting Equipment	$600	$600
1	Coolant Exchange System	$570	$570
1	Battery Charger (Absorbed Glass Mat [AGM] / Gel compatible)	$500	$500

Instructional Materials **Total: $3,900**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Textbooks Approved CTE Instructional Materials list can be found here.	$100	$2,500
1	Teacher Textbook Edition and Resources	$500	$500
1	Diagnostic Information Platform	$600	$600
1	S/P2 Safety and Pollution Prevention Training Software	$300	$300

Instructional Supplies **Total: $34,170**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
1	Universal Joint Press Set	$495	$495
2	Reverse Brake/Clutch Bleeders	$490	$980
2	Battery Load Testers	$475	$950
5	Graphing Multimeters (GMM), Oscilloscopes, or Digital Multimeters (DMM)	$450	$2,250
1	Action Camera	$450	$450
2	Camshaft Bearing Remover and Inserter Sets	$310	$620

1	Coil Spring Compressor	$300	$300
1	Automatic Charger (low amperage)	$300	$300
2	Inside Metric Micrometer sets	$250	$500
2	Transmission and Engine Oil Pressure Testers	$225	$450
1	Ball Joint Service Kit	$225	$225
2	Voltage Drop Testers	$200	$400
4	Creepers	$200	$800
2	Test Lead Kits	$125	$250
2	Crankshaft Harmonic Balancer Kits	$100	$200
4	Wheel Chocks	$50	$200
Varies	Hand Tools (various types of wrenches and pliers, chisel sets, drill motors, flashlights, hacksaws, hammers, inspection mirrors, screw drivers, punch sets, screw starters and extractors, socket sets, torque wrenches, etc.)	$8,000	$8,000
Varies	Miscellaneous Tools (caulking guns, c-clamps, files, drills for welding, gear puller sets, heat guns, oil can disposal, panel splitters, pry bar sets, putty knives, sanding tools, rivet guns, tap and die sets, tape measures, tin sips, tire pressure gauges, twist drill sets, special removing and releasing tools, axle tools, exhaust pressure kits, etc.)	$6,000	$6,000
Varies	Shop Equipment (grounded extension cords, jumper cables, heat lamps, hood props, infrared contact thermometers, oil and coolant drain pans, shop brooms, trash cans, work lights, wheel dollies, work stands, work benches, etc.)	$3,000	$3,000
Varies	Personal Protective Equipment (PPE) (gloves, glasses/goggles, face shields, hearing protection, welding PPE, seat covers, fender covers, etc.)	$1,800	$1,800
Varies	Welding Tools and Materials	$1,800	$1,800
Varies	Micrometers – Inside and Depth (metric and standard)	$1,700	$1,700
Varies	Brake Specialty Tools (brake bleeder, fluid tester, lining thickness gauges, rotor (disc) micrometer, drum brake gauge, trailer electrical cord tester, etc.)	$1,500	$1,500
Varies	Hydraulic Jack and Jack Stands (3-ton, 5-ton, 7-ton)	$1,000	$1,000

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Other **Total: $1,275**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
1	Occupational Safety and Health Administration (OSHA) Instructor Training	$300	$300
25	Occupational Safety and Health Administration (OSHA) Student Exams	$39	$975

Category Totals:

Classroom Equipment	$1,560
Program Equipment	$147,845
Instructional Materials	$3,900
Instructional Supplies	$34,170
Other	$1,275
Estimated Program Total	**$188,750**

Crosswalks and Alignments for Program of Study Standards

Crosswalks and alignments are intended to assist the teacher make connections for students between the technical skills within the program and academic standards. The crosswalks and alignments are not intended to teach the academic standards but to assist students in making meaningful connections between their CTE program of study and academic courses. The crosswalks are for the required program of study courses, not the complementary courses.

Crosswalks (Academic Standards)

The crosswalks of the Diesel Technology Standards show connections with the Nevada Academic Content Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Diesel Technology program connect with and support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the Nevada Academic Content Standards in English Language Arts, Mathematics, and Science.

Alignments (Mathematical Practices)

In addition to connections with the Nevada Academic Content Standards for Mathematics, many performance indicators support the Mathematical Practices. The following table illustrates the alignment of the Diesel Technology Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Diesel Technology program connect with and support academic learning.

Alignments (Science and Engineering Practices)

In addition to connections with the Nevada Academic Content Standards for Science, many performance indicators support the Science and Engineering Practices. The following table illustrates the alignment of the Diesel Technology Standards Performance Indicators and the Science and Engineering Practices. This alignment identifies the performance indicators in which the learning objectives in the Diesel Technology program connect with and support academic learning.

Crosswalks (Common Career Technical Core)

The crosswalks of the Diesel Technology Standards show connections with the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Diesel Technology program connect with and support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Diesel Technology Standards are crosswalked to the Transportation, Distribution, and Logistics Career Cluster™ and the Facility & Mobile Equipment Maintenance Career Pathway.

Crosswalk of Diesel Technology Program of Study Standards and the Nevada Academic Content Standards

English Language Arts: Reading Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	2.1.15
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	2.1.1, 3.1.1, 6.4.1, 7.8.1
RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.	2.1.13, 2.1.14, 2.1.15 3.1.3, 3.1.4, 6.1.2
RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	2.1.15, 3.1.3, 3.1.4
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	3.1.1, 6.4.1
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	2.1.1, 2.1.4, 2.1.7, 2.1.13 2.1.14, 3.1.1, 6.1.2, 6.4.1

English Language Arts: Speaking and Listening Standards

Nevada Academic Content Standards		Performance Indicators
SL.11-12.1d	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.	3.2.1

English Language Arts: Writing Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.	3.2.1
WHST.11-12.2d	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.	3.2.1
WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	2.1.1, 2.1.7, 2.1.13, 2.1.14 2.1.15, 3.1.1, 3.1.3, 3.1.4 3.2.1, 4.1.4, 5.15.7, 5.17.4 5.17.5, 6.1.2
WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	2.1.13, 2.1.14, 3.1.1, 6.4.1
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.	2.1.15

Alignment of Diesel Technology Standards and the Mathematical Practices

Mathematical Practices	Diesel Technology Performance Indicators
1. Make sense of problems and persevere in solving them.	
2. Reason abstractly and quantitatively.	
3. Construct viable arguments and critique the reasoning of others.	4.5.5, 5.2.7, 5.2.14, 9.1.11
4. Model with mathematics.	5.1.4, 5.2.5, 5.2.8, 6.1.3 6.2.2, 8.1.1, 12.1.4. 12.1.5
5. Use appropriate tools strategically.	4.1.4, 6.1.4. 9.1.6
6. Attend to precision.	
7. Look for and make use of structure.	
8. Look for and express regularity in repeated reasoning.	

Alignment of Diesel Technology Standards and the Science and Engineering Practices

Science and Engineering Practices	Diesel Technology Performance Indicators
1. Asking questions (for science) and defining problems (for engineering).	4.2.2, 4.5.1, 9.1.3, 9.1.7
2. Developing and using models.	
3. Planning and carrying out investigations.	
4. Analyzing and interpreting data.	6.1.3
5. Using mathematics and computational thinking.	4.1.4, 6.1.4
6. Constructing explanations (for science) and designing solutions (for engineering).	7.1.1
7. Engaging in argument from evidence.	
8. Obtaining, evaluating, and communicating information.	6.2.2, 9.1.10

Crosswalks of Diesel Technology Standards and the Common Career Technical Core

Transportation, Distribution, and Logistics Career Cluster	Performance Indicators
1. Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster™ and the role of transportation, distribution and logistics in society and the economy.	1.5.1
2. Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.	4.4.1
3. Describe the key operational activities required of successful transportation, distribution and logistics facilities.	2.2.4, 3.2.1-3.2.3, 3.2.6 4.5.4, 13.1.4, 13.3.1, 13.4.1
4. Identify governmental policies and procedures for transportation, distribution and logistics facilities.	3.1.1, 3.1.3
5. Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.	2.1.7, 2.1.8, 2.1.14, 2.1.15
6. Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.	1.4.3

Facility & Mobile Equipment Maintenance Career Pathway	Performance Indicators
1. Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.	2.1.21
2. Design ways to improve facility and equipment system performance.	