Diesel Technology Curriculum Framework

This document was prepared by:

Office of Career Readiness, Adult Learning & Education Options
Nevada Department of Education
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INTRODUCTION

The Nevada CTE Curriculum Frameworks are a resource for Nevada’s public and charter schools to design, implement, and assess their CTE programs and curriculum. The content standards identified in this document are listed as a model for the development of local district programs and curriculum. They represent rigorous and relevant expectations for student performance, knowledge, and skill attainment which have been validated by industry representatives.

The intent of this document is to provide a resource to districts as they develop and implement CTE programs and curricula.

This program ensures the following thresholds are met:

- The CTE course and course sequence teaches the knowledge and skills required by industry through applied learning methodology and, where appropriate, work-based learning experiences that prepare students for careers in high-wage, high-skill and/or high-demand fields. Regional and state economic development priorities shall play an important role in determining program approval. Some courses also provide instruction focused on personal development.
- The CTE course and course sequence includes leadership and employability skills as an integral part of the curriculum.
- The CTE course and course sequence are part of a rigorous program of study and include sufficient technical challenge to meet state and/or industry-standards.

The CTE program components include the following items:

- Program of Study
- State Skill Standards
- Employability Skills for Career Readiness Standards
- Career Technical Student Organizations (CTSO)
- Curriculum Frameworks
- CTE Assessments:
  - Workplace Readiness Skills Assessment
  - End-of-Program Technical Assessment
- Certificate of Skill Attainment
- CTE Endorsement on a High School Diploma
- CTE College Credit
NEVADA DEPARTMENT OF EDUCATION
CURRICULUM FRAMEWORK FOR
DIESEL TECHNOLOGY

PROGRAM TITLE: DIESEL TECHNOLOGY

STATE SKILL STANDARDS: DIESEL TECHNOLOGY

STANDARDS REFERENCE CODE: DT

CAREER CLUSTER: TRANSPORTATION, DISTRIBUTION & LOGISTICS

CAREER PATHWAY: FACILITY & MOBILE EQUIPMENT MAINTENANCE

PROGRAM LENGTH: 3 LEVELS (L1, L2, L3C)

PROGRAM ASSESSMENTS: DIESEL TECHNOLOGY WORKPLACE READINESS SKILLS

CTSO: SKILLSUSA

GRADE LEVEL: 9-12

AVAILABLE INDUSTRY CERTIFICATIONS/LICENSES PROVIDERS: AUTOMOTIVE SERVICE EXCELLENCE (ASE) OSHA

PROGRAM PURPOSE

The purpose of this program is to prepare students for postsecondary education and employment in the Diesel Technology industry.

The program includes the following state standards:

- Nevada CTE Skill Standards: Diesel Technology
- Employability Skills for Career Readiness
- Nevada Academic Content Standards (alignment shown in the Nevada CTE Skill Standards):
  - Science (based on the Next Generation Science Standards)
  - English Language Arts (based on the Common Core State Standards)
  - Mathematics (based on the Common Core State Standards)
- Common Career Technical Core (alignment shown in the Nevada CTE Skill Standards)

CAREER CLUSTERS

The National Career Clusters™ Framework provides a vital structure for organizing and delivering quality CTE programs through learning and comprehensive programs of study (POS). In total, there are 16 Career Clusters in the National Career Clusters™ Framework, representing more than 79 Career Pathways to help students navigate their way to greater success in college and career. As an organizing tool for curriculum design and instruction, Career Clusters™ provide the essential knowledge and skills for the 16 Career Clusters™ and their Career Pathways.*

PROGRAM OF STUDY

The program of study illustrates the sequence of academic and career and technical education coursework that is necessary for the student to successfully transition into postsecondary educational opportunities and employment in their chosen career path. (NAC 389.803)

PROGRAM STRUCTURE

The core course sequencing provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. Complete program sequences are essential for the successful delivery of all state standards in each program area.

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<thead>
<tr>
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<tr>
<td>Diesel Technology III</td>
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The core course sequencing with the complementary courses provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. A program does not have to utilize all of the complementary courses in order for their students to complete their program of study. Complete program sequences are essential for the successful delivery of all state standards in each program area.

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*Complementary Courses

STATE SKILL STANDARDS

The state skill standards are designed to clearly state what the student should know and be able to do upon completion of an advanced high school career and technical education (CTE) program. The standards are designed for the student to complete all standards through their completion of a program of study. The standards are designed to prepare the student for the end-of-program technical assessment directly aligned to the standards. (Paragraph (a) of Subsection 1 of NAC 389.800)
EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS

Employability skills, often referred to as “soft skills”, have for many years been a recognizable component of the standards and curriculum in career and technical education programs. The twenty-one standards are organized into three areas: (1) Personal Qualities and People Skills; (2) Professional Knowledge and Skills; and (3) Technology Knowledge and Skills. The standards are designed to ensure students graduate high school properly prepared with skills employers prioritize as the most important. Instruction on all twenty-one standards must be part of each course of the CTE program. (Paragraph (d) of Subsection 1 of NAC 389.800)

CURRICULUM FRAMEWORK

The Nevada CTE Curriculum Frameworks are organized utilizing the recommended course sequencing listed in the Program of Study and the CTE Course Catalog. The framework identifies the recommended content standards, performance standards, and performance indicators that should be taught in each course.

CAREER AND TECHNICAL STUDENT ORGANIZATIONS (CTSO)

To further the development of leadership and technical skills, students must have opportunities to participate in one or more of the Career and Technical Student Organizations (CTSOs). CTSOs develop character, citizenship, and the technical, leadership and teamwork skills essential for the workforce and their further education. Their activities are considered a part of the instructional day when they are directly related to the competencies and objectives in the course. (Paragraph (a) of Subsection 3 of NAC 389.800)

WORKPLACE READINESS SKILLS ASSESSMENT

The Workplace Readiness Skills Assessment has been developed to align with the Nevada CTE Employability Skills for Career Readiness Standards. This assessment provides a measurement of student employability skills attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter “C”. (e.g., Level = L3C) (Paragraph (d) of Subsection 1 of NAC 389.800)

END-OF-PROGRAM TECHNICAL ASSESSMENT

An end-of-program technical assessment has been developed to align with the Nevada CTE Skill Standards for this program. This assessment provides a measurement of student technical skill attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter “C”. (e.g., Level = L3C) (Paragraph (e) of Subsection 1 of NAC 389.800)

CERTIFICATE OF SKILL ATTAINMENT

Each student who completes a course of study must be awarded a certificate which states that they have attained specific skills in the industry being studied and meets the following criteria: A student must maintain a 3.0 grade point average in their approved course of study, pass the Workplace Readiness Skills Assessment, and pass the end-of-program technical assessment. (Subsection 4 of NAC 389.800)

CTE ENDORSEMENT ON A HIGH SCHOOL DIPLOMA

A student qualifies for a CTE endorsement on their high school diploma after successfully completing the following criteria: 1) successful completion of a CTE course of study in a program area, 2) successful completion of academic requirements governing receipt of a standard diploma, and 3) meet all requirements for the issuance of the Certificate of Skill Attainment. (NAC 389.815)
CTE COLLEGE CREDIT

CTE College Credit is awarded to students based on articulation agreements established by each college for the CTE program, where the colleges will determine the credit value of a full high school CTE program based on course alignment. An articulation agreement will be established for each CTE program designating the number of articulated credits each college will award to students who complete the program.

CTE College Credit is awarded to students who: (1) complete the CTE course sequence with a grade-point average of 3.0 or higher; (2) pass the state end-of-program technical assessment for the program; and (3) pass the Workplace Readiness Assessment for employability skills.

Pre-existing articulation agreements will be recognized until new agreements are established according to current state policy and the criteria shown above.

Please refer to the local high school’s course catalog or contact the local high school counselor for more information. (Paragraph (b) of Subsection 3 of NAC 389.800)

ACADEMIC CREDIT FOR CTE COURSEWORK

Career and technical education courses meet the credit requirements for high school graduation (1 unit of arts and humanities or career and technical education). Some career and technical education courses meet academic credit for high school graduation. Please refer to the local high school’s course catalog or contact the local high school counselor for more information. (NAC 389.672)
CORE COURSE:
RECOMMENDED STUDENT PERFORMANCE STANDARDS

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COURSE DESCRIPTION
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 and operating principles. The repair, maintenance, and diagnostic procedures will enhance students' awareness of the applications of scientific principles. 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.

TECHNICAL STANDARDS

CONTENT STANDARD 1.0: IDENTIFY AND UTILIZE SAFETY PROCEDURES AND PROPER TOOLS
Performance Standard 1.1: Demonstrate General Lab Safety Rules and Procedures

  Performance Indicators: 1.1.1-1.1.19

Performance Standard 1.2: Identify and Utilize Proper Tools

  Performance Indicators: 1.2.1-1.2.5

CONTENT STANDARD 2.0: PERFORM BASIC VEHICLE SERVICE
Performance Standard 2.1: Identify and Utilize Vehicle Service Information

  Performance Indicators: 2.1.1-2.1.6

Performance Standard 2.2: Prepare a Vehicle for Service

  Performance Indicators: 2.2.1-2.2.5

Performance Standard 2.3: Prepare a Vehicle for the Customer

  Performance Indicators: 2.3.1

CONTENT STANDARD 4.0: PERFORM PREVENTATIVE MAINTENANCE INSPECTIONS
Performance Standard 4.5: Analyze Lubrication Systems for Service

  Performance Indicators: 4.5.1

Performance Standard 4.8: Inspect Cab and Hood Hardware/Accessories for Service

  Performance Indicators: 4.8.1-4.8.9

CONTENT STANDARD 5.0: ANALYZE HYDRAULIC SYSTEMS
Performance Standard 5.1: Investigate General System Operation

  Performance Indicators: 5.1.1-5.1.2

Performance Standard 5.2: Assess Hydraulic Pumps

  Performance Indicators: 5.2.1-5.2.3

CONTENT STANDARD 7.0: PERFORM SUSPENSION AND STEERING SERVICE
Performance Standard 7.6: Evaluate Wheels and Tires

  Performance Indicators: 7.6.1-7.6.6

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CONTENT STANDARD 9.0 : INVESTIGATE TRANSPORTATION SYSTEMS
  Performance Standard 9.1 : Assess Transportation Systems
    Performance Indicators : 9.1.1-9.1.4

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS
CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS
  Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills
    Performance Indicators : 1.1.1-1.1.7
  Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills
    Performance Indicators : 1.2.1-1.2.10
  Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills
    Performance Indicators : 1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*
  English Language Arts: Reading Standards for Literacy in Science and Technical Subjects
    Writing Standards for Literacy in Science and Technical Subjects
    Speaking and Listening
  Mathematics: Mathematical Practices

* Refer to the Diesel Technology Standards for alignment by performance indicator
CORE COURSE:
RECOMMENDED STUDENT PERFORMANCE STANDARDS

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**COURSE DESCRIPTION**
This course is a continuation of Diesel Technology I. This course is designed to provide intermediate students with diesel systems service and repair skills. It will provide students with in-depth knowledge of diesel systems operating principles and the applications of diesel power. Areas of study may include: engines, steering and suspension, preventative maintenance, hydraulics, electrical systems, and braking systems. 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.

**TECHNICAL STANDARDS**

**CONTENT STANDARD 3.0 : APPLY CONCEPTS OF DIESEL ENGINE SERVICE**
- Performance Standard 3.1 : Perform Preliminary Engine Inspection
  - Performance Indicators : 3.1.1-3.1.4
- Performance Standard 3.2 : Perform Cylinder Head and Valve Train Service
  - Performance Indicators : 3.2.1-3.2.6
- Performance Standard 3.3 : Perform Engine Block Service and Repair
  - Performance Indicators : 3.3.1-3.3.14
- Performance Standard 3.4 : Perform Lubrication Systems Service and Repair
  - Performance Indicators : 3.4.1-3.4.4
- Performance Standard 3.5 : Perform Cooling Systems Service and Repair
  - Performance Indicators : 3.5.1-3.5.8
- Performance Standard 3.6 : Inspect Air Induction and Exhaust Systems
  - Performance Indicators : 3.6.1-3.6.4

**CONTENT STANDARD 4.0 : PERFORM PREVENTATIVE MAINTENANCE INSPECTIONS**
- Performance Standard 4.1 : Assess Engine Systems for Service
  - Performance Indicators : 4.1.1-4.1.6
- Performance Standard 4.3 : Assess Air Induction and Exhaust Systems for Service
  - Performance Indicators : 4.3.1-4.3.7
- Performance Standard 4.4 : Investigate Cooling Systems for Service
  - Performance Indicators : 4.4.1-4.4.9
- Performance Standard 4.7 : Assess Cab and Hood Safety Equipment for Service
  - Performance Indicators : 4.7.1-4.7.4
  - Performance Indicators : 4.9.1-4.9.4

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Performance Standard 4.14 : Investigate Hydraulic Brakes for Service
Performance Standard 4.16 : Investigate Suspension and Steering Systems for Service
   Performance Indicators : 4.16.1-4.16.13
Performance Standard 4.17 : Assess Tires and Wheels for Service
   Performance Indicators : 4.17.1-4.17.8

CONTENT STANDARD 5.0 : ANALYZE HYDRAULIC SYSTEMS
Performance Standard 5.4 : Examine Hoses, Fittings, and Connections
   Performance Indicators : 5.4.1-5.4.3

CONTENT STANDARD 6.0 : ANALYZE BRAKE SYSTEMS
Performance Standard 6.4 : Assess Hydraulic Brakes – Hydraulic System
   Performance Indicators : 6.4.1-6.4.7
Performance Standard 6.5 : Assess Hydraulic Brakes – Mechanical/Foundation Brakes
   Performance Indicators : 6.5.1-6.5.4
Performance Standard 6.6 : Assess Hydraulic Brakes – Power Assist Units
   Performance Indicators : 6.6.1-6.6.3
Performance Standard 6.8 : Perform Wheel Bearing Service and Repair
   Performance Indicators : 6.8.1-6.8.2

CONTENT STANDARD 7.0 : PERFORM SUSPENSION AND STEERING SERVICE
Performance Standard 7.1 : Assess Steering Systems - Column
   Performance Indicators : 7.1.1-7.1.4
Performance Standard 7.2 : Assess Steering Systems - Units
   Performance Indicators : 7.2.1-7.5.4
Performance Standard 7.3 : Assess Steering Systems - Linkage
   Performance Indicators : 7.3.1-7.3.2
Performance Standard 7.4 : Investigate Suspension Systems
   Performance Indicators : 7.4.1-7.4.8
Performance Standard 7.5 : Perform Wheel Alignment Diagnosis, Adjustment, and Repair
   Performance Indicators : 7.5.1-7.5.7

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS

CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS
Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills
   Performance Indicators : 1.1.1-1.1.7
Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills
   Performance Indicators : 1.2.1-1.2.10
Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills
   Performance Indicators : 1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*

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

   Mathematics: Mathematical Practices

* Refer to the Diesel Technology Standards for alignment by performance indicator
# COURSE DESCRIPTION

This course is a continuation of Diesel Technology II. This course is designed to provide advanced students with diesel systems service and repair skills. Areas of study may include: engines, steering and suspension, preventative maintenance, hydraulics, electrical systems, and braking systems. 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. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

## TECHNICAL STANDARDS

### CONTENT STANDARD 3.0 : APPLY CONCEPTS OF DIESEL ENGINE SERVICE

- **Performance Standard 3.7** : Perform Fuel Supply Systems Service  
  **Performance Indicators** : 3.7.1-3.7.3

### CONTENT STANDARD 4.0 : PERFORM PREVENTATIVE MAINTENANCE INSPECTIONS

- **Performance Standard 4.2** : Investigate Fuel Systems for Service  
  **Performance Indicators** : 4.2.1-4.2.3
- **Performance Standard 4.6** : Investigate Cab and Hood Instruments and Controls for Serviceability  
  **Performance Indicators** : 4.6.1-4.6.6
- **Performance Standard 4.10** : Assess Battery and Starting Systems  
  **Performance Indicators** : 4.10.1-4.10.6
- **Performance Standard 4.11** : Assess Charging Systems  
  **Performance Indicators** : 4.11.1-4.11.3
- **Performance Standard 4.12** : Investigate Lighting Systems for Service  
  **Performance Indicators** : 4.12.1-4.12.3
- **Performance Standard 4.13** : Examine Air Brakes for Service  
  **Performance Indicators** : 4.13.1-4.13.20
- **Performance Standard 4.15** : Examine Air Brakes for Service  
  **Performance Indicators** : 4.15.1-4.15.14
- **Performance Standard 4.18** : Analyze Frame and Fifth Wheel for Service  
  **Performance Indicators** : 4.18.1-4.18.6

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CONTENT STANDARD 5.0 : ANALYZE HYDRAULIC SYSTEMS
Performance Standard 5.3 : Perform Filtration/Reservoirs ( Tanks ) Service
  Performance Indicators : 5.3.1-5.3.5
Performance Standard 5.5 : Evaluate Actuators for Service
  Performance Indicators : 5.5.1-5.5.6

CONTENT STANDARD 6.0 : ANALYZE BRAKE SYSTEMS
Performance Standard 6.1 : Assess Air Brakes – Air Supply and Service Systems
  Performance Indicators : 6.1.1-6.1.10
Performance Standard 6.2 : Assess Air Brakes – Mechanical/Foundation Brakes
  Performance Indicators : 6.2.1-6.2.6
Performance Standard 6.3 : Assess Air Brakes – Parking Brakes
  Performance Indicators : 6.3.1-6.3.3
Performance Standard 6.7 : Diagnose Air and Hydraulic Anti-lock Brake Systems ( ABS ) and Automatic Traction Control ( ATC ) Systems
  Performance Indicators : 6.7.1-6.7.6

CONTENT STANDARD 8.0 : ANALYZE ELECTRIC/ELECTRONIC SYSTEMS
Performance Standard 8.1 : Perform General Electrical Systems Service
  Performance Indicators : 8.1.1-8.1.9
Performance Standard 8.2 : Perform Battery Service
  Performance Indicators : 8.2.1-8.2.8
Performance Standard 8.3 : Perform Starting System Service
  Performance Indicators : 8.3.1-8.3.5
Performance Standard 8.4 : Perform Charging System Diagnosis and Repair
  Performance Indicators : 8.4.1-8.4.7
Performance Standard 8.5 : Perform Lighting Systems Diagnosis and Repair
  Performance Indicators : 8.5.1-8.5.8

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS
CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS
Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills
  Performance Indicators : 1.1.1-1.1.7
Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills
  Performance Indicators : 1.2.1-1.2.10
Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills
  Performance Indicators : 1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*

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

* Refer to the Diesel Technology Standards for alignment by performance indicator
COMPLEMENTARY COURSE(S):

Programs that utilize the complementary courses can include the following courses. The Advanced Studies course allows for additional study through investigation and in-depth research.

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COURSE DESCRIPTION

This course is offered to students who have achieved all content standards in a program whose desire is 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.

TECHNICAL STANDARDS

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

SAMPLE TOPICS

- Participate in individual/team competitions
- Investigate and utilize shop management techniques and procedures
- Participation in an internship or job shadow opportunities
- Explore college and career opportunities
Programs that utilize the complementary courses can include the following courses. The lab courses allow additional time to be utilized in developing the processes, concepts, and principles as described in the classroom instruction. The standards and performance indicators for each lab course are shown in the corresponding course listed in the previous section.

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**COURSE DESCRIPTION**
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.

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