

## Medium Heavy Diesel: Scope & Sequence

### Semester 1, Year 1

MHD101 Diesel Engine/Core Curriculum  
(18 Weeks)

#### District Pre-Assessment

##### Unit 1 (5 Weeks)

#### Lab and Classroom Safety, Rules & Employability Skills:

- Syllabus, Procedures, Rules
- Safety Online Training
- Hand Tools and Power Tools
- Shop Safety and Orientation
- Certification: SP2 Safety Certification
- CTSO Integration (Leadership Skills): Officer Elections, Officer Training
- Professional Skills: 6A-C, 8A-I
- Academic Standards: ELA.11-12.W.4, ELA.11-12.W.5, ELA.11-12.RI.10, ELA.11-12.SL.3, 5.NF.B.3, 5.NF.B.6, 5.NF.B.7
- Work-based Learning: Guest speaker
- Technical Standard: 1.1-1.24, 2.11-2.6

##### Unit 2 (5 Weeks)

#### Introduction to Diesel/Internal Combustion Engine:

- Basic Theory of Combustion
- History of Engines
- Operations of Internal Combustion Engines
- Difference between S.I. and C.I. Engines
- Engine Components and Functions
- Deconstruction and Reassembly of Engines
- Timing Systems
- CTSO Integration (Leadership Skills): Officer training, Skills USA Fall Leadership Conference Chapter Meeting
- Professional Standards: 4.A-F
- Academic Standards: ELA.11-12.W.2, ELA.11-12.L.6, ELA.11-12.SL.3, ELA.11-12.SL.6
- Work-based Learning: Guest Speaker and Resume Writing
- Technical Standard: 2.3, 2.4, 2.6, 3.1, 3.2.4.1, 4.9, 5.4, 5.6

##### Unit 3 (3 Weeks)

#### Cooling and Lubrication Systems:

- Principles of cooling and lubrication systems
- Cooling System Function and Components
- Lubrication System Function and Components
- CTSO Integration (Leadership Skills): Chapter meeting, Chapter Social, Community Service Event
- Professional Standards: 2.A-C
- Academic Standards: ELA.11-12.W.8, ELA.11-12.W.9, G-GMD.A.3
- Work-based Learning: Guest Speaker and Workplace Visit

- Technical Standard: 3.1-3.3, 4.1-4.9

##### Unit 4 (3 Weeks)

#### Fuel Systems:

- Principles of fuel delivery systems
- Low and high pressure fuel systems
- Intake and exhaust systems
- Emission systems
- Turbo and induction systems
- CTSO Integration (Leadership Skills): chapter meeting, Fund Raising
- Professional Standards: 5.A-E
- Academic Standards: ELA.11-12.W.4, ELA.11-12.W.7, ELA.11-12.W.9
- Work-based Learning: Soft Skills Training
- Technical Standard: 5.1-5.6, 6.1-6.6

##### Unit 5 (2 Weeks)

- Principles of electricity
- Ohm's Law
- Conventional and electron theories
- Electrical circuits
- Troubleshooting and Diagnostics
- CTSO Integration (Leadership Skills): Chapter Meeting, Fund Raising
- Professional Standards: 8.A-I
- Academic Standards: ELA.11-12.RI.2, ELA.11-12.RI.10, ELA.11-12.SL.4, 6.EE.A.2, 7.EE.B.3, 7.RP.A.3, 7.G.B.4, HS.P2U1.5, HS.P4U1.8, HS.P3U1.6, HS.P4U1.8, HS.P4U3.9
- Work-based Learning: Soft Skills Training
- Technical Standard: 13.1-13.11, 17.1-17.4

#### Semester Exam

### Semester 2, Year 1

MHD102 Diesel Engine Maintenance  
(14 Weeks)

##### Unit 5 Continued (4 Weeks)

#### Basic Electrical:

- Principles of electricity
- Ohm's Law
- Conventional and electron theories
- Electrical circuits
- Troubleshooting and Diagnostics
- CTSO Integration (Leadership Skills): Skills USA Region 5, Chapter meeting
- Professional Standards: 8.A-I
- Academic Standards: ELA.11-12.RI.2, ELA.11-12.RI.10, ELA.11-12.SL.4, 6.EE.A.2, 7.EE.B.3, 7.RP.A.3, 7.G.B.4, HS.P2U1.5, HS.P4U1.8, HS.P3U1.6, HS.P4U1.8, HS.P4U3.9
- Work-Based Learning: Soft Skills Training, Job shadow
- Technical Standard: 13.1-13.11, 17.1-17.4

### Unit 6 (3 Weeks)

#### **Battery, Starting and Charging Systems:**

- Batteries, testing and diagnostics
- Starting & charging system components and functions
- Starting & charging system troubleshooting and diagnostics
- CTSO Integration (Leadership Skills):Skills USA Arizona Conference, Chapter Meeting
- Professional Standards: 1.A-D
- Academic Standards: ELA.11-12.W.5, ELA.11-12.W.6
- Work-Based Learning: Job Shadow Reflection
- Technical Standard: 14.1-14.6, 15.1-15.3, 16.1-16.5

### Unit 7 (4 Weeks)

#### **Preventive Maintenance:**

- D.O.T. Inspections
- A,B, T- Level Inspections
- Diagnostic code retrieving, troubleshooting and diagnostics
- CTSO Integration (Leadership Skills):Chapter meetings
- Professional Skills: planning a year end banquet
- Academic Standards: ELA.11-12.RI.10, ELA.11-12.W.4
- Work-Based Learning Soft Skills Training
- Technical Standard: 13.1-13.11, 14.1-14.6

### Unit 8 (3 Weeks)

#### **HVAC and Refrigeration Systems:**

- Principles of Cooling
- Air conditioning systems
- Troubleshooting and diagnostics on Air Conditioning Systems
- Trailer Refrigeration System
- CTSO Integration (Leadership Skills) Soft Skills Training
- Professional Skills: How To Execute A Planned Event
- Academic Standards: ELA.11-12.SL.4, ELA.11-12.SL.6
- Work-Based Learning: student externship
- Technical Standard: 4.1-4.9

### **Semester 1, Year 2**

MHD201 Diesel Electric/Electronic System  
(15 Weeks)

### Unit 1 (1 Week)

- Syllabus, Procedures, Rules
- Safety online training
- Year 1 Review
- CTSO Integration (Leadership Skills): sp2 certification safety

- Professional Skills:4 A-F
- Academic Standards: ELA11-12.W4,W5,RI.10, SI3
- Work-Based Learning Guest Speaker, Job Application
- Technical Standard: 1.1-1.24

### Unit 2 (1 Week)

#### **Hydraulics:**

- Principles of hydraulics
- Hydraulics systems and components
- Application of hydraulics
- CTSO Integration (Leadership Skills):officer training
- Professional Skills:4a-f
- Academic Standards: ELA.11-12.W2,I6,SL.3,SL.6
- Work-Based Learning: Guest Speaker
- Technical Standard: 9.1-9.13

### Unit 3 (6 Weeks)

#### **Truck Brakes Systems:**

- Hydraulic brake systems
- Air brake systems
- Inspection, troubleshooting and diagnostics
- Air over hydraulics systems
- ABS systems troubleshooting and diagnostics
- Financial Practices
- CTSO Integration (Leadership Skills): SkillsUSA Fall Conference
- Professional Standards: 9.0
- Academic Standards: ELA 11-12 w8,w9
- Work-Based Learning guest speaker
- Technical Standard 8.1-8.18

### Unit 4 (5 Weeks)

#### **Drivetrain Systems:**

- Manual transmission
- Automatic Transmission
- Driveshaft
- Differentials
- Organizational culture
- CTSO Integration (Leadership Skills): SkillsUSA Fall Leadership Conference, Chapter Meetings
- Professional Standards:7.0
- Academic Standards: ELA 11-12 RI2,RI10, 12-12, SL4
- Work-Based Learning: job shadow
- Technical Standard: 7.1-7.19

### Unit 5 (2 Weeks)

#### **Automotive Service Excellence (ASE) Test Preparation:**

- Basic engines review
- Electrical review
- Air Brakes Review

- Certification: ASE- Diesel Engines, Electrical |Electronic Systems, Air Brakes exam
- CTSO Integration (Leadership Skills): fund raising
- Professional Skills:
- Academic Standards: ELA 11-12 RI2,RI10,SL4
- Work-Based Learning: Job Shadow and Externship
- Technical Standard: 1.1-17-4 (All)

#### **Semester Exam**

### **Semester 2, Year 2**

MHD202 Diesel Advanced Technologies  
(14 Weeks)

#### Unit 6 (5 Weeks)

#### **Steering and Suspension:**

- Tires, Wheels and Hubs
- Tires, Wheels and Hubs
- Front axles and vehicle alignment factors
- Suspension systems
- Steering systems
- Alignment
- Leadership
- Correct imperfections
- CTSO Integration (Leadership Skills): SkillsUSA Regional Conference, Chapter Meeting
- Professional Standards: 5.0
- Academic Standards: 5.NF.B.3
- Work-Based Learning: Guest Speaker, Workplace Visit
- Technical Standard: 10.1-10.15

#### Unit 7 (2 Weeks)

#### **Truck Frames and Construction:**

- Truck chassis
- Trailer chassis
- Fifth Wheels
- Inspection and Maintenance
- Certification: ASE t5 steering and suspension
- CTSO Integration (Leadership Skills): SkillsUSA Regional Competition
- Professional Standards: 3.0
- Academic Standards: ELA11-12 W5,W6
- Work-Based Learning: Mock Interviews
- Technical Standard:12.1-12.5

#### Unit 8 (3 Weeks)

#### **Electronic Control Units Networking:**

- Electronics
- Obd2 systems & Hd-Obd
- Cummins Insite software & Q.S.O.L. Labs
- Snap on scan tool training
- C.A.N.
- Retrieving and diagnostics of troubleshooting codes
- CTSO Integration (Leadership Skills): SkillsUSA State Conference
- Professional Skills:
- Academic Standards: ELA 11-12 w5,w9,l4,l6,ri7,l4

- Work-Based Learning: Soft Skills Training
- Technical Standard: 13.1-13.11

#### Unit 9 (1 Week)

#### **Course Review:**

- Engines, Brakes, Steering and Suspension, Electrical & Drivetrains
- CTSO Integration (Leadership Skills): chapter meeting, end of year banquet
- Professional Skills: ALL
- Academic Standards: ELA 11-12 sl4,sl6
- Work-Based Learning: Externship
- Technical Standard: 1.1-17-4 (All)

#### **ADE Technical Skills Assessment**

#### Unit 10 (4 Weeks)

#### **Automotive Service Excellence (ASE):**

- Welding repair labs
- Industry certification study and testing. (ASE,SP/2,CUMMINS)
- Student enterprise projects
- SkillsUSA end of the year banquet
- Certification: ASE- Diesel, Engines, Electrical|Electronic Systems, Brakes, Suspension & Steering exam
- CTSO Integration (Leadership Skills): SkillsUSA National Conference
- Professional Skills: ALL
- Academic Standards: review all
- Work-Based Learning: soft skills training
- Technical Standard: 1.1-17-4 (All)

Arizona Department of Education (ADE)  
Automotive Service Excellence (ASE)  
Common AZCCR Math Standards (CAMS)  
English Language Arts Standards (ELAS)