# Diesel Mechanics/Heavy Truck Maintenance

## PROGRAM OUTLINE

## PROGRAM GOAL AND OUTCOMES

### Program Goal

To provide students with knowledge of skills ranging from basic diesel engine operations to troubleshooting and repair. Students will learn how to maintain and do repairs on their own trucks, work for a truck fleet or dealership, or start a full- or part-time business.

| Program Outcomes | Courses | Evidence of Learning |
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| Recognize the role of a diesel repair technician and the many exciting career opportunities available to skilled technicians | DMM001: Orientation to Diesel Mechanics/Heavy Truck Maintenance | Multiple-choice lesson exam |
| Identify common tools and shop safety procedures used in the repair of heavy-duty vehicles | DMM002: Diesel Truck Operations, Safety, and Technology | Multiple-choice lesson exams |
| List basic operation of a diesel engine and its major components | DMM003: Diesel Engine Fundamentals | Multiple-choice lesson exams |
| Describe the operation of the cooling and lubrication systems of a typical diesel engine | DMM004: Truck Engine Lubrications and Cooling and Exhaust Systems | Multiple-choice lesson exams |
| Identify the various procedures used in the inspection and rebuilding of a typical diesel engine | DMM013: Troubleshooting and Repair | Multiple-choice lesson exams |
| Explain the operation of a mechanical fuel injection system, the fuel-delivery system, as well as the properties of the various types of diesel fuels | DMM005: Truck Fuel Systems | Multiple-choice lesson exams |
| Recognize the basics of electrical and electronic engine control systems | DMM006: Truck Electronics and Engine Controls | Multiple-choice lesson exams |
| Recognize the basic operation and repair of heavy-duty truck steering and suspension systems, along with service and repair of vehicle wheels and tires | DMM010: Truck Tires, Suspension, and Steering | Multiple-choice lesson exams |

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| Identify the operation of hydraulic and pneumatic braking devices and control systems, the interpretation of fault-indication messages, and the troubleshooting of brake system problems | DMM011: Truck Brake Systems | Multiple-choice lesson exams |
| Describe the operation and repair procedures for common heavy-duty truck drivelines, automatic transmissions, and manual transmissions and clutch systems | DMM012: Drivelines and Transmissions | Multiple-choice lesson exams |
| Recognize the function and operation of heating, ventilation, and air conditioning systems used on heavy-duty trucks | DMM009: Truck HVAC Systems | Multiple-choice lesson exams |
| Explain the basic theory and repair of various electrical systems, including the battery, charging system, starting system, and lighting systems | DMM008: Truck Electrical Systems | Multiple-choice lesson exams |
| Identify the safety practices and maintenance procedures for truck and trailer systems | DMM007: Truck and Trailer Maintenance | Multiple-choice lesson exam |

## PROGRAM STRUCTURE

### SYP101: Orientation

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| Lesson 1 | **Starting Your Program** |

### DMM001: Orientation to Diesel Mechanics/Heavy Truck Maintenance

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| Lesson 2 | **Introduction to Diesel Truck Mechanics** |

### DMM002: Diesel Truck Operations, Safety, and Technology

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| Lesson 3 | **Introduction to Truck Engine Operation** |
| Lesson 4 | **Safe Shop Practices** |
| Textbook | ***Diesel Technology*** |

### DMM003: Diesel Engine Fundamentals

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| Lesson 5 | **Diesel Engine Fundamentals, Part 1** |
| Lesson 6 | **Diesel Engine Fundamentals, Part 2** |

### DMM004: Truck Engine Lubrications and Cooling and Exhaust Systems

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| Lesson 7 | **Truck Engine Lubrication and Cooling Systems** |
| Lesson 8 | **Truck Engine Air Intake and Exhaust Systems** |

### DMM005: Truck Fuel Systems

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| Lesson 9 | **Introduction to Fuel Systems** |
| Lesson 10 | **Diesel Engine Injection Systems, Part 1** |
| Lesson 11 | **Diesel Engine Injection Systems, Part 2** |

### DMM006: Truck Electronics and Engine Controls

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| Lesson 12 | **Electricity and Diesel Engine Electrical Systems** |
| Lesson 13 | **Electronic Engine Controls** |

### DMM007: Truck and Trailer Maintenance

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| Lesson 14 | **Introduction to Truck Maintenance** |
| Textbook | ***Truck and Trailer Systems*** |

### DMM008: Truck Electrical Systems

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| Lesson 15 | **Truck Electrical Systems, Part 1** |
| Lesson 16 | **Truck Electrical Systems, Part 2** |
| Lesson 17 | **Truck Computer Systems** |

### DMM009: Truck HVAC Systems

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| Lesson 18 | **HVAC Systems** |

## DMM010: Truck Tires, Suspension, and Steering

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| Lesson 19 | **Tires, Wheels, and Trailer Maintenance** |
| Lesson 20 | **Suspension and Steering Systems** |

## DMM011: Truck Brake Systems

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| Lesson 21 | **Truck Brake Systems, Part 1** |
| Lesson 22 | **Truck Brake Systems, Part 2** |

## DMM012: Drivelines and Transmissions

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| Lesson 23 | **Drivelines, Clutches, and Axles** |
| Lesson 24 | **Manual Transmissions** |
| Lesson 25 | **Automatic Transmissions** |

## DMM013: Troubleshooting and Repair

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| Lesson 26 | **Review of Diesel Engine Topics** |
| Lesson 27 | **Troubleshooting and Repair** |
| Lesson 28 | **Review of Electrical, Starting, and Cooling Systems** |
| Lesson 29 | **PM Inspection and Troubleshooting** |
| Textbook | ***Troubleshooting and Repairing Diesel Engines*** |

# COURSE DESCRIPTIONS AND OBJECTIVES

## SYP101: Starting Your Program

In this course, you'll develop the necessary skills to ensure your success in the program. You'll learn how you can improve your study skills, so you're able to use a number of tools that will help you to be successful.

By the end of this course, you'll be able to:

- Identify skills needed to be a confident and independent online learner

## DMM001: Orientation Diesel Mechanics/Heavy Truck Maintenance

As you start reading this first lesson, you'll learn about the growing diesel-engine-powered vehicle repair field and the increasing need for professional technicians. You'll discover the many exciting career opportunities that are available to skilled technicians. Finally, you'll learn about the basic operation of engines and other vehicle systems.

By the end of this course, you'll be able to:

- Analyze the job roles, components, and mechanics associated with diesel truck maintenance

## DMM002: Diesel Truck Operation, Safety, and Technology

This course will introduce you to the operations of diesel engine, including how the diesel cycle differs from other types of engine cycles, and how (and why) the diesel engine has been a very popular choice for powering such a wide range of vehicles. The course includes several major diesel engine components and moves on to cover shop safety and tools.

You will learn about the different types of work environment where diesel technicians work, like the trucking industry, diesel-powered locomotive repair shops, heavy-equipment repair shops, nautical engine overhaul and maintenance facilities, and many other industries employ technicians who maintain and repair diesel engines.

You will also learn about the work performed by diesel technicians which vary and they involve the knowledge of various vehicle components, including several engine systems and accessories. When a problem with an engine accessory occurs, they'll often be required to locate and solve the issue.

By the end of this course, you'll be able to:

- Analyze the principles, components, and classifications of the diesel engines
- Identify the safety precautions, protective gears, and tools required by the diesel technicians

## DMM003: Diesel Engine Fundamentals

In this course, you'll take a closer look at diesel engine components. In the first lesson, you'll be familiarized with the various components of engine blocks, crankshafts, and piston assembly. In the second part of this course, you'll be introduced with the various functions of the cylinder head, camshaft, and valve train components. Finally, this course will help you to get an overview on how various components of a diesel engine works and functions.

By the end of this course, you'll be able to:

- Identify the various components of engine blocks, crankshaft, and piston assembly
- Categorize the various components of cylinder heads and camshaft as well as their servicing process

## DMM004: Truck Engine Lubrication, Cooling, and Exhaust Systems

This course continues your study of diesel engine systems. You'll look at lubrication, cooling, air intake, and exhaust systems. You'll soon find that lubricating systems are easy to comprehend once you understand the system's components. You'll also be able to understand how to properly maintain oil filters as well as how to recognize low oil situations. Along with this, you'll also look at the functions of components related to engine breathing and troubleshoot components of the exhaust system.

By the end of this course, you'll be able to:

- Identify the purpose of lubrication and cooling systems in trucks
- Categorize the various parts and purposes of the truck engine air intake and exhaust systems

## DMM005: Truck Fuel Systems

In this course, you'll continue your study of diesel technology by looking at fuel and injection systems. You'll be learning about the different types, essential components, and methods of maintenance for the fuel and injection systems.

By the end of this course, you'll be able to:

- Identify the major components of diesel engine fuel system
- Categorize the various components of fuel injection system
- Identify the major components of distributor injection pump and mechanical fuel injector systems

## DMM006: Truck Electronics and Engine Controls

This course covers the basics of electricity and then moves on to diesel engine electrical systems, including the charging and starting systems. You'll learn about electronic engine controls.

The information is divided into two lessons; the first lesson focuses on basic electrical theories, the charging systems, and the diesel engine's starting system. The second lesson describes each major component related to the computer control system of engines.

By the end of this course, you'll be able to:

- Categorize the electrical principles, troubleshooting methods, and starter-system functions related to electrical system of trucks
- Identify the main operational and functional components related to electronic engine controls of trucks

## DMM007: Truck and Trailer Maintenance

This course provides an introduction to the trucking industry and details key career and certification information. You'll also review safety practices and take another look at tools and measuring equipment.

By the end of this course, you'll be able to:

- Analyze the fundamentals of truck maintenance and the components of the trucking industry

## DMM008: Truck Electrical Systems

This course will introduce you to the electrical theories, types of batteries, system monitoring programs, and more such topics related to the truck's electrical system. This course takes another look at basic electrical topics before moving on to cover truck electrical systems, such as starting and charging systems, lighting, and wiring. You'll also study about the truck computer systems.

By the end of this course, you'll be able to:

- Categorize the theories, components, and elements related to the truck electrical systems
- Identify the utility of the lighting system and starting system of trucks
- Analyze the purpose of vehicle computer system, its maintenance, and importance of system monitoring programs

## DMM009: Truck HVAC Systems

This part of your program looks at truck heating, ventilation, and air-conditioning (HVAC) systems and auxiliary power units (APUs). In this course, you'll learn about important truck HVAC control systems, how they operate, and how to maintain them. You'll also spend some time reading about APUs and their purpose in conjunction with truck HVAC systems.

By the end of this course, you'll be able to:

- Analyze the components and maintenance of truck HVAC systems

## DMM010: Tires, Suspension, and Steering

This part of your program deals with some of the systems and components that will most likely demand the bulk of your repair efforts. Tires and suspension systems, for example, wear out during much shorter intervals than parts such as engines. You'll also cover wheels, frames, and steering and trailer systems.

By the end of this course, you'll be able to:

- Categorize the various types of tires, wheels, and the methods of maintaining them
- Identify the purpose of suspension and steering systems

## DMM011: Truck Brake Systems

This part of your program focuses on truck brake systems, an important topic for just about any heavy-duty truck technician. You'll study different types of brake systems, their components, and how they work.

By the end of this course, you'll be able to:

- Categorize the different hydraulic and air brake systems and the methods of maintaining them
- Identify the various parts and maintenance methods associated with air-brake and anti-lock brake systems

## DMM012: Drivelines and Transmissions

This part of your program covers the driveline system, clutches, and drive axles before moving on to truck manual and automatic transmissions. You'll learn about the major components, operation, and general procedures for servicing these systems.

By the end of this course, you'll be able to:

- Identify the functions, components, and methods of maintenance for the driveshaft, clutch, and axles
- Analyze the components, functional aspects, and maintenance of the truck's transmission
- Identify the operational aspects and efficiency of the automatic transmission

## DMM013: Troubleshooting and Repair

In this course, you'll review engine- and electrical-system operating characteristics, as this knowledge forms the foundation on which all troubleshooting studies and skills are built.

The conclusion of your program focuses on troubleshooting practices as well as how to approach a problem by making the most of the tools and knowledge you've already gained. You'll also cover preventive maintenance topics, including inspections and maintenance programs. Developing an effective approach to troubleshooting takes time, but it also requires having the right mindset.

By the end of this course, you'll be able to:

- Categorize the various operating principles and operational problems in a typical diesel engine
- Compare various diagnostic methods used for fuel-injection system, lubrication system, valve system, and air-filtering system
- Identify the various function of electrical system, starting system, and cooling system
- Analyze the requirements of preventive measurement program and the testing procedures of oil analysis

**Note:** The titles of your learning materials may be different from those listed on your program outline. There is no need to call your instructor about these differences. While the titles of certain learning materials may differ, the educational content is the same. All learning materials are designed to give you the finest education in your field. If you need instructional assistance, however, be sure to call for help. We reserve the right to revise the program of study and the instructional materials and to substitute for the items of equipment offered.