



Course: Diesel Engines 101: A Practical Approach

Contact Hours: 30

Pre-requisite: Basic Automotive Knowledge

Abstract

This course offers an introduction to the operation, maintenance, and repair of diesel engines used in various applications like vehicles, industrial machinery, and generators. Students will learn about diesel engine components, operation cycles, and common maintenance practices, preparing them for basic troubleshooting and understanding environmental impacts.

Target Audience

- Automotive Students and Apprentices: interested in automotive maintenance
- Mechanic and Technicians
- Persons who will be engaged in maintenance and repair
- Entry-level Automotive Technicians
- Hobbyists and DIY Enthusiasts
- Fleet Operators and Managers
- Career Changers
- Educational Instructors

Learning Outcomes

- Grasp the basic principles of how diesel engines operate
- Identify and describe the function of various diesel engine components
- Conduct routine maintenance and perform basic troubleshooting

Course Content

Session 1: Introduction to Diesel Engines

- Overview of diesel technology and applications
- Differences between diesel and gasoline engines
- Basic principles of diesel engine operation

Session 2: Fundamentals of Diesel Technology

- Thermodynamics in diesel engines
- The four-stroke diesel cycle: intake, compression, power, exhaust
- Diesel engine efficiency and performance metrics

Session 3: Components of Diesel Engines

- Detailed look at key components: pistons, cylinders, fuel injectors, etc.
- Engine block and cylinder head construction
- Role and operation of turbochargers and superchargers

Session 4: Fuel Injection System

- Types of diesel fuel systems: common rail, unit injector
- Function and maintenance of fuel pumps and injectors
- Understanding fuel quality and its impact on engine performance

Session 5: Air Intake and Exhaust Systems

- Importance of air management in diesel engines
- Components: air filters, intercoolers, exhaust manifolds
- Emissions control technologies: SCR, DPF, EGR

Session 6: Lubrication and Cooling Systems

- Role of engine oil in lubrication and protection
- Types of cooling systems used in diesel engines
- Preventive maintenance for lubrication and cooling systems

Session 7: Electrical Systems and Engine Management

- Overview of electrical systems: starters, alternators, batteries
- Engine sensors and electronic control units (ECUs)
- Diagnostics and electronic troubleshooting

Session 8: Maintenance and Troubleshooting

- Routine maintenance schedules and procedures
- Common mechanical and electrical faults
- Troubleshooting steps and diagnostics tools

Session 9: Practical Workshop

- Hands-on session: disassembling and reassembling a diesel engine
- Inspection of wear and damage on critical components
- Practical exercises in diagnosing common issues

Session 10: Review and Final Assessment

- Comprehensive review of all topics covered
- Discussion on the future of diesel technology and alternative fuels
- Final examination to assess understanding and skills