

# MTRK 152A: MEDIUM AND HEAVY TRUCK ENGINES SERVICE, DIAGNOSIS, AND REPAIR

## Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2024
Credits:	6
Total Contact Hours:	162
Lecture Hours :	81
Lab Hours:	81
Hours Arranged:	0
Outside of Class Hours:	162
Total Student Learning Hours:	324
Prerequisite:	MTRK 101 (or concurrent enrollment) or MTRK 148 (or concurrent enrollment) or AUTO 101 or by department consent based upon individual's experience or ASE certifications or manufacturer certification.
Transferable to CSU:	Yes
Transferable to UC:	No
Grading Method:	Standard Letter, Pass/No Pass

## Catalog Course Description

Intended for those students majoring in Medium and Heavy Duty Truck or those currently employed with a medium and heavy truck service/repair establishment seeking to improve their skills. This course covers essential engine theory, inspection, diagnosis, service and repair. Engine inspection and measurements are covered, with emphasis on in-vehicle repairs. This course prepares students for ASE Truck Gas and Diesel Engine Repair (T-1, T-2) certification exam. 81 lecture hours, 81 lab hours.

## Course Objectives

- complete ninety-five percent (95%) of Priority 1 (P-1), seventy percent (70%) of Priority 2 (P-2) twenty-five percent (25%) of the Priority 3 (P-3) required National Automotive Technician Education Foundation (NATEF) objectives for Diesel Engines (T2). Please see attached NATEF objectives (pages 39-45) or [www.natef.org](http://www.natef.org) for the most current objectives.
- Perform proper engine measurements using precision measurement tooling
- Perform valvetrain component removal, replacement and adjustment as per manufacturer recommendations
- Perform engine bottom end disassembly, reassembly and adjustment as per manufacturer recommendations
- Identify and perform procedures for proper front engine component gear timing
- Identify mechanical fuel injection component adjustments and repair
- Identify operation and repair of engine braking systems
- Identify operation and repair of engine subsystems such as intake preheat systems, exhaust gas recirculation systems, turbo chargers and superchargers

## Major Course Content

1. Engine mechanical related safety
  - a. Audible voice commands when working with a helper
  - b. Working around machinery in motion
  - c. Shop ergonomics
  - d. Tool placements
2. Fasteners, seals and gaskets related to engine repair.
  - a. Fasteners
    - i. Terminology
    - ii. Selection
    - iii. Repair
  - b. Seals
    - i. Terminology
    - ii. Installation
  - c. Gaskets
    - i. Terminology
    - ii. Selection
    - iii. Application
3. Theory of Operation of Various Engines and Related Systems
  - a. Engine block-dry and wet liners
  - b. Rotating assembly
  - c. Reciprocating assembly
  - d. Valve train
  - e. Cooling system
  - f. Exhaust system
4. Diagnosis, Repair and Service of Engines and Related Systems Using Manufacturer Standards and Service Information
  - a. Engine block
  - b. Rotating assembly
  - c. Reciprocating assembly
  - d. Valve train
  - e. Cooling system
  - f. Exhaust system
5. Engine Assembly Using Manufacturer Procedures and Service Information
  - a. Engine block
  - b. Rotating assembly
  - c. Reciprocating assembly
  - d. Valve train
  - e. Cooling system
  - f. Exhaust system
6. Mechanical fuel system component operation and repair
  - a. Mechanical fuel pumps
  - b. Fuel distribution systems
  - c. Fuel injector types
  - d. Fuel injector operation and adjustments
  - e. Injector removal and replacement
7. Engine braking systems

- a. Compression release braking systems
  - b. Exhaust braking systems
  - c. Engine retarders
8. Engine subsystems
- a. Intake preheat systems
  - b. Turbochargers
  - c. Superchargers
  - d. Throttle systems
  - e. Exhaust gas recirculation systems

## Lab Content

### I. Diagnosis, Repair and Service of Engines and Related Systems Using Manufacturer Standards and Service Information

- Engine block
- Rotating assembly
- Reciprocating assembly
- Valve train
- Cooling system
- Exhaust system
- Mechanical fuel injection system

### II. Engine Rebuilding Procedures Including Disassembly, Cleaning and Inspection Using Manufacturer Standards and Service Information

- Engine block
- Rotating assembly
- Reciprocating assembly
- Valve train
- Cooling system
- Exhaust system
- Mechanical fuel injection system

### III. Engine Assembly Using Manufacturer Procedures and Service Information.

- Engine block
- Rotating assembly
- Reciprocating assembly
- Valve train
- Cooling system

### IV. Exhaust System Inspection

- Aftertreatment removal
- Exhaust smoke analysis

### V. Power Output Analysis

- Full load operation diagnosis
- Engine power down diagnosis

## Suggested Reading Other Than Required Textbook

Students will read selected diesel trade journals.

## Examples of Required Writing Assignments

This course requires a 3-4 page research paper explaining the principles of diesel engine operation and/or new developments in diesel engines. Student are to use APA format.

## Examples of Outside Assignments

Students will write a brief summary of trade journals or periodicals. Students will also be required to complete take home ASE style quizzes.

## Instruction Type(s)

Lab, Lecture, Online Education Lecture