

## SYLLABUS

**DATE OF LAST REVIEW:** 4/23/2020  
**CIP CODE:** 47.0613  
**SEMESTER:** Departmental Syllabus  
**COURSE TITLE:** Advanced Diesel Engines  
**COURSE NUMBER:** DEVT 0210  
**CREDIT HOURS:** 5  
**INSTRUCTOR:** Departmental Syllabus  
**OFFICE LOCATION:** Departmental Syllabus  
**OFFICE HOURS:** Departmental Syllabus  
**TELEPHONE:** Departmental Syllabus  
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*KCKCC-issued email accounts are the official means for electronically communicating with our students.*

**PREREQUISITES:** Diesel Engines I

**REQUIRED TEXT AND MATERIALS:** Please check with the KCKCC bookstore, <http://www.kckccbookstore.com> for the required text for your particular class.

**COURSE DESCRIPTION:** Advanced Diesel Engines builds on the knowledge, skills and abilities obtained from Diesel Engines I. The course provides a more in-depth approach to diesel engine mechanical diagnostic and repair procedures on common engines utilized in light, medium and heavy diesel trucks, and construction equipment. Detailed precision measurements and testing processes utilizing OEM and aftermarket tools are utilized.

**METHOD OF INSTRUCTION:** A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

### **COURSE OUTLINE:**

- I. Introducing advanced diesel engines
- II. General diesel engine diagnostic repair
  - A. Diagnose engine operation
  - B. Identify system components, configurations, and types of a diesel engine.

- C. Diagnose engine no-crank and crank issues.
- III. Cylinder Head and Valve Train
  - A. Inspect electronic wiring harness and brackets.
  - B. Inspect cylinder head for cracks/damage and determine needed action.
  - C. Inspect injector sleeves/seals.
  - D. Adjust valve bridges, clearances, and injectors.
- IV. Engine Block
  - A. Inspect crankshaft vibration damper and mounts.
  - B. Perform crankcase pressure test.
  - C. Install and inspect flywheel housing.
  - D. Inspect cylinder sleeve counter and lower bore.
  - E. Replace/reinstall cylinder liners and seals.
  - F. Check condition of piston cooling jets.
- V. Lubrication Systems
  - A. Test engine oil pressure and temperature.
  - B. Check engine oil.
  - C. Determine proper lubricant.
  - D. Inspect clean and test oil cooler and components.
  - E. Inspect turbocharger lubrication systems.
  - F. Inspect oil pressure regulator valves.
- VI. Cooling Systems
  - A. Recover, flush and refill coolant.
  - B. Inspect coolant conditioner.
  - C. Inspect valves, lines, and fittings.
  - D. Inspect and pressure cooling systems.
  - E. Inspect, test, and repair thermostatic cooling fan systems (hydraulic, pneumatic and electronic).
  - F. Test engine block heaters
  - G. Inspect turbocharger
- VII. Air Induction and Exhaust Systems
  - A. Inspect turbocharger, wastegates and piping systems.
  - B. Diagnose air induction system problems.
  - C. Inspect engine exhaust system.
  - D. Inspect crankcase ventilation.
  - E. Inspect variable ratio geometry turbocharge, controls and actuators.
  - F. Demonstrate knowledge of charge air cooler operation and testing.
  - G. Diagnose preheater/inlet air heater or glow plug system and controls.
- VIII. Fuel System
  - A. Check fuel level and condition.
  - B. Inspect fuel tanks.
  - C. Inspect low pressure fuel system components.
  - D. Replace fuel filter.
  - E. Inspect high pressure fuel system components.
  - F. Demonstrate knowledge and understanding of different types of fuel systems.
  - G. Perform fuel supply and return system tests.
- IX. Engine Brakes

- A. Inspect engine compression and exhaust brake housing.
- B. Inspect and adjust engine compression.
- C. Inspect, test and adjust engine compression and/or exhaust brake control

**EXPECTED LEARNER OUTCOMES:**

- A. The student will be able to describe diesel engines.
- B. The student will be able to diagnose and inspect cylinder heads and valve trains.
- C. The student will be able to inspect engine blocks.
- D. The student will be able to inspect lubrication systems.
- E. The student will be able to inspect cooling systems.
- F. The student will be able to diagnose air induction systems.
- G. The student will be able to diagnose exhaust systems.
- H. The student will be able to diagnose fuel systems.
- I. The student will be able to inspect engine breaks.

**COURSE COMPETENCIES:**

Upon successful completion of this course:

*The student will be able to describe diesel engines.*

- 1. The student will be able to demonstrate knowledge of diesel engines.
- 2. The student will be able to diagnose diesel engine issues.

*The student will be able to diagnose and inspect cylinder heads and valve trains.*

- 3. The student will be able to demonstrate knowledge of cylinder heads and valve trains.
- 4. The student will be able to adjust cylinder head, valve trains and related components.

*The student will be able to inspect engine blocks.*

- 5. The student will be able to demonstrate knowledge of engine blocks.
- 6. The student will be able to diagnose issues with engine blocks and related components

*The student will be able to inspect lubrication systems.*

- 7. The student will be able to diagnose issues in lubrication systems.
- 8. The student will be able to demonstrate knowledge of lubrication systems.
- 9. The student will be able to demonstrate knowledge of oil pressure valves.

*The student will be able to inspect cooling systems.*

- 10. The student will be able to diagnose cooling system issues.
- 11. The student will be able to demonstrate knowledge of cooling system and related components.
- 12. The student will be able to inspect turbocharger.

*The student will be able to diagnose air induction systems.*

- 13. The student will be able to demonstrate knowledge of air induction systems
- 14. The student will be able to diagnose issues with air induction system components.

- The student will be able to diagnose exhaust systems.*
15. The student will be able to demonstrate knowledge of exhaust system.

- The student will be able to diagnose fuel systems.*
16. The student will be able to demonstrate knowledge of fuel systems.

- The student will be able to inspect engine brakes.*
17. The student will be able to demonstrate knowledge of engine brakes
  18. The student will be able to diagnose issues with engine brakes.
  19. The student will be able to adjust engine brakes.

**ASSESSMENT OF LEARNER OUTCOMES:** Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

**SPECIAL NOTES:**

This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

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