

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Engine Repair 1
COURSE NUMBER	AUTT-0213
DIVISION	Career and Technical Education
DEPARTMENT	AUTT
CIP CODE	47.0604
CREDIT HOURS	2
CONTACT HOURS/WEEK	Class: 1 Lab: 2
PREREQUISITES	AUTT-0103
COREQUISITES	None
COURSE PLACEMENT	None

COURSE DESCRIPTION

In this course students will study and perform tasks from the National Automotive Technicians Education Foundation's (NATEF) Automobile Service Technology (AST) Program. In this course students will complete service work orders, remove and install engine components, service valve adjustments, and study lubrication and cooling system service. This course will emphasize strategies to remove and replace engine assemblies from automobiles. This course is the first of a two part engine repair program, with the second part offered as part of the Master Automotive Service Technology (MAST) program. All students will successfully complete each element of personal safety training before working in the Automotive Laboratory.

PROGRAM ALIGNMENT

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:

https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1. Demonstrate adherence to safety and pollution prevention standards according to OSHA and EPA regulations.
2. Demonstrate the ability to communicate effectively in workplace scenarios with an appropriate level of preparedness for daily tasks and assignments.
3. Demonstrate the ability to diagnose and repair mechanical and electrical damage according to Original Equipment Manufacturer (OEM) specifications and recommendations.

TEXTBOOKS

<http://kckccbookstore.com/>

METHODS 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, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

- I. Engine Removal and Reinstallation
 - A. Locating service data
 - B. Planning removal procedure
 1. Organization
 2. Marking components
 3. Pictures
 4. Organizing work area
 - C. Lifting engines
 1. Crane
 2. Powertrain lifts
 3. Lift brackets
 4. Chaining
 5. Engine stands
 - D. Fluids
 - E. Hose removal
 - F. Wiring removal
 - G. Containing spills
 - H. Transmission separation
 - I. Cleaning
 - J. Part exchange
 - K. Gaskets and sealing technique
 - L. Engine mounts
 - M. Engine pre-lube
 - N. Engine starting
- II. Cylinder Head
 - A. Remove and inspect cylinder head
 1. De-torque
 2. Inspect for cracks
 3. Inspect for warpage
 4. Inspect gaskets

- B. Valve train
 1. Inspect pushrods
 2. Inspect rocker arms
 3. Inspect rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked passages
- C. Install cylinder head
 1. Preparation of gasket surface
 2. Tighten to specification
 3. Angle and torque tightening techniques
- D. Camshaft and drive belt and chain
 1. Drive gear wear
 2. Backlash
 3. Endplay
 4. Sprocket
 5. Chain wear
 6. Overhead cam drive sprocket (s)
 7. Drive belt (s)
 8. Belt tension
 9. Tensioners
 10. Camshaft reluctor ring/tone ring
 11. Valve timing components
 12. Verify camshaft timing
 13. Camshaft position sensor indexing
- III. Block Assembly
 - A. Remove and inspect crank shaft dampener
 - B. Dampener repair sleeve
 - C. Keyways
 - D. Seals
- IV. Lubrication
 - A. Oil pressure tests
 - B. Auxiliary coolers
 - C. Oil temperatures and pressure switches
- V. Cooling System
 - A. Causes of overheating
 - B. Water pump
 - C. Radiators
 - D. Cooling fan shroud, fan, air dams
 - E. Fan clutch

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Perform engine diagnosis; Removal and Reinstallation (R & R).
 - 1. Complete work orders to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
 - 2. Inspect, remove and replace engine mounts.
 - 3. Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.

- B. Perform cylinder head and valve train diagnosis and repair.
 - 4. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.
 - 5. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.
 - 6. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
 - 7. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing.
 - 8. Establish camshaft position sensor indexing.

- C. Perform engine block assembly diagnosis and repair.
 - 9. Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).

- D. Perform lubrication and cooling systems diagnosis and repair.
 - 10. Identify causes of engine overheating.
 - 11. Inspect, remove, and replace water pump.
 - 12. Remove and replace radiator.
 - 13. Inspect and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
 - 14. Perform oil pressure tests; determine necessary action.
 - 15. Inspect auxiliary coolers; determine necessary action.
 - 16. Inspect, test, and replace oil temperature and pressure switches and sensors.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

College Catalog

<https://www.kckcc.edu/academics/catalog/index.html>

College Policies and Statements

<https://www.kckcc.edu/about/policies-statements/index.html>

Accessibility and Accommodations

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.