

AUTC 221 – Engine Systems & Emission Control II
AUTC 290-Automotive Cooperative Education I
(Students must be registered in the same section for each course)

This course includes a study of theories and practice of various automotive engine control systems. The course will improve previously acquired diagnostic skills related to troubleshooting engine computer data and networking systems. The use of up-to-date testing equipment, including the scan tool and lab scope are used in checking the electrical, ignition, emissions system, and CAN Bus network.

In the lab, students will learn a hands-on strategy to perform basic maintenance of engines and learn how to use a variety of hand tools and diagnostic tools. Students will be required to wear clothing appropriate for auto shop safety at all classes. Safety glasses will also be required at all classes.

III. Statement of Course Need

- A. Automotive technicians are vital to our mobile and transport-dependent community. Advanced understanding of how all systems function together to produce a well-running vehicle are extremely important. This course promotes advanced understanding of the automotive engine control systems, and builds critical thinking skills to improve engine diagnostics.
- B. Lab assignments for the course will build upon skills from Engine Performance and Diagnosis I. The lab assignments will enhance the student's ability to read engine computer data and improve lab scope use and advanced diagnostic tasks while maintaining instruction that reinforces the safety practices in a demonstrative environment.
- C. Course transferability: The course transfers as one of the core fundamental courses for the Automotive Technology major and includes a laboratory component; for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities, go to their individual websites.

IV. Place of Course in College Curriculum

- A. Free Elective
- B. This course meets the program requirement for the Automotive Technology Certificate and the Associate of Applied Science in Automotive Technology.
- C. Course transferability; for New Jersey schools go to the NJ Transfer website, www.njtransfer.org. For all other colleges and universities go to their individual sites.

V. Outline of Course Content

1. Review of engine computer systems
2. Review of Emission Control Systems

- a. Evaporative Emission
 - b. Air Injection
 - c. Catalytic Convertor
3. Computerized Engine Control Applications
4. Advanced circuitry and functionality of computer controls
5. Use of Graphing multi-meter (GMM)
6. Digital storage oscilloscope (DSO)
 - a. includes output signal
 - b. resistance
 - c. frequency data
7. Can Bus Diagnosis and Repair
8. Software, updates, or flash reprogramming
9. Electronic Engine Controlled Systems
 - a. Inputs
 - b. Outputs
10. Supercharging and Turbocharging
 - a. Drivability and Diagnosis
11. Trouble-Shooting and Repairs
 - a. Utilizing Various Diagnostic Tools, Scopes and Scanners
 - b. Utilizing DMM, Graphing meters, Oscilloscopes

VI. A. Course Learning Outcomes

At the completion of the course, students will be able to:

1. Examine electronic computer systems and networking communications, and identify appropriate diagnostic platform tools and diagnostic equipment used during diagnosis and repair.
2. Analyze the structure and function of engine performance and networking systems in computer controlled systems.
3. Investigate complex diagnostic and repair issues arising in automobile engine performance systems.
4. Inspect various components of the vehicle's computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope to determine proper diagnostic processes, service, and repairs.
5. Interpret diagnostic trouble codes, obtain, graph, and interpret scan tool data related to the emissions control systems for necessary repairs.
6. Diagnose a variety of defects related to the fuel delivery and ignition systems.
7. Identify and interpret engine performance concerns during operation.
8. Inspect, test, and replace engine components according to manufacturer's specifications.
9. Perform lab experiments and tasks to competent skill level as listed on the NATEF curriculum standards.
10. Identify and describe techniques to troubleshoot, repair, maintain, and solve problems with automotive engine computer control systems (GE NJ 4)

11. Apply quantitative reasoning to problems with automotive engine computer control systems (GE NJ 2) Discuss issues involving automotive engine computer control systems (GE NJ 1)

B. Assessment Instruments

1. lectures
2. demonstrations
3. laboratory work
4. instructional videos/DVDs
5. laboratory performance
6. examinations
7. NATEF task list

VII. Grade Determinants

- A. lab performance
- B. examinations
- C. class participation
- D. technical writing
- E. interactive simulations

Primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. lecture/discussion
- B. small-group work
- C. group discussion
- D. computer-assisted instruction
- E. laboratory
- F. simulation/role playing
- G. demonstration
- H. student collaboration

VIII. Text and Materials

- A. Suggested Text: Automotive Technology: Principles, Diagnosis, and Service Plus MyAutomotiveLab with Pearson eText -- Access Card Package / Edition 5 by James D. Halderman (Author), Prentice Hall Publishing ISBN-10: 0134009088 / ISBN-13: 9780134009087
- B. Students will be required to wear clothing appropriate for auto shop safety at all classes. Student are required to wear a standard industry uniform. Safety glasses will also be required at all classes.

C. The Automotive Program utilizes online curriculum and online industry service and repair information from the following sources:

- I. AllData
- II. Snap On Industries III. Shop Key Pro.

D. Various Automotive Magazines

E. Students are provided the use of RVCC technology during the course

Please note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.

IX. Resources

- A. Reference books
- B. Text Book
- C. AllData
- D. Shop Key Pro
- E. Snap On Industries
- F. NAPA Pro-Link
- G. Published Automotive Magazines
- H. Lab/Shop Tools and Equipment
- I. Electude Interactive Courseware
- J. Safety equipment
- K. Lubricants and various automotive fluids
- L. Sample automotive system components
- M. Instructional videos/DVDs
- N. Auto mechanics shop facility at RVCC workforce building