

Raritan Valley Community College Course Outline

AUTC 202 – Engine Performance and Diagnosis I

I. Basic Course Information

- A. Course Number and Title: AUTC 202 – Engine Performance and Diagnosis I
- B. New or Modified Course: Modified
- C. Date of Proposal: Fall 2017
- D. Effective Term: Fall 2018
- E. Sponsoring Departments: *Science and Engineering Department*
- F. Semester Credit Hours: 2
- G. Weekly Contact Hours: 4 Lecture: 1
 Laboratory: 3
 Out of class student work per week: 3.5
- H. Prerequisite: A grade of C or better in courses AUTC 201 - Engine Systems & Emission Control and AUTC 104 – Automotive Electrical Systems
- I. Laboratory Fees: Yes
- J. Name and Telephone Number or Email Address of Department Chair and Divisional Dean at time of approval:
Department Chair: Marianne Baricevic, Marianne.baricevic@raritanval.edu
Divisional Dean: Sarah Imbriglio, sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisite: A grade of C or better in courses AUTC 201 - Engine Systems & Emission Control and AUTC 104 – Automotive Electrical Systems I. This course will include a study of theories and practice of various automotive engine control systems. The course will build diagnostic skills related to troubleshooting engine computer 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 general engine conditions.

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 precision measurement 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 will develop the student's knowledge of engine diagnosis. This course is intended to enhance the student's knowledge beyond understanding and build critical thinking skills.
- B. Lab assignments for the course will introduce basic maintenance and repair of engine systems while maintaining instruction that reinforces 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 Basic Engine Operation
 - a. Phases and Chemistry of Internal Combustion
- 2. Review of Emission Control Systems
 - a. Evaporative Emission
 - b. PCV
 - c. EGR
 - d. Air Injection
 - e. Catalytic Converter
- 3. Fuel Delivery, Carbs and Feedback Carbs
 - a. Internal Operation and Theory
 - b. Influence of Emissions and Air/Fuel Mixtures on Drivability

4. Fuel Delivery - Mechanical and Constant Fuel Injection
 - a. Control Components and Theory
 - b. Drivability Diagnosis
5. Fuel Delivery – Electronic Fuel Injection
 - a. Fuel pumps and Delivery Components
 - b. Fuel Injectors and Control Circuits
 - c. Control and Feedback Sensors
 - d. Input vs Output Circuits
 - e. Drivability Diagnosis
6. Ignition Systems, Standard, Electronic and Computer Controlled
 - a. Standard Ignition System: Theory, Components and Diagnosis
 - b. High Energy Ignition: Theory, Components and Diagnosis
 - c. Distributorless Ignition: Theory, Components and Diagnosis
 - d. Coil-On-Plug Systems: Theory, Components and Diagnosis
 - e. Other Electronic Ignition System Designs
7. Electronic Engine Controls and Computer Controlled Systems
 - a. Sensors
 - b. Solenoids
 - c. Computer Controlled Components
8. Supercharging and Turbocharging
 - a. Air Fuel Ratios
 - i. Drivability and Diagnosis
9. Trouble-Shooting and Repairs
 - a. Utilizing Various Diagnostic Tools, Scopes and Scanners

VI. General Educational and Course Learning Outcomes

A. General Educational Learning Outcomes

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

1. identify techniques to troubleshoot, repair, maintain, and solve problems related to automotive engine computer control systems (GE NJ 4)
2. apply quantitative reasoning to problems with the maintenance of automotive engine computer control systems (GE NJ 2)
3. discuss issues involving automotive engine computer control systems (GE NJ 1)

B. Course Learning Outcomes

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

1. Examine internal combustion components and identify appropriate tools and measuring instruments used during diagnosis and repair.
2. Analyze the structure and function of engine performance systems in automobiles.

3. Investigate complex diagnostic and repair issues arising in automobile engine performance systems.
4. Describe the importance of the steps involved in the troubleshooting process for diagnosing concerns and also for solving the problem.
5. Inspect various components of the vehicle's fuel delivery, air intake and exhaust systems to determine proper diagnostic processes, service, and repairs.
6. Interpret diagnostic trouble codes and scan tool data related to the emissions control systems for necessary repairs.
7. Diagnose a variety of defects related to the fuel delivery and ignition systems.
8. Identify and interpret engine performance concerns during operation.
9. Inspect, test, and replace engine components according to manufacturer's specifications.
10. Perform lab experiments and tasks to competent skill level as listed on the NATEF curriculum standards.

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