RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

AUTC 221 – Engine Systems & Emission Control II

I. Basic Course Information

A. Course Number and Title: AUTC 221 – Engine Systems & Emission Control II

B. New or Modified Course: Modified

C. Date of Proposal: Fall 2022

D. **Effective Term: Fall 2023**

E. Sponsoring Departments: *Science and Engineering Department*

F. Semester Credit Hours: 3

G. Weekly Contact Hours: 5 Lecture: 2
Laboratory: 3
Out of class student work per week: 5.5

H. Prerequisite (s)☐ Corequisite (s) ☐ **OR** Prerequisite (s) and Corequisite (s) ☒**:**
Prerequisite: AUTC 101 – Automotive Introduction, Fundamentals, and Safety
AUTC 201– Engine Systems & Emission Control I
Corequisites: AUTC 204 – Automotive Electrical Systems II
AUTC 208 – Engine Performance and Diagnosis II
AUTC 220 Hybrid/Electric Vehicles
AUTC 290-Automotive Cooperative Education I
(Students must be registered in the same section for each course)

I. Additional Fees: None

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: AUTC 101 – Automotive Introduction, Fundamentals, and Safety
AUTC 201– Engine Systems & Emission Control I

Corequisites: AUTC 204 – Automotive Electrical Systems II
AUTC 208 – Engine Performance and Diagnosis II
AUTC 220 Hybrid/Electric Vehicles
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This course will build on the theory and practice of advanced operation of the internal combustible engine, the OTTO cycle, lubricating systems, and coolant systems. Training is provided in diagnosing, repairing, and theory of the following subsystems: cylinder block, cylinder heads, and intake and exhaust systems with emphasis on emission control systems.

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. Understanding the structure and function of engine lubrication systems in automobiles and their maintenance are integral elements for the education of well-trained technicians in the field. Efficiency, performance and compliance with EPA regulations (State and Federal) are mandatory in this field as well as customer satisfaction. This course is intended to enhance the student's knowledge beyond understanding.

B. Lab assignments for the course will introduce students to the basic engine power plant of the vehicle, introduce basic maintenance and repair of engine lubrication systems, and maintaining instruction that reinforces 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

A. Advanced Engine Systems
    i. Engine Design and Diag. ii. Engine Cylinder and Valve Train iii. Engine Camshaft Phasing iv. VVT
B. Principles of valve Timing
C. Valve Timing Diagnosis
D. Air/Fuel Atomization Process
E. Engine Rebuilding Process
F. Engine Disassembly
    i. Oil Gallery
G. Cylinder and Valve Train Machining
H. Crankshaft Oil Galleries
I. Camshaft and Valve Train Inspection
    i. Oil Galleries ii. Pushrods iii. Rocker Arms iv. Timing Components
    v. Camshaft/crankshaft timing vi. Camshaft Indexing
J. Total Review of Combined Components
K.

VI. A. Course Learning Outcomes

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

1. Analyze the structure and layout of engines and engine lubrication systems.
2. Compare and contrast the various engine lubrication system components relating to OHV and pushrod engine layout.
3. Inspect, test, and replace engine lubrication system components according to manufacturer's specifications.
4. Examine internal lubrication system components and identify appropriate tools and measuring instruments used during diagnosis and repair.
5. Perform lab experiments and tasks to competent skill level as listed on the NATEF curriculum standards.
6. Identify techniques to troubleshoot, repair, maintain, and solve problems with automotive engine lubrication systems (GE NJ 4)
7. Apply quantitative reasoning to problems with the maintenance of automotive engine lubrication systems (GE NJ 2)
8. Discuss issues involving automotive engine lubrication 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