

ILLINOIS VALLEY COMMUNITY COLLEGE



COURSE OUTLINE

DIVISION: Workforce Development

COURSE: ATO 2280 - Computerized Engine Controls

Date: Spring 2014

Credit Hours: 3

Prerequisite(s): ATO 1220, 1250, 2210, 2220 or consent of instructor

Delivery Method:

<input checked="" type="checkbox"/> Lecture	2 Contact Hours (1 contact = 1 credit hour)
<input type="checkbox"/> Seminar	0 Contact Hours (1 contact = 1 credit hour)
<input checked="" type="checkbox"/> Lab	2 Contact Hours (2 contact = 1 credit hour)
<input type="checkbox"/> Clinical	0 Contact Hours (3 contact = 1 credit hour)
<input type="checkbox"/> Online	
<input type="checkbox"/> Blended	

Offered: Fall Spring Summer

IAI Equivalent –**Only for Transfer Courses**–go to <http://www.itransfer.org>.

CATALOG DESCRIPTION:

This course is designed to teach how computers aid in controlling fuel systems, electronic ignition, and emission control devices. On-Board Diagnostics Generation II system will be taught along with all of the various engine input and output devices and how they work with the engine computer (PCM). During lab scanners, digital storage oscilloscopes, and other electronic testers will be used to solve issues associated with Service Engine Soon light and other driveability problems.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

- To apply analytical and problem solving skills to personal, social and professional issues and situations.
- To communicate orally and in writing, socially and interpersonally.
- To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
- To understand and use contemporary technology effectively and to understand its impact on the individual and society.
- To work and study effectively both individually and in collaboration with others.
- To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
- To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
- To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

Provided a vehicle, a service manual, the proper tools and equipment, the student will be able to perform the following performance objectives after instruction in the classroom and a demonstration in lab:

1. List five major automotive exhaust pollutants.
2. Explain how various EGR valves operate.
3. Explain how computer-controlled spark advance operates.
4. Test an electronic ignition pickup coil assembly, ignition coil and control module with the use of a digital ohmmeter and voltmeter.
5. Check actual computer controlled distributor spark advance on an automobile.
6. Locate engine computers, input and output devices on an assigned vehicle.
7. Explain how feedback carburetion operates.
8. Adjust a throttle position sensor, mixture control solenoid and idle speed control motor to specifications.
9. Use a digital ohmmeter and voltmeter or a computer scanner tester to test an oxygen sensor, coolant sensor, vehicle speed sensor, barometric sensor, electronic spark timing, and to bring up codes, voltages, or resistance's on an assigned automobile.

10. Correctly interpret dwell-meter and voltmeter readings from a mixture control solenoid and adjust to specifications if necessary.
11. Use manufacturer's service manuals to repair a computer controlled malfunction.
12. Explain how throttle body electronic fuel injection operates.
13. Make any and all adjustments needed on a throttle body fuel injector unit.
14. Use electrical wiring diagrams to repair electrical problems.
15. Explain how multi-port fuel injection operates.
16. Know how to test electronic pintel type injectors.
17. Properly test gasoline for too much alcohol content.
18. Use the four gas analyzer to diagnose engine problems.

COURSE TOPICS AND CONTENT REQUIREMENTS:

- I. Automotive Emission Standards and Air Pollution
 - A. Air Pollution
 - B. Regulated Motor Vehicle Emissions
 1. CO, HC, NOx, SO2, and PM
 2. Emission Specifications
 - C. Emission Test Procedures

- II. Exhaust Gas Recirculation Systems
 - A. EGR Valves
 1. Types of valves
 - B. Time Delay Systems
 - C. Diagnosis of EGR Systems

- III. Air Injection Emission Systems
 - A. Air Pump
 - B. Air System
 - C. Pulse Air Injection
 1. Design and Operation
 - D. Thermactor Air Pump Systems
 1. Design and Operation
 - E. Chrysler Air Injection System
 - F. Aspirator Systems

- IV. Distributor Spark Retard Emission System
 - A. Spark Delay Valve Systems

- 1. Coolant Spark Control
- 2. Cold-Start Advance
- B. Orifice Spark Advance Control
 - 1. Design and Operation
- C. Transmission Controlled Spark
 - 1. Low Gear Operation
 - 2. High Gear Operation
- D. Diagnosis of Distributor Spark Retard Systems

V. Electronic Ignition Systems

- A. General Motors High-Energy Ignition
 - 1. Design and Operation
 - 2. Ohmmeter and Voltmeter Tests
- B. Electronic Spark Control - HEI Systems
 - 1. Design and Operation
 - 2. Diagnose No Start Conditions
- C. Ford Solid State Ignition Systems
 - 1. Design
 - 2. Dura-Spark I Ignition
 - 3. Dura-Spark II Ignition
 - 4. Thick Film Integrated Ignition
 - 5. Troubleshoot System
- D. Chrysler Electronic Ignition Systems
 - 1. Design
 - 2. Conventional Four-Terminal Module
 - 3. Conventional Five-Terminal Module
 - 4. Hall Effect Ignition
 - 5. Troubleshoot System

VI. Computer-Controlled Distributor Advance Systems

- A. Chrysler Electronic Lean Burn (ELB)
 - 1. Design and Operation
 - 2. Diagnosis of ELB
- B. Ford Electronic Engine Control (EEC I)
 - 1. Electronic Control Assembly
 - 2. Input and Output Sensors
 - 3. Operation
 - 4. Diagnosis of EEC

VII. Computer Controlled Carburetor Systems

- A. General Motors Computer Command Control (C3)
System
 - 1. Electronic Control Module (ECM)
 - 2. ECM Inputs
 - 3. ECM Output Control Functions
 - 4. Vara-jet, dualjet, and quadrajet carburetor

- adjustments.
- 5. Diagnosis of C3
 - a) Check - Engine Light
 - b) Ground ALCL Connector
 - c) Computerized C3 Testers
 - d) Dwellmeter
- B. Ford Electronic Engine Control II (ECC II) Systems
 - 1. Compare to EEC I
 - 2. EGO - Sensor
 - 3. Other Sensors
 - 4. Diagnosis EEC II
- C. Ford Electronic Engine Control III (EEC III) Systems
 - 1. Compare to EEC I and EEC II
 - 2. FBCA Carburetor Actuator
 - 3. Diagnosis of EEC III
- D. Ford Electronic Engine Control (EEC IV) Systems
 - 1. Compare to EEC III
 - 2. ECA, inputs, and outputs
 - 3. Diagnosis of EEC IV
 - a) Latch down
 - b) On demand vs. continuous codes
- E. Ford Microprocessor Control Unit Systems
 - 1. Operation
 - 2. Air - Fuel Ratio Control
 - 3. Diagnosis of MCU
- F. Chrysler Electronic Feedback Carburetor Systems
 - 1. Operation
 - 2. ESC Computer
 - 3. Input Sensors
 - 4. Output Sensors
 - 5. Diagnosis of EFBC

VIII. Computer Controlled Fuel Injection Systems

- A. General Motors Throttle Body Injection Systems
 - 1. Throttle Body Unit
 - 2. Fuel System
 - 3. Components
 - 4. Diagnosis of TBI
- B. Ford Electronic Fuel Injection
 - 1. System Design
 - 2. Fuel System
 - 3. Components
 - 4. Diagnosis of EFI
- C. Chrysler Electronic Fuel Injection
 - 1. System Design
 - 2. Input Sensors
 - 3. Control Modules
 - 4. Fuel System

- 5. Diagnosis of EFI
- IX. Four Gas Analyzer
 - A. Design
 - B. HC, CO, CO₂ and O₂
 - C. Specifications
 - D. Troubleshooting

INSTRUCTIONAL METHODS:

- 1. Lecture
- 2. Demonstration
- 3. Filmstrips
- 4. Handouts
- 5. Transparencies
- 6. Reading Assignments
- 7. Current Events
- 8. Quizzes
- 9. Exams

INSTRUCTIONAL MATERIALS:

TEXT: Scan Tool Diagnostics for Domestic Vehicles. Jendham, Inc. 1997.
Waveform Reference Manual. Tektronix, 1995.

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

- 1. Meet classroom and lab objectives of this course as stated in course outline.
- 2. Pass written exams and quizzes.
- 3. Student evaluation form for live lab performance objectives.
- 4. Safe work habits.
- 5. Hands on experience.
- 6. Attendance.
- 7. Class participation.
- 8. Current events.
- 9. Assigned readings and questions.

OTHER REFERENCES

Course Competency/Assessment Methods Matrix

ATO 2280 - Computerized Engine		Assessment Options																																	
For each competency/outcome place an "X" below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment			
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D									
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