

FLORIDA STATE COLLEGE AT JACKSONVILLE

NON-COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: AER 0501
COURSE TITLE: Engine Performance I
PREREQUISITE(S): AER0190C and AER 0691C
COREQUISITE(S): None
TOTAL CONTACT HOURS: 100

(For Office Use Only:
Vocational Credits 3.5)

FACULTY WORKLOAD POINTS: 3.3

STANDARDIZED CLASS SIZE
ALLOCATION: 24

COURSE DESCRIPTION:

This course is designed to teach entry-skills job in the diagnosis and repair of drivability problems. Topics covered include engine performance and electrical and computer system operations. Emphasis is placed on manufacturer's diagnostic charts and advanced diagnostic equipment. Use of scanners on fuel injected vehicles will be addressed.

SUGGESTED TEXT(S): Automotive Technology, 2nd e., Halderman

IMPLEMENTATION DATE: Fall Term, 1987 (881)
Fall Term, 1996 (971)

REVIEW OR MODIFICATION DATE: Fall Term, 1998
Fall Term, 2002 (20031)
Fall Term, 2008 (20091)
Spring Term, 2008 (20082), (Purge)
Fall Term, 2008 (20091)

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
I. Introduction	10
A. Tools	
B. Safety	
C. Shop Procedures	
II. Review of Basic Engine Performance Fundamentals	12
A. General Power Train Diagnosis	
B. Magnetism, Conductors, Insulators	
C. Electrical vs. Electronic Circuits	
D. Economy	
III. Why Computers?	8
A. Emissions	
B. Mileage	
C. Drivability	
D. Economy	
IV. Computerized Engine Control Components	30
A. Input Sensors and Devices	
B. Actuators	
C. Control Modules	
V. Fuel System and Diagnosis	20
A. EFI - Electronic Fuel Injection	
B. PFI - Port Fuel Injection	
C. MPFI - Multi-Port Fuel Injection	
D. Throttle Body - Throttle Body Fuel Injection	

PROGRAM TITLE: Automotive Service Technology

COURSE TITLE: Engine Performance I

CIP NUMBER: 0647.060405

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

01.0 DEMONSTRATE AN UNDERSTANDING OF AUTOMOTIVE MECHANICS -- The student will be able to:

- 01.01 Apply shop safety rules and procedures.
- 01.02 Use and maintain hand tools such as screwdrivers, special application pliers, hammers, chisels, punches, special application wrenches and sockets, files, hack-saws, bench vises and "C" clamps.
- 01.03 Demonstrate use of precision measuring tools.
- 01.04 Use and install fasteners such as screws and bolts, key screw extractors, helicoil inserts and thread cutting taps and dies.
- 01.05 Use and maintain power tools such as drills, bench grinders, drill presses, hydraulic presses, impact wrenches, air chisels, parts washers, hydraulic jacks and vehicle hoists.
- 01.06 Apply basic math skills.
- 01.07 Use and apply metric and English measurement skills.
- 01.11 Demonstrate use of technical manuals, specification handbooks and charts.
- 01.20 Demonstrate knowledge of engine components.
- 01.21 Demonstrate an understanding of basic ignition and fuel systems.
- 01.29 Demonstrate knowledge of internal engine components.
- 01.30 Describe electrical terms, magnetism, electrical current flow and Ohms' law.
- 01.31 Demonstrate an understanding of series circuits.
- 01.32 Demonstrate an understanding of parallel circuits.
- 01.33 Demonstrate an understanding of series-parallel circuits.
- 01.35 Demonstrate an understanding of advanced electronics concepts.
- 01.36 Demonstrate an understanding of electronic schematic diagrams and diagnostic techniques.
- 01.37 Demonstrate an understanding of electrical/electronic wire repair procedures.
- 01.38 Demonstrate an understanding of electronic semiconductor concepts and components.
- 01.39 Demonstrate an understanding of electronic transistor concepts and components.
- 01.40 Demonstrate an understanding of electronic micro-processor concepts, functions and components.
- 01.42 Locate and correct rattles and noises.
- 01.52 Check vehicle visibility.

02.0 APPLY ELECTRICAL AND ELECTRONIC SKILLS IN DIAGNOSING/TROUBLESHOOTING MALFUNCTIONS OF ELECTRICAL/ELECTRONIC COMPONENTS -- The student will be able to:

- 02.01 Use and apply basic electrical and electronic test equipment and meters.
- 02.02 Perform power checks with test lights.
- 02.03 Perform continuity tests.
- 02.04 Measure voltage drop, current flow and resistance in a circuit or component with a multi-meter. (ASE)
- 02.05 Locate an open circuit and a short circuit.

LIST PERFORMANCE STANDARD ADDRESSED: (Continued)

NUMBER(S):	TITLES(S):
02.10	Test, remove and replace fuses and circuit breakers.(ASE)
02.16	Test and replace electrical system switches. (ASE)
02.19	Test and replace sending units. (ASE)
02.20	Diagnose engine malfunctions.
02.26	Test and replace instrument panel units. (ASE)

06.0 DEMONSTRATE PROFICIENCY IN ENGINE PERFORMANCE SERVICE -- The student will be able to:

- 06.01 Analyze engine performance.
- 06.02 Perform running cylinder balance tests.
- 06.03 Perform cylinder compression tests.
- 06.04 Check the performance of engines equipped with on-board computers.
- 06.09 Inspect and test primary circuits.
- 06.12 Inspect, remove and replace ignition wires, caps and rotors.
- 06.16 Inspect, remove and replace fuel filter. (ASE)
- 06.17 Measure fuel flow and pressure.
- 06.20 Adjust idle speed.
- 06.21 Clean and adjust chokes. (ASE)
- 06.24 Set idle speed to specifications.
- 06.26 Service throttle body fuel injection systems.
- 06.27 Service ported fuel injection systems.
- 06.33 Inspect, remove and replace catalytic converter. (ASE)
- 06.34 Diagnose mechanical, ignition and fuel emission problems.
- 06.37 Perform cylinder leakage tests.
- 06.38 Diagnose and correct malfunctions in computer control systems.
- 06.39 Diagnose, test and replace on-board computer controls.
- 06.40 Diagnose, service and replace computerized sensors.
- 06.44 Check and adjust turbo charger waste gates. (ASE)
- 06.45 Test exhaust emissions using a four gas analyzer.
- 06.48 Check and adjust injection pump timing.
- 06.50 Check and adjust idle and maximum speeds.
- 06.51 Test and service preheating systems.

09.0 DEMONSTRATE PROFICIENCY IN ENGINE REPAIR SERVICE -- The student will be able to:

- 09.05 Perform cylinder balance tests.
- 09.06 Perform cylinder compression tests.
- 09.07 Perform cylinder leakage tests. (ASE)



NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

<i>Section 1</i>	
COURSE PREFIX AND NUMBER: AER 0501	SEMESTER CREDIT HOURS: <u>100</u>
COURSE TITLE: Engine Performance I	

Section 2

TYPE OF COURSE: (Click on the box to check all that apply)

<input type="checkbox"/> AA Elective	<input type="checkbox"/> AS Required Professional Course	<input type="checkbox"/> College Prep
<input type="checkbox"/> AS Professional Elective	<input type="checkbox"/> AAS Required Professional Course	<input type="checkbox"/> Technical Certificate
<input type="checkbox"/> Other	<input checked="" type="checkbox"/> PSAV	<input type="checkbox"/>
Apprenticeship		
<input type="checkbox"/> General Education: (For General Education courses, you must also complete Section 3 and Section 7)		

Section 3 (If applicable)

INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:

<input type="checkbox"/> Communications	<input type="checkbox"/> Social & Behavioral Sciences	<input type="checkbox"/> Mathematics
<input type="checkbox"/> Natural Sciences	<input type="checkbox"/> Humanities	

Section 4

INTELLECTUAL COMPETENCIES:

<input checked="" type="checkbox"/> Reading	<input checked="" type="checkbox"/> Speaking	<input checked="" type="checkbox"/> Critical Analysis	<input type="checkbox"/> Quantitative Skills	<input type="checkbox"/> Scientific Method of Inquiry
<input checked="" type="checkbox"/> Writing	<input checked="" type="checkbox"/> Listening	<input type="checkbox"/> Information Literacy	<input type="checkbox"/> Ethical Judgment	<input checked="" type="checkbox"/> Working Collaboratively

<i>Section 5</i>	
LEARNING OUTCOMES	METHOD OF ASSESSMENT
• DEMONSTRATE AN UNDERSTANDING OF AUTOMOTIVE MECHANICS	Written test, NATEF Authentic Task Observation (NATO)
• APPLY ELECTRICAL AND ELECTRONIC SKILLS IN DIAGNOSING/TROUBLESHOOTING MALFUNCTIONS OF ELECTRICAL/ELECTRONIC COMPONENTS	Written test, NATEF Authentic Task Observation (NATO)
• DEMONSTRATE PROFICIENCY IN ENGINE PERFORMANCE SERVICE	Written test, NATEF Authentic Task Observation (NATO)
• DEMONSTRATE PROFICIENCY IN ENGINE REPAIR SERVICE	Written test, NATEF Authentic Task Observation (NATO)

Section 6

Name of Person Completing This Form: <u>Paul Soar</u>	Date: Nov 10, 2007
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