ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Workforce Development

COURSE: ATO 1250 – Engine Performance

Date: Spring 2014

Credit Hours: 3.0

Prerequisite(s): None

Delivery Method:		
	☒ **Lecture**	**2 Contact Hours (1 contact = 1 credit hour)**
	☐ **Seminar**	**0 Contact Hours (1 contact = 1 credit hour)**
	☒ **Lab**	**2 Contact Hours (2 contact = 1 credit hour)**
	☐ **Clinical**	**0 Contact Hours (3 contact = 1 credit hour)**
	☐ **Online**	
	☐ **Blended**	

Offered: ☒ **Fall** ☐ **Spring** ☒ **Summer**

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

CATALOG DESCRIPTION:
This course is a basic tune-up class with the purpose of obtaining an understanding of ignition systems used in automotive vehicles. The basic design of all electronic ignition systems and how to troubleshoot each component from a no-start or driveability condition will be taught in the classroom. Basic test equipment such as compression and cylinder leakage testers, regular oscilloscope, hand-held digital storage oscilloscope, multimeter, and 4-gas analyzer will be taught during lab.

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:

I. Engine Repair Tasks (NATEF)
  A. General Engine Diagnosis; Removal and Reinstallation (R & R)
    I.A.7 Perform cylinder compression tests; determine necessary action.
    I.A.8 Perform cylinder leakage tests; determine necessary action.
    I.A.9 Perform cylinder compression tests; determine necessary action.
    I.A.10 Perform cylinder leakage tests; determine necessary action.

VI. Electrical/Electronic Systems Tasks (NATEF)
  A. General Electrical System Diagnosis
    VI.A.3 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
    VI.A.4 Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).
    VI.A.5 Use wiring diagrams during diagnosis of electrical circuit problems.
    VI.A.6 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.
    VI.A.7 Check electrical circuits with a test light; determine necessary action.
    VI.A.8 Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.
    VI.A.9 Measure current flow in electrical/ electronic circuits and components using an ammeter; determine necessary action.
    VI.A.10. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.
    VI.A.11 Check electrical circuits using jumper wires; determine necessary action.
    VI.A.12 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.

VIII. Engine Performance Tasks (NATEF)

A. General Engine Diagnosis

VIII.A.1 Identify and interpret engine performance concern; determine necessary action.

VIII.A.2 Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.

VIII. A.3 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).

VIII.A.7 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.

VIII.A.8 Perform cylinder power balance test; determine necessary action.

VIII.A.9 Perform cylinder compression test; determine necessary action.

VIII.A.10 Perform cylinder leakage test; determine necessary action.

VIII.A.11 Diagnose engine mechanical, electrical, electronic, fuel and ignition problems with an oscilloscope and engine diagnostic equipment; determine necessary action.

VIII.A.12 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings and determine necessary action.

C. Ignition System diagnosis and Repair

VIII.C.1 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action.

VIII.C.2 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action.

VIII.C.3 Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.

VIII.C.4 Inspect, test, and service distributor.

VIII.C.5 Inspect and test ignition system secondary circuit wiring and components; perform necessary action.

VIII.C.6 Inspect and test ignition coil(s); perform necessary action.

VIII.C.7 Check and adjust ignition system timing and timing advance/retard (where applicable).

VIII.C.8 Inspect and test ignition system pick up sensor or triggering devices; perform necessary action.

COURSE TOPICS AND CONTENT REQUIREMENTS÷

Magnetism, Electromagnetism, and EMI Suppression

A. Sources of Electricity
   a. Friction, Heat, Light, Pressure, Chemistry, and Magnetism
B. Results of Electricity
   a. Light, Motion, and Magnetism
C. Polarity and How Polarity Can be Used to Repair Vehicles
D. Electromagnetism and Application
   a. Description and Operation
E. Relays and Properties
   a. Description and Operation
   b. How to Troubleshoot a Relay

INSTRUCTIONAL METHODS:

1. Lecture
2. Demonstrations (each performance objective)
3. Handouts
4. Quizzes
5. Transparencies
6. Summaries

INSTRUCTIONAL MATERIALS:

TEXTBOOK:

1. James Halderman. Advanced Engine Performance Diagnosis, 3rd Edition. Pearson Prentice Hall, 2006.

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

- Practice proper shop safety
- Meet objectives of course
- Pass written exams and quizzes
- Perform lab exercises satisfactorily
- Class participation (discussion)
- Homework - Chapter summaries
- Notebook

OTHER REFERENCES

Course Competency/Assessment Methods Matrix

ATO 1250 – Engine Performance	**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
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**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						
I.A.7 Engine Repair Tasks - Perform cylinder compression tests; determine necessary action.					X																											
I.A.8 Engine Repair Tasks - Perform cylinder leakage tests; determine necessary action.					X																											
I.A.9 Engine Repair Tasks - Perform cylinder compression tests; determine necessary action.					X																											
I.A.10 Engine Repair Tasks - Perform cylinder leakage tests; determine necessary action.					X																											
VI.A.3 Electrical/Electronic Systems Tasks - Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).					X			X	X																							

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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
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**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							
VI.A.4 Electrical/Electronic Systems Tasks - Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).					X																												
VI.A.5 Electrical/Electronic Systems Tasks - Use wiring diagrams during diagnosis of electrical circuit problems.					X			X	X																								
VI.A.6 Electrical/Electronic Systems Tasks - Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.					X			X	X																								
VI.A.7 Electrical/Electronic Systems Tasks - Check electrical circuits with a test light; determine necessary action.					X																												
VI.A.8 Electrical/Electronic Systems Tasks - Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.					X																												

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VI.A.9 Electrical/Electronic Systems Tasks - Measure current flow in electrical/ electronic circuits and components using an ammeter; determine necessary action.					X																												
VI.A.10 Electrical/Electronic Systems Tasks - Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.					X																												
VI.A.11 Electrical/Electronic Systems Tasks - Check electrical circuits using jumper wires; determine necessary action.					X																												
VI.A.12 Electrical/Electronic Systems Tasks - Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.					X																												
VIII.A.1 Engine Performance Tasks - Identify and interpret engine performance concern; determine necessary action.					X																												

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VIII.A.2 Engine Performance Tasks - Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.					X																												
VIII.A.3 Engine Performance Tasks - Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).					X																												
VIII.A.7 Engine Performance Tasks - Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.					X			X	X																								
VIII.A.8 Engine Performance Tasks - Perform cylinder power balance test; determine necessary action.					X																												
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VIII.A.10 Engine Performance Tasks - Perform cylinder leakage test; determine necessary action.					X																												
VIII.A.11 Engine Performance Tasks - Diagnose engine mechanical, electrical, electronic, fuel and ignition problems with an oscilloscope and engine diagnostic equipment; determine necessary action.					X																												
VIII.A.12 Engine Performance Tasks - Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings and determine necessary action.					X			X	X																								
VIII.C.1 Engine Performance Tasks - Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action.					X			X	X																								

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VIII.C.2 Engine Performance Tasks - Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action.					X			X	X																								
VIII.C.3 Engine Performance Tasks - Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.					X																												
VIII.C.4 Engine Performance Tasks - Inspect, test, and service distributor.					X																												
VIII.C.5 Engine Performance Tasks - Inspect and test ignition system secondary circuit wiring and components; perform necessary action.					X																												
VIII.C.6 Engine Performance Tasks - Inspect and test ignition coil(s); perform necessary action.					X																												

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VIII.C.7 Engine Performance Tasks - Check and adjust ignition system timing and timing advance/retard (where applicable).					X			X	X																						
VIII.C.8 Engine Performance Tasks - Inspect and test ignition system pick up sensor or triggering devices; perform necessary action.					X			X	X																						