ATL 180 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: ATL 180 Title: IC ENGINE PERFORMANCE
Full Title: Internal Combustion Engine Performance
Last Reviewed: 1/22/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Students will explore the operation, troubleshooting and repair of the ignition, fuel, and emission control systems of late model automobiles through lecture, demonstration, and practical lab. This course emphasizes safety and the proper use of tools and diagnostic equipment. This course also prepares students to pass the Automotive Service Excellence (ASE) A8 Engine Performance certification test, and enter the automotive trade as an apprentice level technician specializing in engine performance and emission control. This course conforms with ASE Education's instructional and content guidelines.

Prerequisites/Corequisites:
Course Completion of ATL 110 and ATL 162

Recommended Preparation:
Eligibility for ENGL 1A or equivalent

Limits on Enrollment:

Schedule of Classes Information:
Description: Students will explore the operation, troubleshooting and repair of the ignition, fuel, and emission control systems of late model automobiles through lecture, demonstration, and

practical lab. This course emphasizes safety and the proper use of tools and diagnostic equipment. This course also prepares students to pass the Automotive Service Excellence (ASE) A8 Engine Performance certification test, and enter the automotive trade as an apprentice level technician specializing in engine performance and emission control. This course conforms with ASE Education's instructional and content guidelines. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion of ATL 110 and ATL 162
Recommended: Eligibility for ENGL 1A or equivalent
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Explain the operation, troubleshooting and repair of the ignition, fuel and emission control systems of late model automobiles.
2. Use diagnostic tools and equipment to analyze and diagnose common problems.
3. Demonstrate repair of automotive ignition, fuel, and integrated electronic engine controls.
4. Demonstrate skills necessary to pass the ASE Engine Performance (A8) Certification Exam.

Objectives:
At the conclusion of this course, the student should be able to:
1. Evaluate and repair engine systems based on knowledge and application of engine operating principles.
2. Test, diagnose, and repair engine mechanical components.
3. Explain the operation of automotive ignition, fuel, and integrated electronic engine controls, including: On Board Diagnostics generation II (OBDII) systems, network systems, and diagnostic communication systems.
4. Analyze and diagnose common problems and repair automotive ignition, fuel, and integrated electronic engine controls, including OBDII.
5. Successfully pass a mock ASE A8 Engine Performance Certification Exam.
6. Qualify to enter the automotive trade as an apprentice level technician specializing in engine performance and emission control.

Topics and Scope:

I. OBD II
- A. OBD II connector identification
- B. Retrieving OBD II diagnostic trouble codes
- C. OBD II monitors status

II. Computer Fundamentals
- A. Powertrain Control Module (PCM) actuators diagnosis
- B. Controller Area Network (CAN) and network communications
- C. Module communication

III. Temperature Sensors
IV. Oscilloscopes and Graphing Multimeters
V. Throttle Position Sensors
VI. Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Sensors
VII. Mass Airflow Sensors (MAF)
VIII. Oxygen Sensors
- A. Oxygen sensor diagnosis
- B. Wide-band oxygen sensor

IX. Ignition System Operation and Diagnosis
- A. Ignition system identification
- B. Electronic ignition diagnosis
- C. Ignition scope analysis
- D. Ignition inspection and testing
- E. Spark plugs inspection
- F. Ignition coil testing
- G. Primary ignition inspection and testing

X. Fuel Pumps, Lines, and Filters
- A. Fuel pump testing
- B. Fuel pump current draw test
- C. Fuel filter replacement

XI. Fuel Injection Components and Operation
XII. Electronic Throttle Control Systems
XIII. Fuel Injection System Diagnosis and Service
- A. Scan tool diagnosis
- B. Fuel trim diagnosis
- C. Port fuel-injection system diagnosis
- D. Injector resistance testing
- E. Fuel injector balance test
- F. Injector voltage waveform test

XIV. Vehicle Emission Standards and Testing
XV. Emission Control Devices Operation and Diagnosis
- A. Diagnosis of emission-related concerns
- B. Exhaust system backpressure test
- C. Positive Crankcase Ventilation (PCV) system inspection
- D. Exhaust Gas Recirculation (EGR) system scan tool diagnosis
- E. Service EGR system
- F. EGR electrical sensors
- G. Catalytic converter test
- H. Secondary air injection diagnosis
- I. Evaporative emission controls diagnosis
- J. Smoke test of the Evaporative Emission (EVAP) system

XVI. Scan Tools and Engine Performance Diagnosis

A. OBD II connector identification
B. Scan tool diagnosis

XVII. Hybrid Electric Vehicle Safety Procedures
A. Hybrid vehicle High Voltage (HV) circuit disconnect
B. Identify HV of hybrid electric vehicles

XVIII. Fuel Cells and Advanced Technology

XIX. Engine Mechanical
A. Camshaft timing
B. Valve adjustment

XX. Proper Tool Use and Safety

All topics are covered in both the lecture and lab parts of the course.

Assignment:

Lecture-Related Assignments:
1. Weekly reading (20-70 pages)
2. Weekly quizzes
3. Midterm exam
4. Final exam

Lab-Related Assignments:
1. Lab notebook
2. Weekly lab exercises and skill tests
3. Weekly component identification
4. Weekly lab reports

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab exercises; lab reports	Problem solving 10 - 30%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Skills tests; component identification	Skill Demonstrations 20 - 40%

Exams: All forms of formal testing, other than skill performance exams.

Weekly quizzes; midterm exam; final exam	Exams 30 - 50%

Other: Includes any assessment tools that do not logically fit into the above categories.

Lab notebook; participation in lab	Other Category 10 - 20%

Representative Textbooks and Materials:
Automotive Electrical and Engine Performance. 8th ed. Halderman, James. Prentice Hall. 2020
Automotive Electricity and Electronics. Jones, David. CDX. 2018 (classic)
Advanced Automotive Electricity and Electronics. Klyde, Michael. CDX. 2018 (classic)
Automotive Engine Performance. Goodnight, Nicholas and VanGelder, Kirk. CDX Learning System. 2020
Instructor prepared materials