

**HIBBING COMMUNITY COLLEGE
COURSE OUTLINE**

COURSE TITLE & NUMBER: Fuel and Emission Systems: ASES 1016

CREDITS: 2 (17 Lec/ 34 Lab)

PREREQUISITES: Instructor approval

CATALOG DESCRIPTION:

Fuel and Emission Systems covers the operation, diagnosis, and repair of the automotive fuel system. Fuel injections are introduced. Theory, design, diagnosis and service of the vehicles emission system are included.

OUTLINE OF MAJOR CONTENT AREAS:

- I. Fuel delivery
 - A. Design
 - B. Testing
 - C. Service
- II. Carburation principles and adjustments
- III. Fuel injection basics
 - A. Operation and diagnosis
 - B. Service
- IV. Emission controls
 - A. Emissions systems
 - B. Emission component function
 - C. Emission testing

COURSE GOALS/OBJECTIVES/OUTCOMES:

Students will

- 1. check catalytic converter operation.
- 2. define air pump operation.
- 3. diagnose emissions & durability concerns caused by secondary air and catalytic converter systems.
- 4. define PCV valve operation.
- 5. identify PCV system malfunction & corrections.
- 6. perform PCV system tests.
- 7. explain café.
- 8. identify EGR valve operation.
- 9. diagnose EGR system malfunctions & corrections.
- 10. test EGR system electrical components.
- 11. identify catalytic converter types.
- 12. identify catalytic converter function.

13. test air pump control valve, pump and other electrical components.
14. test EGR valve operation.
15. service EGR system components.
16. describe mechanical fuel pump operation.
17. define air fuel ratio.
18. test mechanical fuel pump.
19. troubleshoot fuel pump.
20. describe electrical fuel pump operation.
21. test electrical fuel pump.
22. differentiate return from returnless fuel systems
23. replace fuel filter.
24. define hydrocarbons.
25. define carbon monoxide.
26. define oxides of nitrogen.
27. define carbon dioxide.
28. explain infra red exhaust analyzer operation.
29. perform assigned tasks.
30. define HG vacuum.
31. explain IM 240 testing.
32. explain green state emissions, ULEV & ZEV.
33. inspect exhaust system components.
34. diagnose exhaust sample using gas analyzer.
35. check fuel system for fuel leaks.
36. check fuel system for vapor leaks.
37. check fuel quality (ethanol).
38. check air induction system for leaks.
39. replace air filter.
40. Differentiate enhanced & non-enhanced evaporative emission system.
41. perform exhaust system back pressure test.
42. explain malfunctions of evaporative system components.
43. explain on-board evaporative emissions system test procedures.
44. perform pressure 2 smoke tests using smoke machine.
45. diagnose evaporative system DTC.

MNTC GOALS AND COMPETENCIES MET:

N/A

HCC COMPETENCIES MET:

Working Productively & Cooperatively
Communicating Clearly & Effectively
Thinking Creatively & Critically

STUDENT CONTRIBUTIONS:

The student is expected to

1. attend all lectures.
2. participate in class discussions.
3. perform assigned tasks.
4. hand in assignments when due.
5. follow all safety rules.

**STUDENT ASSESSMENT SHALL TAKE PLACE USING INSTRUMENTS
SELECTED/DEVELOPED BY THE COURSE INSTRUCTOR.**

**SPECIAL INFORMATION: (SPECIAL FEES, DIRECTIVES ON HAZARDOUS
MATERIALS, ETC.)**

Students are required to wear safety glasses in the lab.

AASC APPROVAL DATE: December 18, 2013
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REVIEW DATE: December 2018

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