SYLLABUS

DATE OF LAST REVIEW: 02/11/2013

CIP CODE: 47.0604

SEMESTER: Departmental Syllabus

COURSE TITLE: Engine Performance 2

COURSE NUMBER: AUTT0282

CREDIT HOURS: 7

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.

PREREQUISITE(S): AUTT0101, AUTT0102, AUTT0161, AUTT0181 or approval from instructor

REQUIRED TEXT AND MATERIALS:
Please see bookstore for current textbook(s) and other required material.

COURSE DESCRIPTION:
This course contains competencies that can be used in their entirety within a single course or as needed for courses designed by a Kansas institution as Institutional Flexible Credit. Through a variety of learning and assessment activities students can: analyze engine mechanical integrity; analyze fuel system concerns; analyze ignition system concerns; analyze induction system concerns; analyze exhaust system concerns; service fuel system concerns; repair fuel system concerns; service ignition system concerns; repair ignition system concerns; service induction system concerns; service exhaust system concerns; repair induction system concerns; repair exhaust system concerns.

METHOD OF INSTRUCTION:
A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

**COURSE OUTLINE:**
All students must comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

I. Engine mechanical integrity
   A. Compression tests
   B. Vacuum tests
   C. Valve timing
   D. Methods of missing cylinder detection
   E. Cylinder leak detection
   F. Vacuum leak detection

II. Analyzing fuel system concerns
   A. Fuel pressure
   B. Fuel delivery system
   C. Fuel regulation
   D. Fuel injection
      1. Injector
      2. Injector controls
      3. Other injection systems
   E. Cleaning

III. Analyzing ignition system concerns
    A. Basic ignition principles
       1. Coil
       2. Power
       3. Coil control
       4. Primary
       5. Secondary ignition systems
    B. Diagnostic equipment
       1. Scope
       2. Voltage testers
       3. Low amp current ramping
    C. Timing light
    D. Scan tools
    E. Servicing ignition components

IV. Analyzing induction system concerns
    A. Intake manifold
    B. Air filters
    C. Idle circuits
    D. Mass air flow/speed density
E. Related induction components
   1. EGR
   2. PCV
V. Analyze exhaust system concerns
   A. Post catalytic converter
   B. 4 or 5 gas analyzer
   C. Backpressure
VI. Service fuel system concerns
   A. Tank removal
   B. EVAP evaporation issues
   C. Fuel injector cleaning
   D. Fuel filter service
   E. Current ramping
   F. Scan tool data
   G. Analyzing exhaust
VII. Repair fuel system concerns
   A. Removal of fuel tanks
   B. Fuel line repair
   C. Fuel leaks
   D. Pump replacement
   E. Regulators
VIII. Service ignition system concerns
   A. Tune up
   B. Spark plug gap
   C. High voltage containment
   D. Stator/pick up coil
   E. Cam/Crank sensors
   F. Ignition modules
   G. Computer adjusted timing
   H. Scan tool special tests
IX. Repair ignition system concerns
   A. Crankshaft sensor replacement
   B. Camshaft sensor replacement
   C. Tune up procedures
   D. Module replacement
   E. Identify hybrid vehicle engine service precautions
X. Service and repair induction system concerns
   A. Idle speed control
   B. Vacuum leak
   C. Intake manifold repair
   D. Air filter
   E. Hot air intake
   F. Intercoolers
   G. Superchargers
   H. Turbochargers
XI. Service and repair exhaust system concerns
A. Clamps  
B. Hangers  
C. Catalectic converter issues  
D. Manifold studs  
E. Welding  
F. Heat shields  
G. Restrictions

XII. Scan tool diagnostics  
A. Global/Enhanced data  
B. Retrieve and record diagnostic trouble codes  
C. OBD II monitor status  
D. Freeze frame data  
E. Clear codes  
F. Pending codes  
G. Graphing codes  
H. Recording  
I. CAN/BUS  
J. Lab scope diagnostics  
K. Pulse width modulation  
L. Sensors  
M. Actuators

XIII. Symptomatic diagnostics  
A. Cranks, won’t start  
B. Slow start  
C. Idles rough  
D. Idles slow  
E. Idles fast  
F. Dies and restarts  
G. Dies and won’t restart  
H. Cold concerns  
I. Hot concerns  
J. Intermittent concerns  
K. No spark  
L. No compression  
M. No fuel/air  
N. Valve timing  
O. Spark timing

EXPECTED LEARNER OUTCOMES:  
A. Explain general engine diagnosis  
B. Demonstrate computerized engine controls diagnosis and repair  
C. Ignition system diagnosis and repair  
D. Explain fuel, air induction, and exhaust systems diagnosis and repair  
E. Demonstrate emissions control systems diagnosis and repair  
F. Explain engine related service

COURSE COMPETENCIES:
**Explain general engine diagnosis**

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
2. Identify and interpret engine performance concern; determine necessary action.
3. Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.
4. Locate and interpret vehicle and major component identification numbers.
5. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
6. Diagnose abnormal engine noise or vibration concerns; determine necessary action.
7. Diagnose abnormal exhaust color, odor, and sound; determine necessary action.
8. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
9. Perform cylinder power balance test; determine necessary action.
10. Perform cylinder cranking and running compression tests; determine necessary action.
11. Perform cylinder leakage test; determine necessary action.
12. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.
13. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.
14. Verify engine operating temperature; determine necessary action.
15. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
16. Verify correct camshaft timing.

**Demonstrate computerized engine controls diagnosis and repair**

18. Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.
19. Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action.
20. Check for module communication (including CAN/BUS systems) errors using a scan tool.
21. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.
23. Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action.
34. Perform active tests of actuators using a scan tool; determine necessary action.
35. Describe the importance of running all OBDII monitors for repair verification.

**Ignition system diagnosis and repair**

36. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.
37. Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition sensors; perform necessary action.
38. Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.

**Explain fuel, air induction, and exhaust systems diagnosis and repair**

42. Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume;
perform necessary action.
43. Replace fuel filters.
44. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
45. Inspect and test fuel injectors.
46. Verify idle control operation.
47. Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.
48. Perform exhaust system back-pressure test; determine necessary action.
49. Test the operation of turbocharger/supercharger systems; determine necessary action

Demonstrate emissions control systems diagnosis and repair

54. Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
55. Diagnose emissions and driveability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action.
56. Inspect and test mechanical components of secondary air injection systems; perform necessary action.
57. Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.
58. Inspect and test catalytic converter efficiency.
59. Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action.
60. Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.
61. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.

Explain engine related service
67. Perform engine oil and filter change.
68. Identify hybrid vehicle internal combustion engine service precautions.

ASSESSMENT OF LEARNER OUTCOMES:
Assessment methods may include, but are not limited to, the following: Homework, Assignments, Quizzes, Class Participation, Chapter Tests, and Final Exam. The grading scale and the process for calculating the course grades are to be determined by the individual instructors. This information will be included in each instructor’s syllabus.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas
Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center in Room 3354 or call (913) 288-7670 V/TDD.