Course Outline of Record

1. Course Code: AUTO-014B
2. a. Long Course Title: Advanced Engine Management
   b. Short Course Title: ADV ENGINE MGMT
3. a. Catalog Course Description:
   This course provides theory and hands-on experience in intermediate to advanced engine management systems including: fuel injection, electronic ignition, emission controls, OBDII, as well as service and maintenance, diagnosis and repair of engine management malfunctions. The focus is then placed on advanced engine management components and systems including: computer inputs, outputs and control and OBDII logic with an emphasis on troubleshooting, diagnosis and repair of advanced engine management malfunctions.
   b. Class Schedule Course Description:
   This class provides lecture/discussion and hands-on experience understanding, servicing, troubleshooting, diagnosing and repairing intermediate to advanced engine management system malfunctions. A testing fee is required.
   c. Semester Cycle (if applicable): Fall
   d. Name of Approved Program(s):
      • AUTOMOTIVE ENGINE MANAGEMENT Certificate of Achievement
      • AUTOMOTIVE TECHNOLOGY AS Degree for Employment Preparation
4. Total Units: 5.00 Total Semester Hrs: 144.00
   Lecture Units: 3.5 Semester Lecture Hrs: 63.00
   Lab Units: 1.5 Semester Lab Hrs: 81.00
   Class Size Maximum: 21 Allow Audit: Yes
   Repeatability: No Repeats Allowed
   Justification: 0
5. Prerequisite or Corequisite Courses or Advisories:
   Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)
   Prerequisite: AUTO 014A
   Advisory: RDG 061
6. Textbooks, Required Reading or Software: (List in APA or MLA format.)
      College Level: Yes
      Flesch-Kincaid reading level: 13
      ISBN: 9780133995671
      College Level: Yes
      Flesch-Kincaid reading level: 13
7. Entrance Skills: Before entering the course students must be able:
   a. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
      • AUTO 014A - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
   b. Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.
      • AUTO 014A - Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.
c. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.
   • AUTO 014A - Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.

d. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.
   • AUTO 014A - Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.

e. Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.
   • AUTO 014A - Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.

Advisory Skills:

f. Use various reading strategies to prepare, read and comprehend expository text
   • RDG 061 - Use SQ3R &/or SOAR along with outlining, note-taking, mapping summarizing and other strategies to prepare, read, & comprehend expository text.

g. Read a variety of texts fluently.
   • RDG 061 - Read a variety of texts fluently.

h. Write organized summaries & reactions that capture main idea and supporting details.
   • RDG 061 - Write organized summaries & reactions that capture main idea and supporting details.

i. Understand multiple word meanings, uses & synonyms
   • RDG 061 - Understand multiple word meanings, uses & synonyms

8. Course Content and Scope:

Lecture:
1. Review of AUTO-014A materials
2. Diagnostic scan tools and DSOs
3. Computer input and output sensors
4. Fuel systems input and output sensors
5. Ignition system input and output sensors
6. OBDII diagnosis
7. Exhaust gas analyzer diagnosis
8. Chrysler web-based training modules

Lab: (if the "Lab Hours" is greater than zero this is required)
1. Safety & environmental protection
2. Lab practice with diagnostic scan tools and DSOs
3. Identify and test various computer input and output sensors
4. Idnetify and test various fuel systems input and output sensors
5. Identify and test various ignition system input and output sensors
6. Diagnose and repair vehicles with an OBDII concern
7. Diagnose driveability concerns using the exhaust gas analyzer
8. Required tasks to meet NATEF 2017 MAST standards

9. Course Student Learning Outcomes:
1. 

05/01/2018
Demonstrate shop safety practices.

2. Diagnose and repair intermediate to advanced level engine management system malfunctions.

3. Diagnose and repair "Check Engine" light concerns.

4. Display teamwork.

5. Demonstrate proficiency in referencing service information, following advanced diagnostic flow-charts and documenting repairs.

10. Course Objectives: Upon completion of this course, students will be able to:
   a. Diagnose oil leaks, emissions, and drivability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action.
   b. Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
   c. Diagnose emissions and drivability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action.
   d. Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.
   e. Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
   f. Inspect and test catalytic converter performance.
   g. Retrieve and record stored OBD II diagnostic trouble codes; clear codes when applicable.
   h. Diagnose the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes.
   i. Diagnose emissions or drivability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes.
   j. Check for module communication (including CAN/BUS systems) errors using a scan tool.
   k. Inspect and test computerized engine control system sensors, power train control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.
   l. Obtain and interpret scan tool data.
   m. Access and use service information to perform step-by-step diagnosis.
   n. Diagnose drivability 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.
   o. Perform active tests of actuators using scan tool; determine necessary action.
   p. Diagnose emissions and drivability problems resulting from malfunctions in the evaporative emissions control system; determine necessary action.
   q. Inspect and test components and hoses of evaporative emissions control system; perform necessary action.
   r. Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action.
   s. Adjust valves on engines with mechanical or hydraulic lifters.
   t. Remove and replace timing belt; verify correct camshaft timing.
   u. Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
   v. Identify hybrid vehicle internal combustion engine service precautions.

11. Methods of Instruction: (Integration: Elements should validate parallel course outline elements)
a. Demonstration, Repetition/Practice  
 b. Discussion  
 c. Laboratory  
 d. Lecture  
 e. Observation  
 f. Participation  
 g. Technology-based instruction  

Other Methods:  
- Reading assignments

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 144.00  
Outside Class Hours: 126.00  

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<th>In-class Assignments</th>
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| 1. Review homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.  
| 2. Complete SP2 safety tests.  
| 3. Notes on lecture.  
| 4. Participation in discussion related to topic of lecture.  
| 5. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities. The notebook must be organized by chapter, in-class notes, handouts and extra-credit assignments. The notebook will be evaluated after the half-way point and graded at the end of the course.  
| 6. Review and discuss vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.  
| 7. Must develop teamwork skills through classroom interaction and discussion. |

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<tr>
<th>Out-of-class Assignments</th>
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| 1. Readings from required text: 1-3 chapters per week from both classroom and shop manuals.  
| 2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.  
| 3. Completion of SP2 safety tests.  
| 4. Assigned readings and written summaries from selected instructor handouts.  
| 5. Written summaries and analysis of assigned websites.  
| 6. Must complete a course project consisting an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork.  
| 7. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities. The notebook must be organized by chapter, in-class notes, handouts and extra-credit assignments. The notebook will be evaluated after the half-way point and graded at the end of the course.  
| 8. Vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.  
| 9. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.  
| 10. Must develop teamwork skills through lab activities and assigned special projects.  
| 11. Chrysler web-based training. |

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*  
- College level or pre-collegiate essays  
- Written homework  
- Term or research papers  
- Laboratory projects
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- Presentations/student demonstration observations
- Group activity participation/observation
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution
- Oral and practical examination
- Other
  Review of homework Lab activity evaluations Written and hands-on exams

14. Methods of Evaluating: Additional Assessment Information:

15. Need/Purpose/Rationale -- All courses must meet one or more CCC missions.

   PO - Career and Technical Education
   - Apply critical thinking skills to execute daily duties in their area of employment.
   - Apply critical thinking skills to research, evaluate, analyze, and synthesize information.
   - Display the skills and aptitude necessary to pass certification exams in their field.
   - Exhibit effective written, oral communication and interpersonal skills.

   PO-BS Problem Solving
   - Recognize the importance of checking a proposed solution to verify that it satisfies the requirements of a problem.
   - Recognize that a solution may not be possible, given limits of time, money, or other finite resources.
   - Identify what isn’t known, but needs to be known in order to solve a problem (depending on the problem domain, reading and/or mathematical skills are helpful).

   IO - Critical Thinking and Communication
   - Summarize, analyze, and interpret oral and written texts, with the ability to identify assumptions and differentiate fact from opinion.
   - Utilizing various communication modalities, display creative expression, original thinking, and symbolic discourse.

   IO - Global Citizenship - Ethical Behavior
   - Apply ethical reasoning to contemporary issues and moral dilemmas.
   - Exhibit respect for self and others.

16. Comparable Transfer Course

   University System    Campus    Course Number    Course Title    Catalog Year

17. Special Materials and/or Equipment Required of Students:

   1. Safety glasses meeting ANSI Z87.1

18. Materials Fees:  

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<tr>
<th>Material or Item</th>
<th>Cost Per Unit</th>
<th>Total Cost</th>
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19. Provide Reasons for the Substantial Modifications or New Course:

   Change requisite and entrance skills to Reading 061

20. a. Cross-Listed Course (Enter Course Code):  N/A
    b. Replacement Course (Enter original Course Code):  N/A

21. Grading Method (choose one):  Letter Grade Only

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22. MIS Course Data Elements
   a. Course Control Number [CB00]: CCC00582266
   b. T.O.P. Code [CB03]: 94800.00 - Automotive Technology
   c. Credit Status [CB04]: D - Credit - Degree Applicable
   d. Course Transfer Status [CB05]: C = Non-Transferable
   e. Basic Skills Status [CB08]: 2N = Not basic skills course
   f. Vocational Status [CB09]: Advanced Occupational
   g. Course Classification [CB11]: Y - Credit Course
   h. Special Class Status [CB13]: N - Not Special
   i. Course CAN Code [CB14]: N/A
   j. Course Prior to College Level [CB21]: Y = Not Applicable
   k. Course Noncredit Category [CB22]: Y - Not Applicable
   l. Funding Agency Category [CB23]: Y = Not Applicable
   m. Program Status [CB24]: 1 = Program Applicable

   Name of Approved Program (if program-applicable): AUTOMOTIVE ENGINE MANAGEMENT, AUTOMOTIVE TECHNOLOGY
   (Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment
   First Year: 21
   Third Year: 21

24. Resources - Faculty - Discipline and Other Qualifications:
   a. Sufficient Faculty Resources: Yes
   b. If No, list number of FTE needed to offer this course: N/A

25. Additional Equipment and/or Supplies Needed and Source of Funding.
    N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. (Explain:)
    N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES
    Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Douglas Hugh Redman     Origination Date 11/08/17