ADVANCED AUTOMOTIVE ELECTRONICS — AUTM 2147

A. **Course Description**

- **Credits:** 5.00
- **Lecture Hours/Week:** 1.00
- **Lab Hours/Week:** 4.00
- **OJT Hours/Week:** 0
- **Prerequisites:** None
- **Corequisites:** None
- **MnTC Goals:** None

This course covers advanced automotive electrical, electronic, and HVAC system diagnostic and repair procedures using various types of tools and test equipment and reference materials available in Alldata, Mitchell and student textbook. Prerequisite: Successful completion of AUTM1003 Automotive Fundamentals, AUTM1013 Automotive Engine Electrical Systems, AUTM2117 Automotive Electrical Systems, AUTM 2127 Automotive Electronic Systems, and AUTM2137 Heating, Ventilation, and Air Conditioning with a minimum overall score of 70% OR concurrent enrollment in course 2960 Skill Development with instructor approval.

B. **Course Effective Dates:** 8/21/17 – Present

C. **Outline of Major Content Areas**

1. Climate control systems operation, diagnosis, and repair
2. Computerized body systems operation, diagnosis, and repair
3. Computerized chassis systems operation, diagnosis, and repair
4. Entertainment systems operation, diagnosis, and repair
5. Information systems operation, diagnosis, and repair

D. **Learning Outcomes**

1. Check for module communication (LAN/CAN/BUS) errors using a scan tool
2. Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.
3. Check operation of electrical circuits with a test light.
4. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm?s Law).
5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and

resistance problems in electrical/electronic circuits.

6. Demonstrate proper use of a digital Multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.
7. Describe the process for software transfers, software updates, or flash reprogramming on electronic modules.
8. Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.
9. Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action
10. Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.
11. Diagnose (troubleshoot) supplemental restraint system (SRS) problems; determine necessary action.
12. Diagnose body electronic system circuits using a scan tool; determine necessary action
13. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
14. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.
15. Diagnose incorrect horn operation; perform necessary action
16. Diagnose incorrect operation of vehicle entertainment systems: determine necessary ACTION
17. Diagnose incorrect relay circuit operation; perform necessary action
18. Diagnose incorrect windshield washer operation; perform necessary action
19. Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action
20. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.
21. Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action
22. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action
23. Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action
24. Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.
25. Disable and enable an airbag system for vehicle service; verify indicator lamp

operation.

26. Identify and test tire pressure monitoring system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lamps.
27. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.
28. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action
29. Inspect, replace, and aim headlights and bulbs
30. Perform battery diagnosis and service; determine necessary action.
31. Perform charging system diagnosis and repairs.
32. Perform starting system diagnosis and repairs.
33. Replace electrical connectors and terminal ends.
34. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
35. Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.
36. Test and diagnose components of electronically-controlled suspension systems using a scan tool; determine necessary action.
37. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
38. Use wiring diagrams to trace electrical/electronic circuits.

E. **Minnesota Transfer Curriculum Goal Area(s) and Competencies**

F. **Learner Outcomes Assessment**

As noted on course syllabus

G. **Special Information**

None noted