SYLLABUS

DATE OF LAST REVIEW : 02/11/2013
CIP CODE: 47.0614
SEMESTER: Departmental Syllabus
COURSE TITLE: Hybrid/ Electric Vehicle Accessories
COURSE NUMBER: AHEV0265
CREDIT HOURS: 3
INSTRUCTOR: Departmental Syllabus
OFFICE LOCATION: Departmental Syllabus
OFFICE HOURS: Departmental Syllabus
TELEPHONE: Departmental Syllabus
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KCKCC-issued email accounts are the official means for electronically communicating with our students.

PREREQUISITE(S): AUTT0262, AUTT0282 or approval by the instructor.

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckccbookstore.com for the required text for your particular class.

COURSE DESCRIPTION:
The student will learn the theory and operation of hybrid, electric, and plug in hybrid accessories including electric power steering, electric air conditioning, electric coolant pumps and other devices. Understanding of the DC to DC converter and charging system will also be discussed. The course will emphasize the importance of safety due to the deadly nature of the high voltage environment. Students are required to purchase their own high voltage class 0 gloves to participate in live lab experiences. For every task in Hybrid Electric Vehicle Accessories, the following safety requirement must be strictly enforced: 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.

**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. High Voltage Electrical Safety  
   A. Electric Shock  
   B. Tool and Equipment Usage  
   C. High Voltage Safety Rules  
   D. Electrical Isolation  
   E. Multimeters  
   F. CAT III  
   G. Service Disconnect Systems

II. DC-DC Converter Systems  
   A. The fundamentals of dc-dc converter operation  
   B. Battery Charging  
   C. Low voltage power for accessories

III. Hybrid Climate Control Systems  
   A. Electric compressors  
   B. Electric A/C compressor power inverter  
   C. Combination electric and belt drive compressors  
   D. Hybrid heating systems  
   E. Auxiliary pump operation during engine idle off mode  
   F. Refrigerant oil conductivity  
   G. Diagnosis and repair

IV. Steering Assist  
   A. Electro-hydraulic power steering systems  
   B. Electric power assist  
   C. Diagnosis and repair

V. Driver Information Center  
   A. Model specific operations  
   B. Understanding data

VI. Brake systems  
   A. Power brake assist  
   B. Electric braking
C. Diagnosis

VII. Plug in Hybrid Electric Vehicle (PHEV)
   A. Off car charging systems
   B. On car charging systems that plug into off car power
   C. Home power requirements and the grid
   D. Components of PHEV’s
   E. Diagnostics of PHEV’s

VIII. Other Systems
   A. Various types of cooling system components
   B. Pumps
   C. Bleeding cooling systems
   D. Key off cooling systems
   E. Special fluids
   F. Various model specific accessories

EXPECTED LEARNER OUTCOMES:

A. The student will be able to describe in detail high voltage electrical safety
B. The student will be able to explain DC-DC converter systems
C. The student will be able to describe hybrid climate control systems
D. The student will be able to describe power steering
E. The student will be able to explain the instrument panel features
F. The student will be able to describe brakes for a hybrid electric vehicle
G. The student will be able to describe Plug in Hybrid Electric Vehicle (PHEV) operation
H. The student will be able to explain other systems

COURSE COMPETENCIES:

The student will be able to describe in detail high voltage electrical safety
1. The student will be able to define high voltage and explain the implications of human interaction
2. The student will be able to explain the purpose of personal protection equipment and what they do
3. The student will be able to demonstrate how to wear high voltage personal protection equipment
4. The student will be able to demonstrate when and where personal protection equipment will be worn
5. The student will be able to demonstrate how to disable high voltage

The student will be able to explain DC-DC converter systems
6. The student will be able to explain how the dc to dc converter works and why
7. The student will be able to describe cycle outputs from the DC to DC converter
8. The student will be able to remove and install a DC-DC converter
9. The student will be able to diagnose DC-DC a converter using a scantool

The student will be able to describe hybrid climate control systems
10. The student will be able to describe how electric compressors work
11. The student will be able to describe how the A/C compressor power inverter works
12. The student will be able to describe how electric and drive belt compressors work
13. The student will be able to explain refrigerant oil conductivity
14. The student will be able to explain compressor speed controls
15. The student will be able to remove and install compressor

*The student will be able to describe power steering*
16. The student will be able to explain how an electric hybrid power steering system works
17. The student will be able to describe two types of hybrid power steering systems
18. The student will be able to demonstrate diagnosis of power steering with a scantool

*The student will be able to explain the instrument panel features*
19. The student will be able to describe model specific features of driver information centers
20. The student will be able to describe gearshift operation and park control

*The student will be able to describe brakes for a hybrid electric vehicle*
21. The student will be able to demonstrate how to bleed brakes with a scantool
22. The student will be able to demonstrate how to enter service mode for brake service
23. The student will be able to describe operation of power brake assist

*The student will be able to describe Plug in Hybrid Electric Vehicle (PHEV)*
24. The student will be able to explain the operation of off car charging systems
25. The student will be able to explain on board car charging systems that plug into off car power
26. The student will be able to discuss power requirements for the home issues regarding the power grid
27. The student will be able to describe the components of PHEV’s
28. The student will be able to view scantool data showing information from off car charging system

*The student will be able to explain other systems*
29. The student will be able to describe cooling system variations on different hybrid vehicles
30. The student will be able to demonstrate techniques for bleeding a cooling system
31. The student will be able to identify special fluids for use in a hybrid electric vehicle
32. The student will be able to explain the operation of key off cooling systems

**ASSESSMENT OF LEARNER OUTCOMES:**
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.
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 Rm. 3354 or call at: 288-7670.