SYLLABUS

DATE OF LAST REVIEW : 02/11/2013

CIP CODE: 47.0614

SEMESTER: Departmental Syllabus

COURSE TITLE: Hybrid/ Electric Vehicle Transmissions

COURSE NUMBER: AHEV0222

CREDIT HOURS: 3

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: Departmental Syllabus

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

PREREQUISITE(S): AUTT0262, AUTT0281 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 drive systems in the automobile. The content will cover batteries, charging, high voltage safety, transmission, inverter/converter operation, cooling systems, diagnosis and repair of these advanced and unique automobiles. 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 Transmissions, 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 and High Voltage Systems
   C. Electrical Isolation
   D. Multi-meters
   E. CAT III environment

II. Diagnostics
   A. Power flow of Toyota and Ford transmissions
   B. Power flow of popular rear wheel drive HEV transmissions
   C. Drive ratios between ICE and EM during different driving modes
   D. Information
   E. Scantool data
   F. Noise

III. Maintenance Service
   A. Lubrication
   B. Cooling systems
   C. Leaks
   D. Noise

IV. Series Hybrids Service
   A. Chevrolet Volt
   B. Other

V. Parallel Hybrids Service
   A. Honda IMA
   B. ISG
   C. Other systems

VI. Series Parallel Hybrid Service
   A. GM/BMW Two-Mode
   B. Toyota
   C. Ford
   D. Nissan
   E. Hyundai/Kia
F. Mazda
G. Other developments

VII. Removal and Installation
A. Cautions
B. Special tools
C. Model specific
D. Other issues

EXPECTED LEARNER OUTCOMES:
A. The student will be able to demonstrate understanding of high voltage electrical safety
B. The student will be able to explain diagnostics of hybrid vehicles
C. The student will be able to describe maintenance procedures
D. The student will be able to explain how to service series hybrids
E. The student will be able to demonstrate how to service parallel hybrid transmissions
F. The student will be able to demonstrate how to service series-parallel hybrid transmissions
G. The student will be able to demonstrate how to remove and install a hybrid transmission

COURSE COMPETENCIES:
The student will be able to demonstrate understanding of 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 explain when and where personal protection equipment will be worn
5. The student will be able to explain how to disable high voltage

The student will be able to explain diagnostics of hybrid vehicles
6. The student will be able to explain power flow through planetary gear sets in Toyota and Ford transmissions
7. The student will be able to explain variations of power flow through 3 manufacturer specific rear wheel drive HEV transmissions
8. The student will be able to explain how power ratios differ for different driving situations in each transmission type
9. The student will be able to demonstrate how to read scan data from a hybrid vehicle
10. The student will be able to explain what data is available for hybrid vehicle diagnostics
11. The student will be able to obtain freeze frame data regarding EM operation
The student will be able to describe maintenance procedures
12. The student will be able to check fluid level on a hybrid transmission
13. The student will be able to explain how to service and bleed cooling systems on a hybrid transmission
14. The student will be able to describe leak testing and service for common problems

The student will be able explain how to service series hybrids
15. The student will be able to explain what components deliver power to the wheels of a series hybrid

The student will be able to demonstrate how to service hybrid components of a parallel hybrid transmission
16. The student will be able to remove IMA components from a Honda
17. The student will be able to identify components of an IMA
18. The student will be able to re-install components of an IMA

The student will be able to demonstrate how to service series-parallel hybrid transmissions
19. The student will be able to demonstrate disassembly of two common series-parallel transmissions
20. The student will be able to identify the names of the components
21. The student will be able to explain what each component does
22. The student will be able to test electrical components for insulation integrity
23. The student will be able to assemble two common series-parallel transmissions

The student will be able to demonstrate how to remove and install a hybrid transmission
24. The student will be able to remove and install a hybrid transmission from a vehicle
25. The student will be able to the student will install a hybrid transmission into the vehicle

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.