INSY 5830/6830/6836 – Vehicle Technology and Trends

1. Course Title: INSY 5830/6830/6836 – Vehicle Technology and Trends
   Department: Industrial and Systems Engineering
   Credit Hours: 3 hours
   Designation: Elective – Automotive Manufacturing Track - MSIE
   Prerequisites: Junior Standing (5830); Graduate Standing (6830/6836)
   Web site: http://www.eng.auburn.edu/ise/courses/insy5830
   Date Prepared: 07/15/2006

2. Instructor(s): John L. Evans
   209 Dunstan Hall
   jevans@eng.auburn.edu
   844-1418

3. Course Time: Tuesday/Thursdays, 8:00 AM – 9:15 AM


   Proceedings SAE Convergence 2006, October 16-18, Detroit, Michigan

6. Course Description: This course investigates the advanced in automotive technology and the impact of future technologies on the design and manufacturer of the automobile. In addition, the impact of the automotive supply chain is explored.

7. Course Objectives: Through class instruction and discussion, homework exercise, outside research and team projects, students should be able to develop a general understanding of the basic concepts of future automotive technology and how these technologies will impact the automobile of the future.

8. Course Requirements and Evaluation:
   Students will be evaluated based on the following assignments and exams:
<table>
<thead>
<tr>
<th>Description</th>
<th>Date</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>In Class</td>
<td>20%</td>
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<tr>
<td>Final exam</td>
<td>In Class</td>
<td>20%</td>
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<tr>
<td>Reports</td>
<td></td>
<td>30%</td>
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<tr>
<td>Team Project</td>
<td></td>
<td>30%</td>
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9. Class Attendance: Regular class attendance is VERY STRONGLY encouraged since much of the material presented in the lectures and class discussion is not otherwise available in the texts and reading assignments. Formal class attendance may, thus, be taken at any or all classes to encourage such participation.

10. Class Policy Statements:
    Exams will be closed book & closed notes. Grades will be based on minimum of 10 point systems.
    The University academic honesty policies will be strictly enforced. Please refer to the Tiger Cub for details about these policies and procedures.

11. Students with Disabilities:
    Any student with a disability needing special accommodation should notify the instructor and contact Dr. Kelly Haynes, Director of the Program for Students with Disabilities, located in 1244 Haley Center, Auburn University.
12. **Topics and Schedule:**
   a. Introduction – (1st Week)
   b. Goals and Vision for the Future (Week 2 – 4)
      i. Government Safety
      ii. Global Trends for Safety (Overview)
      iii. Vision 2030
   c. Technology and its Impact (Week 5 – 6)
      i. MEMS
      ii. Microwave and Sensors
      iii. Adaptive Control
      iv. By-Wire
      v. Mechatronics
      vi. Hybrid
      vii. Fuel Cell
   d. Application Areas (Week 7 – 8)
      i. Convenience Systems
      ii. Safety Systems
      iii. Truck Systems
      iv. Traffic Assistance
   e. Government-Industry R&D Programs and Strategies (Week 9-10)
      i. Asia-Pacific
      ii. European Programs
      iii. United States
      iv. Worldwide Convergence
   f. Priorities and Strategies for Vehicle Industry (Week 11-12)
      i. Automotive Manufacturers
      ii. Automotive Suppliers
      iii. Materials Supply for the Future
   g. Lateral/Side Sensing and Control Systems (Week 13)
      i. Lane Departure
      ii. Road Departure
      iii. Blind Spot Monitoring
      iv. Lateral Control Assistance
   h. Cooperative Vehicle-Highway Systems (Week 14)
      i. Wireless Communication
      ii. Digital Maps and Satellite
      iii. Intelligent Speed Adaptation
      iv. Intersection Collision Avoidance
   i. Human-Centered Systems (Week 14)
      i. Driver Perception
      ii. Driverology
      iii. Driver-Vehicle Interface
      iv. Driver Monitoring and Support
   j. Future Body/Chassis Design (Week 15)
      i. Interior Design Options and Changes
      ii. Common Chassis Design
      iii. Smart Paint – Vehicle Transformation
   k. Enabling Technologies (Week 15)
13. **Contribution to Meeting the Professional Component**
   This course is intended to give the student a comprehensive understanding into the technologies changing the future automobile. This understanding is critical for an engineer working in the automotive industry to understand the future direction of automotive design and how these changes impact the manufacturing of the next generation automobile. The course will also assist engineers working in the automotive supply industry to understand the changes in the industry and the opportunities available for their company.

14. **Justification for Graduate Credit**
   In addition to meeting the same requirements as for the undergraduate course, graduate students are required to select a research topic related to advanced vehicle technology and research this topic, contact industry representatives for active development and implementation programs, compose a detailed report on the progress of this technology, and present this research to the class. In addition, graduate students are required to lead the team projects (with undergraduate students) and are responsible for documenting the results of the team project.

14. **Special Considerations for COE Distance Education Courses**
   **Methods of Delivery:** The AU College of Engineering (COE), through its Graduate Outreach Program (GOP), offers selected graduate-level course work to off-campus students by various means, primarily streaming video delivered via the Internet or DVDs. Standard VHS video tape can also be produced. On-campus classes are held in specialized classrooms and are recorded each class day. Streaming video is available within a few minutes. DVDs (or tapes) are shipped the same day. Handout material made available to on-campus students is posted on the Internet or sent to off-campus students along with the tapes or DVDs.

   **Instructor/Student Communication:** Typically, students and professors communicate via telephone and e-mail, and by exchanging documents via various means. Internet sites and discussion groups may be used to facilitate communication among the students as well as with the instructor.

   **Exam/Test Security:** All off-campus students are required to have test proctors. These proctors serve on behalf of the instructors to maintain the integrity of the program. Proctors must be approved at the departmental level and by the Director of the GOP. Ideally, the proctor is someone in the human resources, personnel, or training and development section of the company, or agency, where the student is employed. On occasion, other personnel ranking at least one administrative level above the student serve as the proctor. In special cases, local librarians, or college testing services personnel may serve as the proctor. Responsibilities of proctors are clearly defined and, prior to approval, all proctors must agree to abide by rigorous rules related to the receipt, handling, administration, and return of tests and examinations.