ME 4823: Hybrid-Electric Vehicle Powertrains

Instructor: Dr. Michael Leamy (ME), 132 Erskine Love Building, michael.leamy@me.gatech.edu

Meeting Times: Tuesday and Thursday, 1:35 – 2:55, 185 Erskine Love Building

Textbook: None Required
Optional (available online through GT library): M. Ehsani, Y. Gao, S.E. Gay and A. Emadi, *Modern Electric, Hybrid Electric, and Fuel Cell Vehicles*, CRC Press, 2005

Prerequisites: ECE-3710

Office Hours: Dr. Leamy, Monday 3:00-4:00 & Tuesday 11:00-12:00

Course Topics:

Introduction Course Description, Components and Architectures	1.5 hours
Power-Split EVT Architectures Planetary Gearing One-Mode EVT Two-Mode EVT Comparisons	7.5 hours
Vehicle Longitudinal Dynamics Newton's Law Mass Factor Loads Traction Gearing	4.5 hours
Hybrid Braking	1.5 hours
Exam 1 (in class)	1.5 hours
High-Level Series/Parallel Hybrid Design Performance Goals Sizing of Components Supervisory Control Simulation Tools	6.0 hours
Team Project Review Meetings (in class)	1.5 hours
Electric Machines and Drives Electromechanical Energy Conversion Fundamentals PM Synchronous Machines, Structure and Operation Switched-Mode Converters for Control Torque-Speed Capabilities, Efficiency Optimization	7.5 hours
Internal Combustion Engines Classification, Terminology, Components Operating Characteristics, PV Diagrams Engine Cycles: Otto, Diesel, Dual, Miller Efficiency Comparisons	7.5 hours
Exam 2 (in class)	1.5 hours

Energy Storage Batteries Supercapacitors	3.0 hours
Conclusion Recap and Future Trends	1.5 hours
Group Project Presentations (during final exam period)	2.5 hours

Grade Determination:
Exam 1 (30%), Exam 2 (30%), Final Project (25%), Problem Sets (15%)

Important Dates:
Exam 1, September 27
Exam 2, November 29
Project Presentations, December 15, 2:50-5:40

Rules Regarding Homework:
It is permissible to discuss homework assignments with your peers, but the written work that you turn in must be your own. Copying computer code and/or other parts of problem solutions is a serious violation of the Georgia Tech Honor Code and will be referred to the Dean of Students for investigation and penalties.

Timing of Gradable Events:
Exams are to be taken at the time announced by the instructor. Exceptions require prior approval from the instructor and will be granted only under unusual circumstances and with appropriate documentation.
Homework must be submitted on time to receive full credit. At the discretion of the instructor, homework submitted shortly after the due date may be accepted for partial credit, but no credit will be given once solutions are posted.

Academic Misconduct: All students are expected to comply with the Georgia Tech Honor Code. Any evidence of cheating or other violations will be referred to the Dean of Students with a recommendation that the penalty be an award of zero points for the graded requirement, and a one letter grade reduction in the course. Cheating includes, but is not limited to: using unauthorized references or notes; copying directly from any source, including friends, classmates, tutors, or a solutions manual; allowing another person to copy your work; taking an exam or handing in a graded requirement in someone else's name, or having someone else take an exam or hand in a graded requirement in your name; or asking for a re-grade of a paper that has been altered from its original form.

Students with Special Needs: Please see the instructors as soon as possible to discuss appropriate arrangements.