Winter 2010

AERO 345 [Bernstein]

AERO 573 [Kolmanovsky]

AERO 584 [Kabamba]

EECS 460 [Meerkov]

EECS 461 [Cook]

EECS 498 (Special Topics: Introduction To Discrete Event Systems) [Lafortune] http://www.eecs.umich.edu/eecs/etc/news/shownews.html (Note: EECS 661 will NOT be offered in Fall 2010).

EECS 498 (Special Topics: Bio-molecular Feedback Systems)[Del Vecchio]

EECS 498 (Special Topics: Electric Machinery and Drives)[Hoffman]

EECS 498 (Special Topics: Grid Integration of Alternative Energy Sources)[Hiskens]

EECS 502 [Teneketzis]

EECS 562 (Aero 551) [Girard]

EECS 565 (Aero 580) [Freudenberg]

EECS 692 (Special Topics in AI: Robot Learning)[Kuipers]
http://eecs.umich.edu/~kuipers/teaching/eecs692-W10.html

ME 542 [Gordon]

ME 561 (EECS 561) [Oldham]

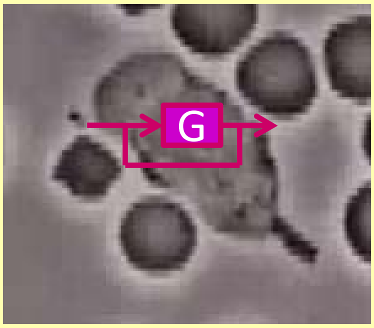
ME 567 (EECS 567) [Moore]

ME 400/599 (Special Topics: Vehicle Electrification: Battery Systems and Control) [Fathy and Stefanopoulou]

ME 400/599 (Special Topics: Vehicle Electrification: Hydrogen and Fuel Cells) [Siegel and Stefanopoulou]

Bio-molecular Feedback Systems

Instructor:
Prof.
Domitilla
Del Vecchio
ddv@umich.edu



EECS 498
Special Topics Course

Objectives: The course will illustrate basic feedback mechanisms that living organisms implement at the molecular level to execute their functions. The emphasis will be on analogies/differences with man-made control systems and on how to re-engineer feedback systems at the molecular level to control cellular behavior. By the end of the course, *engineering students* shoulds be convinced that feedback systems go far beyond what is taught in standard systems/control courses; *non-engineering students* will learn how biological functions can be deeply understood using notions from feedback systems; *everyone* will have learned that biology offers a rich set of inter-changeable building blocks that, just as legos, can be composed to obtain new cellular behaviors.

Topics: *Part 1: Analysis.* Basic concepts of biology, central dogma, regulation mechanisms, simple ODE models for biomolecular systems, feedback, adaptation and integral feedback (e.g., chemotaxis), noise, signaling systems and amplification (e.g., MAPKK cascades), oscillators and delayed negative feedback (e.g., circadian rhythms). *Part 2: Design.* Basic enabling technologies (fabrication, implementation, measurement), examples of simple synthetic bio-molecular modules (oscillators, memory systems, inverters, filters, noise rejection systems), interconnection of modules, impedance problems (i.e., retroactivity), insulation devices and feedback.

Prerequisites: Undergraduate-level linear algebra and calculus, basic probability, A first course in control systems such as EECS 460 is desirable, but not required.

Audience: seniors in control systems interested in biology, graduate students in systems and mathematics interested in biology, graduate students in bioinformatics, physics, and biology interested in exploring new tools for analysis and design

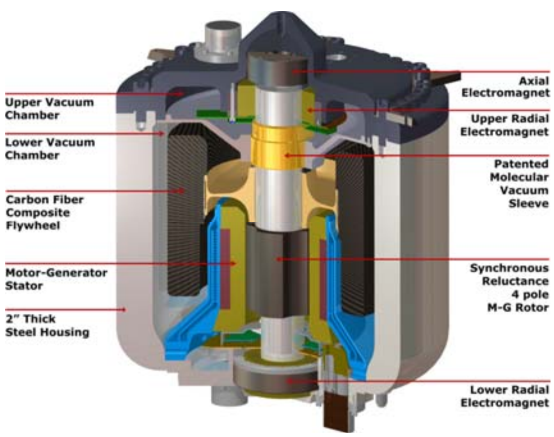
EECS 498: Electric Machinery and Drives
Winter 2010

In the struggle to address today's energy and environmental challenges, many potential solutions require electro-mechanical energy conversion. Examples include electric propulsion drives for electric and hybrid electric vehicles, generators for wind turbines, and high-speed motor/alternators for flywheel energy storage systems.

Tesla Roadster

Wind Turbines

Each of these systems contains: an electric machine operating either as a motor, a generator, or both; a power electronic circuit which interfaces the machine to a power supply or an electrical system; and a controller which measures electrical and mechanical quantities and uses this information to control the power electronic circuitry.



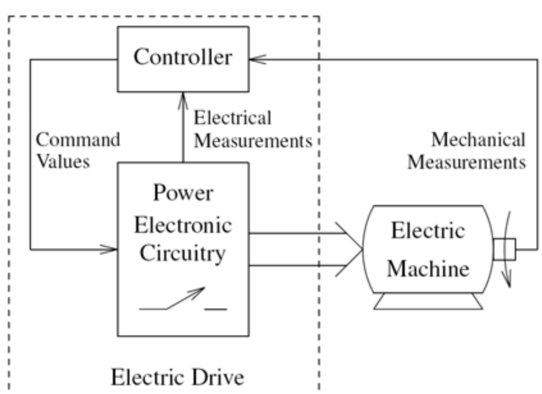
Flywheel Energy Storage

In this course we will cover fundamental electromechanical, power electronic, and control theory in the context of electric drive systems. The capabilities and limitations of different types of electric machines (e.g., permanent magnet, induction) in various drive applications will be covered. MATLAB® Simulink® models will be used throughout the course to give students exposure to the dynamic behavior of these systems.

Lectures: Tuesday & Thursday 12-1:30
Wednesday 12-1

Instructor: Prof. Heath Hofmann
(hofmann@eecs.umich.edu)

Prerequisites: EECS 216 (or equivalent; material will also be accessible to students in non-EE disciplines)




EECS 498 Special Topic

Grid Integration of Alternative Energy Sources

Wednesday, 8:30-10:30am and Friday, 10:00am-Noon
Winter 2010

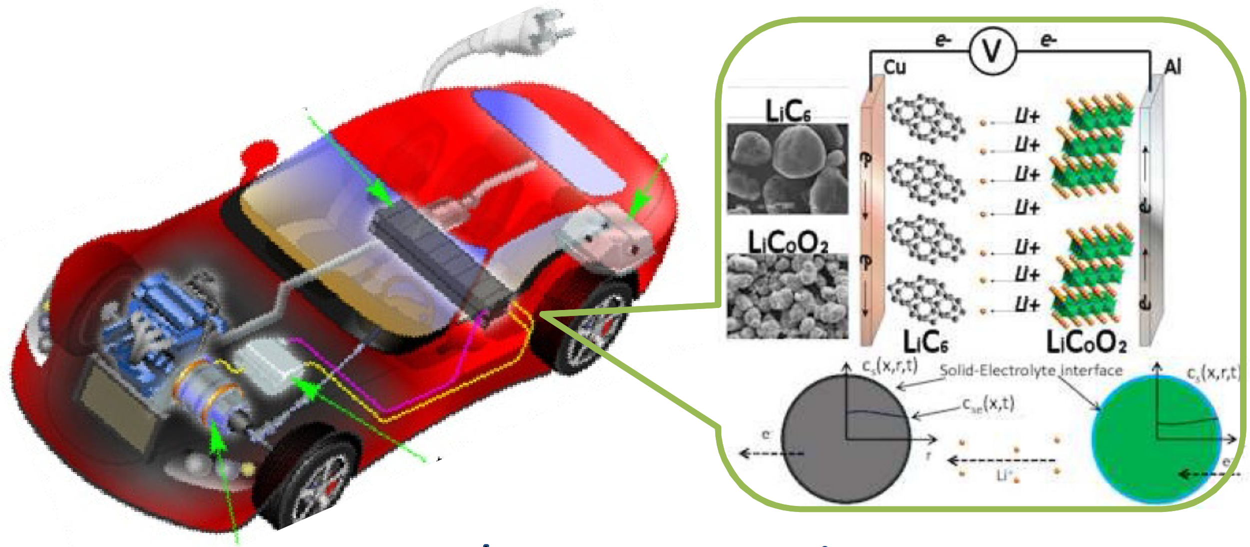
The course will present a variety of alternative energy sources, along with energy processing technologies required for power system connection. System integration issues will be addressed, with consideration given to impacts on current design philosophies and operating procedures. Topics will be covered at a level suited to establishing a broad understanding of the various technologies, and of the associated system implications. The course will develop tools necessary for analysis and design of alternative energy systems.

Syllabus:

1. Power systems: basic concepts, system operation.
2. Wind power: basic principles of wind energy, electromechanical energy conversion, optimal power extraction.
3. Power electronic converters: switches, diodes, basic converter topologies.
4. Photovoltaic (PV) cells: energy conversion principles, electrical modeling, optimal power extraction.
5. Other alternative energy sources: fuel cells, wave power.
6. Energy storage technologies.
7. Plug-in hybrid electric vehicles: basic operating principles, grid interconnection strategies and issues.

Prerequisites: EECS 215 or 314 (or Permission of Instructor).

Course Director: Prof Ian Hiskens, Electrical Engineering and Computer Science.
For additional information contact <hiskens@umich.edu>.



MECHENG 499-006/599-006 Special Topics Course

Vehicle Electrification (Part A): Battery Systems and Control

Winter 2010, Jan 6-Feb24
Monday and Wednesday, 3:30-5:30
Chrysler Center 165 – 2 Credits

This course covers battery modeling, control and diagnostic methodologies associated to battery electric and battery hybrid electric vehicles. Emphasis is placed upon system-level modeling, model order reduction from micro-scale to macro-scale and surrogate models for load control, estimation, on-board identification and diagnostics for Lithium Ion batteries. The electrochemical, electrical, and transport principles for battery modeling are reviewed. Spatiotemporal models of coupled concentration, potential, and thermal phenomena are introduced and then augmented to predict aging and capacity fade. Simulation of the resulting partial differential equations using various popular software tools will be introduced with selected topics on numerical issues. Time- and frequency-domain model order reduction techniques, system identification, parameter estimation, filtering, and control theory will be covered and applied to state of charge, state of health, load governors and rate limiters. Additionally, electric-circuit battery models, DC/DC converters, and other vehicle implementation issues of power management and balancing will be introduced.

This course comprises the first part of a 2-course sequence beginning with MECHENG 499/599-007 [Vehicle Electrification (Part B): Hydrogen and Fuel cells

Intended audience: Junior-level+ undergraduates or graduate students with an interest in vehicular energy storage and conversion.

Grading: A combination of mini-projects and quizzes will be used. A term paper will be required from the graduate students. Two separate grade curves will be applied for the 499 and the 599 registration.

Prerequisites: ME360

Instructors: Dr. Hosam Fathy and Anna Stefanopoulou , Mechanical Engineering Dept.

For additional information: hfathy@umich.edu or annastef@umich.edu

MECHENG 499-007/599-007 Special Topics Course

Vehicle Electrification (Part B): Hydrogen and Fuel Cells

Winter 2010, March 8-April 19
Monday and Wednesday, 3:30-5:30
EECS 1303 – 2 Credits

This course covers essential aspects of fuel cell vehicle technology, hydrogen fueling infrastructure, and potential benefits & barriers to the use of hydrogen as a vehicular fuel. Emphasis is placed upon system-level modeling and control issues of polymer electrolyte membrane fuel cells and on the principles and design of on-board hydrogen storage systems. Hydrogen generation and distribution technologies are introduced, and life-cycle (well-to-wheels) analyses of petroleum consumption, efficiency, and CO_2 reduction are presented. Lectures will be supplemented with fuel cell vehicle demonstrations conducted by local automotive OEMs, and site visits to hydrogen fueling stations.

This course comprises the second part of a 2-course sequence beginning with MECHENG 499/599-006 [Vehicle Electrification (Part A): Battery Systems and Controls]

Intended audience: Junior-level+ undergraduates or graduate students with an interest in vehicular energy storage and conversion.

Grading: A combination of mini-projects and quizzes will be used. A term paper will be required from the graduate students. Two separate grade curves will be applied for the 499 and the 599 registration.

Prerequisites: ME382 or MSE360 and ME360

Instructors: Profs. Don Siegel and Anna Stefanopoulou , Mechanical Engineering Dept.

For additional information: djsiege@umich.edu or annastef@umich.edu