Syllabus
Energy Storage
ME 261 – Fall 2018

This course is intended to provide students an overview on energy conversion and storage schemes/devices with a major focus on electrochemical energy conversion/storage including fuel cells, ionic batteries and super-capacitors. This course is appropriate for engineering and natural science students interested in having an overview of electrochemical energy conversion/storage schemes covering their basic operating principles, fundamental physics behind them and technological advantages/issues.

Instructor
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Pre-requisite
Exposure to Thermodynamics is recommended, but not mandatory

Lectures
Mondays & Wednesdays 4:30 pm – 5:45 pm; GLCR 135

Office Hours
By appointment

Textbook
Energy Storage, Robert A. Huggins, Springer
Fuel Cell Fundamentals, 2nd or 3rd Edition, Ryan O'Hayre et al., Wiley

Grading
Midterm	= 40% (TBD; GLCR 135)
Final	= 60% (Dec. 14; GLCR 135)

Grades will be given using the ***Curved Grading*** system.

Homework will be assigned basically on a weekly basis. They will be posted on UCMCROPS Mondays, and their solutions will be posted the following Monday. The homework is for students' training only. It will not be graded.

Exams will be held in class, and cover the cumulative materials covered prior to the exam.

Accommodating disabilities

The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. **I share this commitment.** An integral part of this commitment is the coordination of effective academic access support services and other resources through UC Merced Disability Services (UCM DS).

UCM Disability Services is located on the second floor of the Student Services Building, Room 230. The e-mail address is disabilityservices@ucmerced.edu.

Academic integrity

Academic integrity is the foundation of an academic community. Academic integrity applies to research as well as undergraduate and graduate coursework. Academic misconduct includes, but is not limited to cheating, fabrication, plagiarism, altering graded examinations for additional credit, having another person take an examination for you, or facilitating academic dishonesty or as further specified in this policy or other campus regulations. For more information, please see UC Merced's academic honesty policy.
http://studentlife.ucmerced.edu/sites/studentlife/files/public/documents/academichonestypolicy.pdf

Violation of academic integrity in this course will result in zero credit for the associated home work and exams, for all involved.

Tentative Weekly Schedule

Week 1	Types of Energy Storage
Week 2	Basic Thermodynamics (Enthalpy, Gibbs Free Energy, Nernst Equation)
Week 3	Fuel Cell – Introduction and Open Circuit Voltage
Week 4	Fuel Cell – Activation and Ohmic Losses
Week 5	Fuel Cell – Mass Transport Loss
Week 6	Fuel Cell – Modeling, Types, Systems
Week 7	Review Session and Midterm Exam
Week 8	Electrochemical Characterization – Polarization Curve, EIS
Week 9	Ionic Batteries – Terminology and Principles, Phase Diagram
Week 10	Ionic Batteries –Electrodes
Week 11	Ionic Batteries –Modeling; Flow Battery
Week 12	Super Capacitor – Principles and Operation
Week 13	Electrochemical Characterization – Cyclic Voltametry
Week 14	Thermal and Mechanical Energy Storage
Week 15	Review Session and Final Exam