Syllabus for ME261-01: Energy Storage

Spring 2017
Instructor: Min Hwan Lee

Designation:	Energy Storage
Catalog Description:	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.
Text Books and Other Required Materials:	1) Energy Storage, Robert A. Huggins, Springer 3) Fuel Cell Fundamentals, 2nd Edition, Ryan O'Hayre et al., Wiley
Course Objectives/ Student Learning Outcomes:	
Program Learning Outcomes:	
Prerequisites by Topic:	Exposure to Thermodynamics is highly recommended, but not mandatory
Course Policies:	Homework will be assigned basically bi-weekly. They will be posted on UCMCROPS Tuesdays and due the following Tuesdays. 10% of score will be subtracted for every delayed day. Collaboration is encouraged, but the work that you turn in should be your own. Exams will be held in class, and cover the cumulative materials covered prior to the exam.
Academic Dishonesty Statement:	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
Disability Statement:	

	Accommodations for Students with 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 am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
Topics:	
Class/laboratory Schedule:	
Midterm/Final Exam Schedule:	Midterm (TBD; CLSSRM 205) Final (May 8; CLSSRM 205)
Course Calendar:	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
Professional Component:	
Assessment/Grading Policy:	Grading Homework = 10% Midterm = 40% Final = 50% Grades will be given using the Curved Grading system.
Coordinator:	
Contact Information:	Min Hwan Lee, Assistant Professor, Mechanical Engineering mlee49@ucmerced.edu, (209) 228-4186, Office: SE2 276
Office Hours:	By appointment