Electrochemical Energy Devices (MSEN7V80)

Course Syllabus

Instructor Resources

Registrar's Intranet: please log in with your UTD NetID and password to access this site. Information that faculty need about grading, scheduling, and other essential aspects of our responsibilities related to teaching are made available and updated regularly in the Registrar's Intranet. This source of information can only be accessed by logging in with your UTD NetID and password. Many important faculty questions are answered here, and this is information that faculty members are expected to know and understand.

FERPA Guidelines: you will be asked to log in before you access the FERPA Faculty Guidelines webpage on the Registrar's Intranet. If faculty have additional questions about FERPA guidance, please contact the Office of the Registrar at records@utdallas.edu for the proper student consent forms and further instructions. NOTE: Class recordings from prior semesters may be used as long there are no identifiable student information due to FERPA because instructors will need students' written consent first. Please review your previous class recordings for identifiable student information before using them in the current term. For additional guidance, contact the Office of the Registrar.

Honorlock: Online proctoring tool will be available for fully online courses and for classes with enrolled international students who are not yet in the United States.

Course Information

Course Prefix, Number, Section	*MSEN7V80*
Course Title	*Electrochemical Energy Devices*
Term	*2024 Spring*
Days & Times	*Monday & Wednesday 2:30pm - 3:45pm*

Professor Contact Information

Professor	*Laisuo Su*
Office Phone	*4124789593*
Email Address	*laisuo.su@utdallas.edu*
Office Location	*RL1.412*
Office Hours	*On appointment*

Note: state time/day and how office hours will be held, e.g., BlackBoard Collaborate or MS Teams (add appropriate links), and/or phone call – optional; please ensure student's identity in adherence to FERPA

Course Pre-requisites, Co-requisites, and/or Other Restrictions

No

Course Description

As a type of energy storage device, batteries, especially lithium-ion batteries, have electrified our society through their applications in portable electronics (cell phones, tablets, laptops, etc.), electric vehicles, medical devices, and grid energy storage. This course will introduce energy storage devices with a focus on battery technology. We will start with fundamental electrochemistry. We will then introduce the principles and performance of various types of batteries with a focus on lithium-ion batteries. The objective of the course is to give the students a solid foundation upon which they will be able to use modern electrochemistry and battery technologies in their research and career.

Student Learning Objectives/Outcomes

Have a general understanding of electrochemistry.

Understand the basics of lithium-ion battery materials, including cathode materials, anode materials, electrolytes, separators, and electrode-electrolyte interphase.

Know other types of batteries and energy storage devices.

Required Textbooks and Materials

Required Texts

No

Required Materials

No

Suggested Course Materials

Suggested Materials

1. A. J. Bard and L. R. Faulkner, Second Edition, Electrochemical Methods: Fundamentals and Applications, John Wiley, New York (2001).
2. Huggins, Robert. Advanced batteries: materials science aspects. Springer Science & Business Media, 2008. Available online, Free download from UTD library
3. D. Linden, Ed., Handbook of Batteries, 2nd edition, McGraw-Hill, New York (1995).

Assignments & Academic Calendar

Topics, Reading Assignments, Due Dates, Exam Dates

Week	Date	Contents	Homework, exam	Reference
1	1/15	Martin Luther King Day		
	1/17	Course introduction, overview	Project selection	Bard Ch1
2	1/22	Introduction of Electrochemistry		
	1/24	Thermodynamics		Bard Ch2
3	1/29	Thermodynamics		
	1/31	Thermodynamics	HW 1	Bard Ch3, 4
4	2/5	Kinetics and Mass Transport		
	2/7	Kinetics and Mass Transport		
5	2/12	Review of Electrochemistry	HW 2, HW 1 Due	
	2/14	Lithium ion Battery - Anodes		
6	2/19	Lithium ion Battery - Anodes		
	2/21	Lithium ion Battery - Cathodes	Project selection Due	
7	2/26	Lithium ion Battery - Cathodes		
	2/28	Lithium ion Battery - Cathodes		
8	3/4	Lithium ion Battery - Cathodes	HW3, HW 2 Due	
	3/6	Mid-term Exam		
9	3/11	Spring Break		
	3/13			
10	3/18	Lithium ion Battery - Electrolytes & separators		
	3/20	Lithium ion Battery - Electrolytes & separators		
11	3/25	Lithium ion Battery -Interphase		
	3/27	Lithium ion Battery -Interphase		
12	4/1	Battery characterization		Bard Ch5,6,8,10
	4/3	Battery characterization		
13	4/8	Battery characterization	HW4, HW3 Due	
	4/10	Other Battery technology		
14	4/15	Other Battery technology		
	4/17	Other Battery technology		
15	4/22	Supercapacitor	HW4 Due	
	4/24	Supercapacitor		
16	4/29	TBD		
	5/1	Project presentation		

Grading Policy

20% - Homework
30% - Midterm exam
40% - Final Project
10% - Attendance and Participation

Course Policies

- Homework should be completed on an individual basis. Students may discuss together but each student needs to turn in his or her own work.
- Homework is due at the beginning of the class. Any conflict regarding any grade (homework, exams, quizzes, etc) must be resolved within 1 week after the grade is returned.
- If you need to miss class on the day of an exam or the day of an assignment for a personal reason, such as a religious observation not recognized by the university, please contact the instructor at least 2 weeks before your anticipated absence to discuss alternative arrangements.
- Students with disabilities are requested to provide a written request and documents.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the AccessAbility Resource Center has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

NOTE: if the instructor records any part of the course, then the instructor will need to add the following syllabus statement:

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Classroom Citizenship
No restrictions

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please see http://go.utdallas.edu/academic-support-resources.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.