



JOINT INSTITUTE  
交大密西根学院

## Course Syllabus

VM509

# Battery Materials: Fundamentals and Applications

2018 Summer

### Course Description:

Battery is ubiquitous in present-day technological applications, ranging from portable devices to grid-scale stationary energy storage. In this course, we will introduce the fundamentals of battery materials. The thermodynamics, chemistry and physics that govern the electrochemical performance of battery materials will be covered. Built upon the fundamental understanding, we will also discuss a wide variety of anode, cathode and electrolyte materials discovered to date. The course will be ended with economic analysis of battery materials and chemistries, and discuss the key factors which determine their application space (e.g., portable electronics vs. electric vehicles).

### Instructor:

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Phone: 021-34204474

Office: Room 401

Office hour: Fridays, 12:00 – 2:00 PM, Rm 401

### Textbook (Author, Book Title, Publisher, Publication Year, ISBN):

Advanced Batteries: Materials Science Aspects,

Robert A. Huggins,

Springer,

ISBN: 978-0-387-76423-8

### Course Prerequisites:

General Chemistry and thermodynamics, or related courses of similar topics

### Course Website:

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邮编 200240

Tel: +86-21-34206045

800 Dong Chuan Road, Shanghai, 200240, PRC

<http://umji.sjtu.edu.cn>



N/A

### Grading Policy (Assignments %, Project, Exams, etc.):

Grade is determined based on your term papers and class attendance. Each term paper is accompanied with an oral defense, which will be also graded. Maximum weighted points & % grade as follows:

<b>Mid-term paper &amp; defense</b>	<b>50%</b>
<b>Final thesis &amp; defense</b>	<b>50%</b>
<b>Total Maximum</b>	<b>100%</b>

### Honor Code Policy:

Term papers must be completed independently; however, students are encouraged to discuss topics. Plagiarism is strictly forbidden. **“Any violation of the Honor Code in the course of completion of the work leads to an automatic loss of all points for this work”.** You must cite your sources as a reference for all your graphs, pictures, figures, tables, theories, equations, etc. You are not allowed to make copies of any course materials without the written permission of the original publisher. You must follow JI policy on honor code and review consequences for violation of such policy. Refer to your student handbook for further honor code policies.

### Teaching Schedule:

Week	NO.	Date	lectures and Exams	Comments
1	1	May 14th	Basic principles of rechargeable batteries	
	2	May 16th	Basic principles of rechargeable batteries	
2	3	May 21st	Characterization techniques for battery materials	
	4	May 23rd	Characterization techniques for battery materials	
3	5	May 28th	Lithium-ion Batteries: electrode materials, electrolyte and critical interfaces	
	6	May 30th	Lithium-ion Batteries: electrode materials, electrolyte and critical interfaces	
4	7	June 4th	Lithium-ion Batteries: electrode materials, electrolyte and critical interfaces	
	8	June 6th	Lithium-ion Batteries: electrode materials, electrolyte and critical interfaces	
5	9	June 11th	Sodium- and potassium-ion batteries	
	10	June 13th	Sodium- and potassium-ion batteries	



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6	11	June 18th	NO CLASS	Dragon Boat Festival
	12	June 20th	Multivalent batteries	
7	13	June 25th	Multivalent batteries <b>Mid-term paper due</b>	
	14	June 27th	<b>Mid-term paper defense</b>	
8	15	July 2nd	Lithium-Air Batteries	
	16	July 4th	Lithium-Air Batteries	
9	17	July 9th	Lithium-Sulfur Batteries	
	18	July 11th	Lithium-Sulfur Batteries	
10	19	July 16th	Solid-state batteries	
	20	July 18th	Holiday for Dragon Boat Festival	
11	21	July 23rd	Solid-state batteries	
	22	July 25th	Solid-state batteries	
12	23	July 30th	Economic analysis of batteries and considerations for practical applications	
	24	August 1st	Economic analysis of batteries and considerations for practical applications <b>Final thesis due</b>	
13	25	August 6th	<b>Final thesis defense</b>	
	26	August 8th		



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