

# Introduction to the Materials Science of Rechargeable Batteries

Lecture I

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PURDUE Engineering



# About Edwin García

- Associate Professor of Materials Engineering
- Have been at Purdue for eight years
- Focus is on Theory and Simulation of Materials (Thermodynamics and Kinetics)
- Interests include:
  - Rechargeable Battery Technology
  - Microstructure Design
  - Ferroelectrics
  - Light Emitting Diodes

# More About Edwin García

- More Interests:

- Microstructure Evolution

- Super Computing

- Fundamentals of Nucleation and Growth

- Other Interests:

- Mexican and World Soccer (religiously, every night)

- The Daily Show (whenever possible)

# Today

- Course Administration
- Office Hours
- Introduction to Batteries (if time permits)



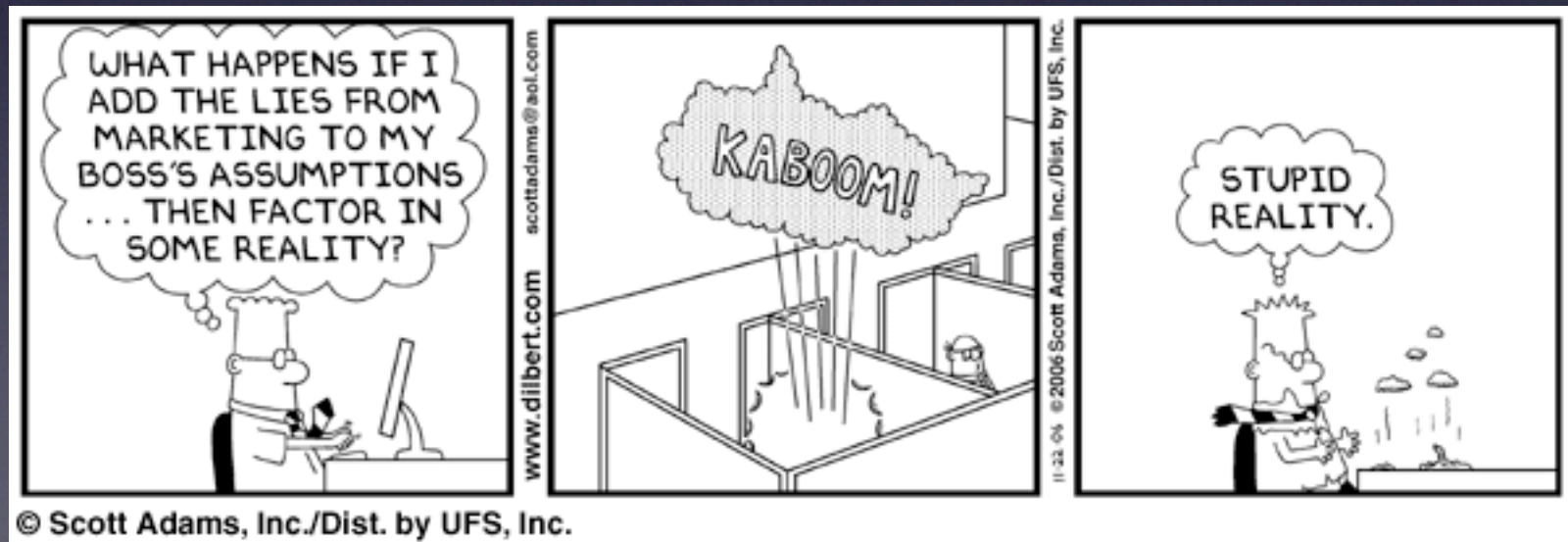
# Final Grade Breakdown



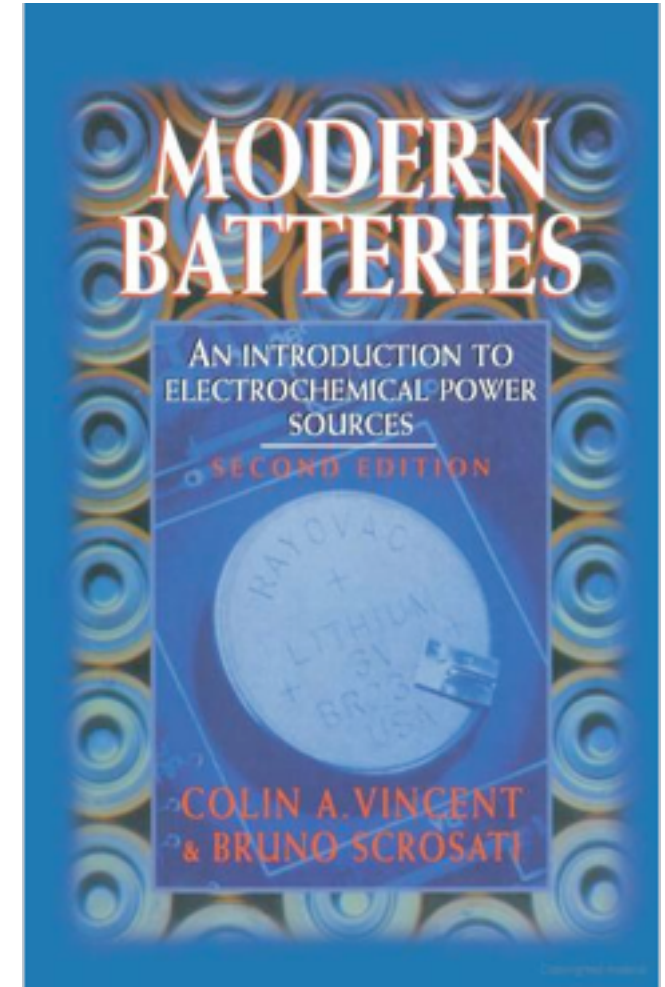
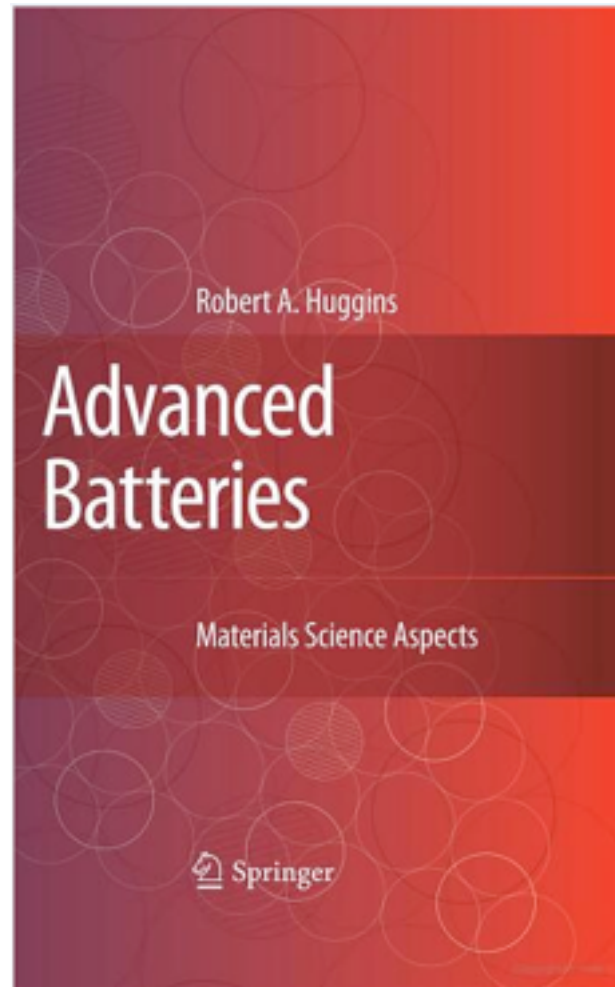
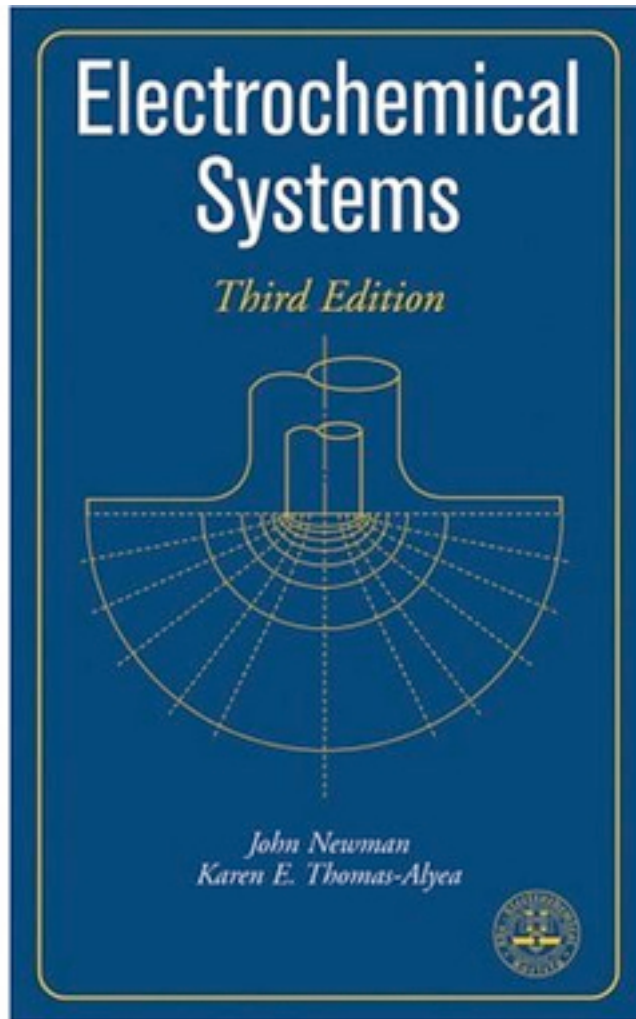
- 20 % Homework
- 40% Exam I
- 40% Exam 2

# Homework

- Homework will be posted on Fridays
- Will be collected a week later
- Teams of two-students are encouraged
- 5 extra points per HW



# References



# Class Webpage

The screenshot shows a web browser window with the URL [https://nanohub.org/groups/mse597rb\\_2013/wiki/MainPage](https://nanohub.org/groups/mse597rb_2013/wiki/MainPage). The page features the nanoHUB.org logo and navigation menus. The main content area displays the title "MSE 597 Introduction to the Materials Science of Rechargeable Batteries" and a "Main Page" section by R. Edwin Garcia. A sidebar on the left contains a "Group Manager" section with options like Overview, Members, Wik, Resources, Discussion, Blog, Wish List, Usage, and Projects. The main text describes the course content, and a file named "597rbsyllabuscirculation.pdf" is listed as uploaded.

nanoHUB.org – Group: MSE 597 Introduction to the Materials Science of Rechargeable Batteries – Wiki: Main Page

https://nanohub.org/groups/mse597rb\_2013/wiki/MainPage

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R. Edwin Garcia (redwing)

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Main Page

by R. Edwin Garcia

Article Edit Comments History Delete Index Main Page

Electrochemical materials and its application to energy storage devices, such as batteries and fuel cells are a rapidly growing field, particularly for portable technologies and electric and hybrid vehicles. This course will deliver an introduction to basic electrochemistry, principles of electrochemical devices, electroactive materials used in such systems, and case studies of rechargeable batteries. Theoretical and practical aspects of battery fabrication will be delivered, while placing an emphasis on the integration of electrochemical principles and materials science for rechargeable battery technology. Current trends and directions of the field of battery technology will also be outlined.

[597rbsyllabuscirculation.pdf](#) (165.41 Kb, uploaded by R. Edwin Garcia 11 seconds)

Lectures

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Handouts

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[https://nanohub.org/groups/mse597rb\\_2013/](https://nanohub.org/groups/mse597rb_2013/)



# Adding Yourself to the Class Website

- go to:

[https://nanohub.org/groups/mse597rb\\_2013/](https://nanohub.org/groups/mse597rb_2013/)

and request to be added to the list

- you will get a confirmation email
- you are done!

# Dates and Deadlines



- Mid Term: October 18th
  - Will focus on the development of thermodynamic and kinetic concepts associated to electrochemical systems
- Second Mid Term: December 6th
  - Will develop an understanding on the reaches and limitations of currently used battery systems
- Final Exam: NO FINAL

# Class Policies



# Attendance and Participation

- Will Keep Track of Students' Participation
- Questions and Comments are Encouraged!