

Modeling of Electrochemical Cells:
Proton Exchange Membrane Fuel Cells
HYD7007 - 01

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Class Meeting Location and Times

- GS Caltex building, 1st floor seminar room
- Wednesday 6:00 PM – 9:00 PM

Course Website

- <http://utkstair.org/clausius/docs/fuelcells/index.html>

Instructor Information

- Office YERC 174B
- Office telephone: 2123-5748
- email: dkeffer@utk.edu

Objective

The objective of this portion of the course is to understand the molecular-level structure and transport processes of Proton Exchange Membranes (PEM) fuel cells.

Organization and Scheduling

Meeting 1. Structure (May 11, 2011)

- Lecture 1. Overview of PEM Fuel Cell Structure
- Lecture 2. Structure of Polymer Electrolyte Membranes
- Lecture 3. Structure of Polymer Electrode/Electrolyte Interfaces

Meeting 2. Water & Charge Transport (May 18, 2011)

- Lecture 4. Overview of transport processes in PEMs
- Lecture 5. Molecular-level Modeling of Water & Charge Transport
- Lecture 6. Multiscale Modeling of Water & Charge Transport

Meeting 3. Membrane Composition (May 25, 2011)

- Lecture 7. PFSA Membranes
- Lecture 8. Membranes of Other Polymer Chemistries
- Lecture 9. Hybrid Composite Membranes

Meeting 4. Polymer Dynamics (June 8, 2011)

- Lecture 10. Atomistic & Coarse-grained Models
- Lecture 11. Nonequilibrium Processes
- Lecture 12. Applications in Fuel Cells

Overall Course Grades

- The total course grade is an average of the three grades for each instructor.

Course Grade for this Portion

- Attendance: 20%
- Homework Assignments: 30%
- Final Exam: 50%

Homework Assignments

Homework assignments will be distributed via the course website.

- assignment 1. Assigned: May 11, 2011. Due: May 18, 2011, beginning of class.
- assignment 2. Assigned: May 18, 2011. Due: May 25, 2011, beginning of class.
- assignment 3. Assigned: May 25, 2011. Due: June 8, 2011, beginning of class.

Final Examination

- Covers only this final third of the class
- date, time and location: To be determined.