MSE 8803E – Materials for Energy Storage and Conversion

School of Materials Science and Engineering
Georgia Institute of Technology

Spring Semester 2016

Course Objective
To provide students with a fundamental understanding of the scientific principles and new strategies to transfer, capture, and store energy derived from various resources (e.g., solar, wind, geothermal, and biomass), the latest developments, and the materials challenges for energy storage, conversion, and harvesting; to emphasize guidelines for rational design of new materials for a clean and secure energy future

Lecture
4:35-5:55 pm Tuesdays and Thursdays in Instr. Center 119

Instructor
Meilin Liu and Chris Summers
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Office Hour
M W F 2-3
Tuesdays and Thursdays in Instr. Center 119

Teaching assistant
TBD

Homework
Problems will be assigned periodically and solutions will be posted a week later. Homework will not be collected or graded.

Exam/grading
2 Exams*, 30% each
Exam 1 – Electro-physical energy storage/conversion
Exam 2 – Electro-chemical energy storage/conversion
1 Term Paper 40%
Design of a novel energy storage/conversion device

*Exams are optional for non-engineering/science students, whose grade may be based mainly on a Term Paper.

References
1. Lecture notes – to be distributed in class
9. Additional references on solar energy to be given later

The references with call numbers are available from the library and will be placed on a 2-hour reserve in the Library.
# MSE 8803E: Topical Outline

<table>
<thead>
<tr>
<th># of Lectures</th>
<th>Date</th>
<th>Topics</th>
<th>Ref</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Introduction</strong></td>
<td>1,2,3</td>
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<tr>
<td>2 wks</td>
<td>Jan 12-21</td>
<td>Global energy issues; Materials science to transcend energy challenges; Materials for energy transformation processes Introduction to Thermodynamics/Kinetics/Crystallography</td>
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<tr>
<td>4 wks</td>
<td>Jan 26 to Feb 18</td>
<td><strong>Electro-physical Energy Storage &amp; Conversion</strong></td>
<td>*,1,2,3,4</td>
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<tr>
<td>1 wk</td>
<td>Feb 23 to Feb 25</td>
<td>Introduction to anisotropy and tensors</td>
<td>1,2,4,5</td>
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<td></td>
<td>Mar 1</td>
<td>Exam 1: Electro-physical energy storage/conversion (30%)</td>
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<tr>
<td>5 wks</td>
<td>Mar 3 to Apr 7</td>
<td><strong>Electrochemical Energy Storage &amp; Conversion</strong></td>
<td>1,6,7</td>
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<td>Apr 12</td>
<td>Exam 2: Electrochemical energy storage/conversion (30%)</td>
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<td>2 wks</td>
<td>Apr 14 To Apr 26</td>
<td><strong>Materials for Solar Energy Conversion (CS)</strong></td>
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<td>Apr 18</td>
<td>Term Paper (40%)</td>
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