



## Course Syllabus: Materials for Energy - MSE 230

<b>Division</b>	Physical Science and Engineering Division
<b>Course Number</b>	MSE 230
<b>Course Title</b>	Materials for Energy
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2018/2019
<b>Semester Start Date</b>	01/27/2019
<b>Semester End Date</b>	05/23/2019
<b>Class Schedule</b> (Days & Time)	09:00 AM - 10:30 AM   Mon Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Husam Niman Alshareef	husam.alshareef@kaust.edu.sa	+966128084477	2228, 3, Ibn Sina (bldg. 3)	By Appointment

Teaching Assistant(s)	
Name	Email
None	

Course Information									
<b>Comprehensive Course Description</b>	This course is intended as a review of the challenges facing materials scientists working in renewable energy and sustainability science and technology. It aims to give the student a birds-eye view of the current topics in energy harvesting and storage materials. The potential of various energy harvesting approaches will be discussed in the context of energy needs facing the world. This will be done with particular focus on materials innovations required to improve the state of the art. After this thorough introduction, the course will discuss solar power and electrochemical energy storage in more depth.								
<b>Course Description from Program Guide</b>	This course is intended as a review of the challenges facing materials scientists working in renewable energy and sustainability science and technology. It aims to give the student a birds-eye view of the current topics in energy harvesting and storage materials. The potential of various energy harvesting approaches will be discussed in the context of energy needs facing the world. This will be done with particular focus on materials innovations required to improve the state of the art. After this thorough introduction, the course will discuss solar power and electrochemical energy storage in more depth.								
<b>Goals and Objectives</b>	<table border="0"> <tr> <td><b>Objectives</b></td> <td><b>Outcome Measures</b></td> </tr> <tr> <td>Materials, physics, and technology of solar cells</td> <td>Summaries and Problem solving in Homework/Exams</td> </tr> <tr> <td>Materials, physics, and technology of other energy harvesting technologies</td> <td>Summaries and Problem solving in Homework/Exams</td> </tr> <tr> <td>Materials, physics, and technology of energy storage</td> <td>Summaries and Problem solving in Homework/Exams</td> </tr> </table>	<b>Objectives</b>	<b>Outcome Measures</b>	Materials, physics, and technology of solar cells	Summaries and Problem solving in Homework/Exams	Materials, physics, and technology of other energy harvesting technologies	Summaries and Problem solving in Homework/Exams	Materials, physics, and technology of energy storage	Summaries and Problem solving in Homework/Exams
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<b>Required Knowledge</b>	General chemistry and physics Introductory Materials Science Elementary Semiconductor Theory Thermodynamics of Materials								

<b>Reference Texts</b>	<p>No text books, but the following two references are useful</p> <p><b>Sustainable Energy - Without the Hot Air</b>  <a href="#">David JC MacKay</a>          Publisher: UIT Cambridge Ltd. (February 20, 2009)          ISBN-10: 0954452933          ISBN-13: 978-0954452933</p> <p><b>Physics of Solar Cells</b>          Jenny Nelson          Imperial College Press; 1 edition (September 5, 2003)          ISBN-10: 1860943497          ISBN-13: 978-1860943492</p> <p><b>Advanced Batteries</b>          R.A. Huggins          Springer; 1 edition (December 10, 2008)          ISBN-10: 0387764232          ISBN-13: 978-0387764238</p>
<b>Method of evaluation</b>	<p><b>50.00%</b> - Final exam  <b>30.00%</b> - Homework /Assignments  <b>20.00%</b> - Course Project(s)</p>
<b>Nature of the assignments</b>	<p>The course will involve:</p> <ol style="list-style-type: none"> <li>1. Review paper</li> <li>2. Presentation</li> <li>2. Homeworks</li> <li>4. One final exam</li> </ol>
<b>Course Policies</b>	<p>Late home works will not be accepted          No make-up exams</p>
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

<b>Week</b>	<b>Lectures</b>	<b>Topic</b>
1	Mon 01/28/2019	Introduction
1	Wed 01/30/2019	Introduction
2	Mon 02/04/2019	Solar Cell Physics
2	Wed 02/06/2019	Solar Cell Physics
3	Mon 02/11/2019	Solar Cell Materials
3	Wed 02/13/2019	Solar Cell Materials
4	Mon 02/18/2019	Solar Cell Materials
4	Wed 02/20/2019	Solar Cell Materials
5	Mon 02/25/2019	Solar Cell Devices
5	Wed 02/27/2019	Solar Cell Devices
6	Mon 03/04/2019	Thermoelectrics
6	Wed 03/06/2019	Thermoelectrics
7	Mon 03/11/2019	Thermoelectrics
7	Wed 03/13/2019	Piezoelectrics
8	Mon 03/18/2019	Piezoelectrics
8	Wed 03/20/2019	Piezoelectrics
9	Mon 03/25/2019	Spring Break
9	Wed 03/27/2019	Spring Break
10	Mon 04/01/2019	Electrochemical Energy Storage
10	Wed 04/03/2019	Electrochemical Energy Storage
11	Mon 04/08/2019	Electrochemical Energy Storage
11	Wed 04/10/2019	Electrochemical Energy Storage
12	Mon 04/15/2019	Electrochemical Energy Storage
12	Wed 04/17/2019	Electrochemical Energy Storage
13	Mon 04/22/2019	Electrochemical Energy Storage
13	Wed 04/24/2019	Electrochemical Energy Storage
14	Mon 04/29/2019	Electrochemical Energy Storage
14	Wed 05/01/2019	Electrochemical Energy Storage
15	Mon 05/06/2019	Fuel Cells
15	Wed 05/08/2019	Fuel Cells
16	Mon 05/13/2019	Presentations
16	Wed 05/15/2019	Presentations
17	Mon 05/20/2019	Final Exam Week
17	Wed 05/22/2019	Final Exam Week

### Note

The instructor reserves the right to make changes to this syllabus as necessary.