



## Course Syllabus: Contemporary Topics in Materials Science - MSE 394

<b>Division</b>	Physical Science and Engineering Division
<b>Course Number</b>	MSE 394
<b>Course Title</b>	Contemporary Topics in Materials Science
<b>Academic Semester</b>	Summer
<b>Academic Year</b>	2018/2019
<b>Semester Start Date</b>	06/16/2019
<b>Semester End Date</b>	08/08/2019
<b>Class Schedule</b> (Days & Time)	09:00 AM - 12:00 PM   Sun Tue

### Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Udo Schwingenschloegl	Udo.Schwingenschloegl@kaust.edu.sa	+966128084399 8084399	3233, 3, Ibn Sina (bldg. 3)	Sunday 4-5 pm

### Teaching Assistant(s)

Name	Email
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### Course Information

<b>Comprehensive Course Description</b>	The course will address selected contemporary topics in Ab-Initio Computational Methods, building up on course MSE 314, specifically interfaces and heterostructures, Dirac materials, topological insulators, valleytronics, thermoelectricity, metal-ion batteries, solar cells, and solid oxide fuel cells.
<b>Course Description from Program Guide</b>	Lecture-based class
<b>Goals and Objectives</b>	<ul style="list-style-type: none"> <li>- The student will gain further experience in the topics covered by course MSE314.</li> <li>- The student will be able to critically evaluate the results of ab-initio calculations.</li> <li>- The student will be able to interpret articles based on ab-initio computational methods.</li> <li>- The student will gain advanced understanding of contemporary research fields.</li> </ul>
<b>Required Knowledge</b>	MSE 314
<b>Reference Texts</b>	Recent articles from the literature.
<b>Method of evaluation</b>	<b>50.00%</b> - Course Project(s) <b>50.00%</b> - Oral presentation
<b>Nature of the assignments</b>	Paper presentations, course project
<b>Course Policies</b>	Active participation required. No absences. No credit for late work.
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

<b>Week</b>	<b>Lectures</b>	<b>Topic</b>
1	Sun 06/16/2019	Interfaces and heterostructures: Theory
1	Tue 06/18/2019	Interfaces and heterostructures: Applications
2	Sun 06/23/2019	Dirac materials: Theory
2	Tue 06/25/2019	Dirac materials: Applications
3	Sun 06/30/2019	Topological insulators: Theory
3	Tue 07/02/2019	Topological insulators: Applications
4	Sun 07/07/2019	Valleytronics: Theory
4	Tue 07/09/2019	Valleytronics: Applications
5	Sun 07/14/2019	Thermoelectricity: Theory
5	Tue 07/16/2019	Thermoelectricity: Applications
6	Sun 07/21/2019	Metal-ion batteries: Theory
6	Tue 07/23/2019	Metal-ion batteries: Applications
7	Sun 07/28/2019	Solar cells: Theory
7	Tue 07/30/2019	Solar cells: Applications
8	Sun 08/04/2019	Solid oxide fuel cells: Theory
8	Tue 08/06/2019	Solid oxide fuel cells: Applications

### **Note**

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