



## Course Syllabus: Apps of Plasma & Atmospheric Pressure - ME 261

<b>Division</b>	Physical Science and Engineering Division
<b>Course Number</b>	ME 261
<b>Course Title</b>	Apps of Plasma & Atmospheric Pressure
<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)	10:30 AM - 12:00 PM   Sun Tue

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Min Suk Cha	min.cha@kaust.edu.sa	+966128082709	4218, 5, Al-Kindi (bldg. 5)	B5. R4218 Sun. 14:00-15:00

Teaching Assistant(s)	
Name	Email

Course Information	
<b>Comprehensive Course Description</b>	<p>Introduction to fundamental discharge physics and related plasma chemistry. Basic principles of various plasma sources in atmospheric pressure condition will be covered including dielectric barrier discharge, pulsed corona, arc, elongated arc, and microwave plasma. Up-to-dated application fields of APP (Atmospheric Pressure Plasma) for mechanical engineers will be introduced.</p> <ul style="list-style-type: none"> <li>- Energy: fuel reforming and combustion.</li> <li>- Environment: after-treatment of hazardous gases.</li> <li>- Manufacturing: surface treatment of materials.</li> <li>- Plasma devices for bio-medical application.</li> </ul>
<b>Course Description from Program Guide</b>	<p>Introduction to plasma sources in atmospheric pressure condition: dielectric barrier discharge, pulsed corona, arc, elongated arc, and microwave plasma. Application fields for mechanical engineers. Energy: fuel reforming and combustion. Environment: after-treatment of hazardous gases. Manufacturing: surface treatment of materials. Plasma devices for bio-medical application.</p>
<b>Goals and Objectives</b>	<ul style="list-style-type: none"> <li>- Conceptual understanding of physics and chemistry of plasmas.</li> <li>- Capability to choose suitable plasma sources in research and applications.</li> <li>- Understanding a role of APP in various fields including energy, environmental, material, and biomedical applications.</li> </ul>
<b>Required Knowledge</b>	General Physics and Chemistry/ Thermodynamics
<b>Reference Texts</b>	<ol style="list-style-type: none"> <li>1. Fridman, Plasma Chemistry, Cambridge (2008)</li> <li>2. Fridman, L. Kennedy, Plasma Physics and Engineering, Taylor &amp; Francis (2004)</li> </ol>
<b>Method of evaluation</b>	<p>30.00% - Final exam 20.00% - Midterm exam 20.00% - Homework /Assignments 20.00% - Course Project(s) 10.00% - Attendance</p>

<b>Nature of the assignments</b>	Written assignments Experimental mini-projects
<b>Course Policies</b>	Absence without prior notice will not be accepted. Late submission of assignments will not be accepted.
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

Week	Lectures	Topic
1	Sun 01/27/2019	Introduction
1	Tue 01/29/2019	Kinetic theory of gases
2	Sun 02/03/2019	General characteristics of plasmas
2	Tue 02/05/2019	Electrical discharges: low pressure
3	Sun 02/10/2019	Electrical discharges: high pressure
3	Tue 02/12/2019	Corona discharges
4	Sun 02/17/2019	Nano-second discharges
4	Tue 02/19/2019	Dielectric barrier discharges 1
5	Sun 02/24/2019	Dielectric barrier discharges 2
5	Tue 02/26/2019	Lab session: DBD
6	Sun 03/03/2019	Lab session: DBD 2
6	Tue 03/05/2019	Arc discharges
7	Sun 03/10/2019	Gliding arc discharges
7	Tue 03/12/2019	Lab session: Arc discharges
8	Sun 03/17/2019	Lab session: Gliding arc discharges
8	Tue 03/19/2019	Midterm exam
9	Sun 03/24/2019	Spring Break
9	Tue 03/26/2019	Spring Break
10	Sun 03/31/2019	Microwave plasma
10	Tue 04/02/2019	Remote plasmas
11	Sun 04/07/2019	Electrically assisted combustion 1
11	Tue 04/09/2019	Electrically assisted combustion 2
12	Sun 04/14/2019	Plasma assisted combustion 1
12	Tue 04/16/2019	Plasma assisted combustion 2
13	Sun 04/21/2019	Material synthesis 1
13	Tue 04/23/2019	Material synthesis 2
14	Sun 04/28/2019	Environmental applications 1
14	Tue 04/30/2019	Environmental applications 2
15	Sun 05/05/2019	Chemical synthesis 1
15	Tue 05/07/2019	Chemical synthesis 2
16	Sun 05/12/2019	Biomedical/agricultural applications 1
16	Tue 05/14/2019	Biomedical/agricultural applications 2
17	Sun 05/19/2019	Final Exam Week
17	Tue 05/21/2019	Final Exam Week

### Note

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