جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

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

Division	Physical Science and Engineering Division
Course Number	ME 261
Course Title	Apps of Plasma & Atmospheric Pressure
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (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

Comprehensive Course Description	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. - Energy: fuel reforming and combustion. - Environment: after-treatment of hazardous gases. - Manufacturing: surface treatment of materials. - Plasma devices for bio-medical application.
Course Description from Program Guide	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.
Goals and Objectives	- Conceptual understanding of physics and chemistry in plasma. - Capability to choose suitable plasma sources in research and applications. - Understanding a role of APP in various fields including energy, environmental, material, and biomedical applications.
Required Knowledge	General Physics and Chemistry/ Thermodynamics
Reference Texts	1. Fridman, Plasma Chemistry, Cambridge (2008) 2. Fridman, L. Kennedy, Plasma Physics and Engineering, Taylor & Francis (2004)
Method of evaluation	**10.00**% - Attendance **20.00**% - Midterm exam **20.00**% - Homework /Assignments **30.00**% - Final exam **20.00**% - Course Project(s)

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

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 01/28/2018	Course introduction
1	Tue 01/30/2018	Kinetic theory of gases
2	Sun 02/04/2018	General features of plasmas
2	Tue 02/06/2018	Electrical discharges: low pressure
3	Sun 02/11/2018	Electrical discharges: high pressure
3	Tue 02/13/2018	Corona discharges
4	Sun 02/18/2018	Nano-second discharges
4	Tue 02/20/2018	Nano-second discharges
5	Sun 02/25/2018	Dielectric barrier discharges
5	Tue 02/27/2018	Dielectric barrier discharges
6	Sun 03/04/2018	Arc discharges
6	Tue 03/06/2018	Gliding arc discharges
7	Sun 03/11/2018	Microwave plasma
7	Tue 03/13/2018	RF discharges
8	Sun 03/18/2018	Remote plasma
8	Tue 03/20/2018	Mid-term exam
9	Sun 03/25/2018	Experiment: Pashen effects
9	Tue 03/27/2018	Continued
10	Sun 04/01/2018	Experiment: dielectric barrier discharges
10	Tue 04/03/2018	Continued
11	Sun 04/08/2018	Spring break
11	Tue 04/10/2018	Spring break
12	Sun 04/15/2018	Electrically assisted combustion
12	Tue 04/17/2018	continued
13	Sun 04/22/2018	Continued
13	Tue 04/24/2018	Plasma assisted combustion
14	Sun 04/29/2018	Continued
14	Tue 05/01/2018	Continued
15	Sun 05/06/2018	Environmental application
15	Tue 05/08/2018	Continued
16	Sun 05/13/2018	Material synthesis and surface treatment
16	Tue 05/15/2018	Continued
17	Sun 05/20/2018	Biomedical/agricultural application
17	Tue 05/22/2018	Continued

Note

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