



Course Syllabus: Contemporary Topics in EnSE - EnSE 394B

Division	Biological and Environmental Sciences & Engineering Division
Course Number	EnSE 394B
Course Title	Contemporary Topics in EnSE
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	05:30 PM - 07:00 PM Sun Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Suzana Pereira Nunes	Suzana.Nunes@kaust.edu.sa	+966128082771	3274, 4, Al-Jazri (bldg. 4)	Please contact the instructor per email for appointments

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	The course is focused on polymer synthesis and thermodynamics of polymer solutions. It will be tightly linked to ChemS 215 Polymers and Polymerization Processes. The student will therefore learn basic concepts of polymer science and different methods of polymerization (see the syllabus of ChemS 215). In addition, concepts of polymer solution thermodynamics and mechanisms of phase separation will be detailed. Examples of pore formation in polymeric membrane will be discussed.
Course Description from Program Guide	A course of current interest. Topics are not permanent and the content of the course will change to reflect recurring themes and topical interest. The content will be approved by the division.
Goals and Objectives	By the end of the course, the student should have a solid knowledge of methods of polymerization and of polymer solution thermodynamics, understanding the conditions associated with phase separation, solubility, Flory-Huggins interaction parameters, nucleation and growth, spinodal decomposition, mixing enthalpy, gelation, etc.
Required Knowledge	Basics of chemistry, particularly organic and physical chemistry.
Reference Texts	L. H. Sperling, Introduction to Physical Polymer Science H. G. Elias, Macromolecules, Vol 3: Physical Structures and Properties Papers on Flory-Huggins theory and others See additional texts for ChemS 215
Method of evaluation	20.00% - Course Project(s) 80.00% - Exam 1
Nature of the assignments	The students will have the same exams and assignments of ChemS 215. In addition, the student will have assigned reading on solution thermodynamics and phase separation, a paper presentation and a group project on the characterization of polymer solution phase separation.
Course Policies	Regular attendance in ChemS 215 and in the scheduled additional discussions on thermodynamics are mandatory.

Tentative Course Schedule*(Time, topic/emphasis & resources)*

Week	Lectures	Topic
1	Sun 08/25/2019 Thu 08/29/2019	Semester starts See schedule of ChemS 215 and in addition discussions on thermodynamics of polymer solution
2	Sun 09/01/2019 Thu 09/05/2019	Concepts of solubility parameters, enthalpy of mixing, entropy of polymer solutions
3	Sun 09/08/2019 Thu 09/12/2019	Discussion
4	Sun 09/15/2019 Thu 09/19/2019	Flory-Huggins theory
5	Sun 09/22/2019 Thu 09/26/2019	University holiday
6	Sun 09/29/2019 Thu 10/03/2019	Mechanisms of phase separation
7	Sun 10/06/2019 Thu 10/10/2019	Discussion
8	Sun 10/13/2019 Thu 10/17/2019	Gelation and formation of porous polymer materials
9	Sun 10/20/2019 Thu 10/24/2019	Discussion
10	Sun 10/27/2019 Thu 10/31/2019	Discussion
11	Sun 11/03/2019 Thu 11/07/2019	Discussion
12	Sun 11/10/2019 Thu 11/14/2019	Mid-semester break
13	Sun 11/17/2019 Thu 11/21/2019	Mid-semester break
14	Sun 11/24/2019 Thu 11/28/2019	Mid-semester break
15	Sun 12/01/2019 Thu 12/05/2019	Mid-semester break
16	Sun 12/08/2019	Exams

Note

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