COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
SURFACE CHEMISTRY IN NANOSCIENCE	**CHBE 568**	**1 or 2**	**2 + 1**	**3**	**10**

Prerequisites	-

Language of Instruction	English
Course Level	Master's Degree
Course Type	Elective
Course Coordinator	
Instructors	Assist. Prof. Cem Levent Altan
Assistants	
Goals	The aim of this course is to give the fundementals of colloid and surface chemistry and give the students the ability to apply this knowledge to nanotechnology. The course is supplemented with experiments to solidify the theoretical knowledge.
Content	Molecular interactions, self-assembly, Brownian motion, sedimentation; Surface Chemistry. Surface tension, capillary action, contact angle, methods of surface tension measurement; Surfactants, micelles, packing parameter, CMC, etc.; Electrostatistics; Colloidal Stability; Phase Diagrams. Vesicles, microemulsions, emulsions, etc.; Polymers in Solution; Nanoparticles and methods of synthesis; Techniques used in Size Determination; Techniques used for Crystal Structure (XRD) and evaluation of data.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Adequate knowledge in science and technology in colloid and surface chemistry; ability to use theoretical and applied information in these areas to solve relevant problems.	1	1,2	A
2) Ability to devise, select, and use modern techniques such as conductivity meter,	2	1,2,3	A,B,C

spectrophotmeter, tensiometer, zeta-potential, viscosity meter, etc needed for engineering practice; ability to employ Excel to plot data and make calculations and Word to write reports effectively.			
3) Ability to conduct experiments, gather data for investigating problems on colloid and surface chemistry such as sedimetation, adsorption, self-assembly and analyze and interpret results from these experiments and also data from other techniques such XRD, microscopy and light scattering.	5	1,3	B
4) Ability to communicate effectively both orally and in writing by following the text book, lab manual and teaching and writing reports and exams in English.	8	1,2,3	A,B,C
5) Recognition of the need for lifelong learning; ability to access information, to follow developments in science and nanotechnology, and to continue to educate him/herself on these topics.	3	1,2	A,B,C
6) Knowledge about nanotechnology and the global and societal effects of nanotechnology on health, environment, and safety.	10	1,2	A,B

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Laboratory
Assessment Methods:	A: Testing, B: Experiment, C: Homework or Project

COURSE CONTENT

Week	Topics	Study Materials
1	INTRODUCTIONS, COLLOID AND SURFACE CHEMISTRY	Textbook
2	MOLECULAR INTERACTIONS, SELF-ASSEMBLY, BROWNIAN MOTION, SEDIMENTATION EXPERIMENT: SEDIMENTATION	Textbook
3	SURFACE CHEMISTRY. SURFACE TENSION METHODS OF SURFACE TENSION MEASUREMENT	Textbook
4	SURFACTANTS, MICELLES, CMC, ETC EXPERIMENT: FACTORS AFFECTING SURFACE TENSION	Textbook
5	ELECTROSTATISTICS EXPERIMENT: ADSORPTION OF POLYELECTROLYTES	Textbook

6	COLLOIDAL STABILITY EXPERIMENT: FLOCCULATION AND COAGUATION	Textbook
7	MIDTERM EXAM I	Textbook
8	VESICLES, MICROEMULSIONS, EMULSIONS, ETC	Textbook
9	NANOPARTICLES AND METHODS OF SYNTHESIS EXPERIMENT: MAGNETITE SYNTHESIS	Textbook
10	TECHNIQUES USED IN SIZE DETERMINATION DLS AND DISCUSSION OF TEM RESULTS	Textbook
11	TECHNIQUES USED FOR CRYSTAL STRUCTURE (XRD) AND EVALUATION OF DATA	Textbook
12	PROJECT PRESENTATIONS BY STUDENTS	Textbook
13	PROJECT PRESENTATIONS BY STUDENTS	Textbook
14	PROJECT PRESENTATIONS BY STUDENTS	Textbook

RECOMMENDED SOURCES	
Textbook	Bucak, S. And Rende, D., Colloid and Surface Chemistry: A Laboratory Guide for Exploration of the Nano World, 1st ED., CRC Press, 2019
Additional Resources	

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterm	1	30
Lab Report	5	35
Proje	1	35

Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
Total		**100**

COURSE CATEGORY	Field Courses

COURSE'S CONTRIBUTION TO PROGRAM

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Acquire expanded and in-depth information via performing scientific research in the field of Chemical Engineering, evaluate, interpret and implement knowledge.			+		
2	Be knowledgable in the contemporary techniques and methods applied in Chemical Engineering and their respective constraints.					+
3	Be cognizant of the novel and developing applications of his/her profession, study and learn them as required.					+
4	Formulate Chemical Engineering problems, develop methods to solve them and implement innovative techniques in solutions					
5	Design and conduct analytical modeling and experimental research, analyze and interpret complex problems encountered in this process.			+		
6	Develop novel and/or original ideas and methods; conceive innovative solutions in systems, component and process design					
7	Complete information via processing limited or incomplete data by the use of scientific methods and implement it; integrate knowledge from different disciplines					
8	Communicate in at least one foreign language at the level of European Language Portfolio B2 orally and in writing.					+
9	Communicate stages and results of his/her studies in a systematic and clear manner orally or in writing in intra or interdisciplinary national and international settings.					
10	Defines societal and environmental aspects of Chemical Engineering applications		+			
11	Observe social, scientific and ethical values during collection, interpretation, and dissemination of data and in all professional activities.					
12	Lead multidisciplinary teams, develop solution methodologies for complex problems and take responsibility					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	13	3	39
Hours for off-the-classroom study (Pre-study, project)	14	10	140
Mid-terms	1	3	3
Laboratory Reports	5	12	60
Final examination	1	3	3
Total Work Load			245
Total Work Load / 25 (h)			9.8
ECTS Credit of the Course			10