COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Fundamentals of Colloid and Surface Chemistry	**CHBE 565**		**3+1**	**3**	**10**

Prerequisites	

Language of Instruction	English
Course Level	MSc
Course Type	Elective
Course Coordinator	
Instructors	
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	Fundamentals of colloid and surface chemistry with theoretical and laboratory work. Topics include: self assembly of amphiphiles, Brownian motion, surface chemistry and monolayers, surface tension and contact angle, electrostatic interactions in colloidal systems, structure and properties of micelles in industrial and biological processes, bilayer systems, membranes in biological systems and transport, micro-and macro emulsions. Lab work includes: surface tension and conductimetric determination of CMC, preparation and characterization of different colloidal structures using UV-Vis Spectrophotometer and microscopy techniques, preparation of microemulsions, and reactions in microemulsion droplets.

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	A
2) Ability to devise, select, and use modern techniques such as conductivity meter, spectrophotmeter, tensiometer, zeta-potential,	4	1, 3	A, B

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.	3	1, 3	B
4) Ability to work efficiently in intra-disciplinary teams by performing experiments as a pair in the lab and ability to work individually by writing reports on these experiments and taking exams.	6	3	B
5) 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.	7	1, 2, 3	A, B
6) 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.	8	1, 2	A, B
7) Knowledge about nanotechnology and the global and societal effects of nanotechnology on health, environment, and safety.	11	1, 2	A, B
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	A

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT

Week	Topics	Study Materials
1	INTRODUCTIONS, COLLOID AND SURFACE CHEMISTRY	Textbook
2	MOLECULAR INTERACTIONS, SELF-ASSEMBLY, BROWNIAN MOTION, SEDIMENTATION	Textbook & Lab Manual
3	SURFACE CHEMISTRY. SURFACE TENSION, CAPILLARY ACTION, CONTACT ANGLE, METHODS OF SURFACE TENSION MEASUREMENT	Textbook
4	SURFACTANTS, MICELLES, PACKING PARAMETER, CMC, ETC	Textbook & Lab Manual
5	ELECTROSTATICS	Textbook & Lab Manual

6	COLLOIDAL STABILITY	Textbook & Lab Manual
7	PHASE DIAGRAMS. VESICLES, MICROEMULSİONS, EMULSIONS, ETC	Textbook & Lab Manual
8	REVIEW AND MIDTERM 1	Textbook
9	POLYMERS IN SOLUTION	Textbook & Lab Manual
10	NANOPARTICLES AND METHODS OF SYNTHESIS	Textbook & Lab Manual
11	TECHNIQUES USED IN SIZE DETERMINATION	Textbook
12	TECHNIQUES USED FOR CRYSTAL STRUCTURE (XRD) AND EVALUATION OF DATA	Textbook
13	POPULAR TOPICS BY STUDENTS	Textbook
14	REVIEW AND MIDTERM 2	Textbook

RECOMMENDED SOURCES	
Textbook	Introduction to Modern Colloid Science, R. Hunter, Oxford Press
Additional Resources	Laboratory Experiments Manual

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	40
Lab Reports + Lab Performance	7	25
Final	1	35
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		35
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		65
Total		**100**

COURSE CATEGORY	Expertise/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.			x		
2	Be knowledgable in the contemporary techniques and methods applied in Chemical Engineering and their respective constraints.					x
3	Be cognizant of the novel and developing applications of his/her profession, study and learn them as required.					x
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.		x			
6	Develop novel and/or original ideas and methods; conceive innovative solutions in systems, component and process design		x			
7	Complete information via processing limited or incomplete data by the use of scientific methods and implement it; integrate knowledge from different disciplines	x				
8	Communicate in at least one foreign language at the level of European Language Portfolio B2 orally and in writing.					x
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		x			
11	Observe social, scientific and ethical values during collection, interpretation, and dissemination of data and in all professional activities.	x				
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 (Excluding two midterms: 13x Total course hours)	13	4	52
Hours for off-the-classroom study (Pre-study, practice)	13	10	130
Midterm examination	2	2	4

Reports	7	8	56
Final examination	1	3	3
Total Work Load			245
Total Work Load / 25 (h)			9.8
ECTS Credit of the Course			10