COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Advanced Materials	CHBE 561	1	3 + 0	3	10

Prerequisites	-

Language of Instruction	English
Course Level	Graduate Degree
Course Type	Technical Elective
Course Coordinator	Assoc. Prof. Erde Can
Instructors	Assoc. Prof. Erde Can
Assistants	-
Goals	The aim of this course is to examine recently developed products in chemical, and biotechnological industries with the integration of principles of chemistry, biology, and engineering in a case-study format and provide students with an advanced knowledge in these interdisciplinary fields.
Content	Integration of principles of chemistry, biology, and engineering to create new products. Uses case-study format to examine recently developed products in chemical, and biotechnological industries. Topics include, nanoporous materials, zeolites, polymers, composites, and biomaterials (medical implants, artificial organs, etc.) Project

Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Expanded and in-depth information of the recently developed products in chemical, and biotechnological industries: polymers, composites, nanoporous materials, zeolites, and biomaterials (medical implants, artificial organs, etc.).	2	1,2,4,7	A,B,C
2) Ability to access information and follow developments about the recently developed products in chemical, and biotechnological industries and ability to acquire information on these areas via scientific rearch and evaluate and interpret the information	1,3	4,7	B,C
3) Examines and defines societal and environmental aspects of the recently developed products in chemical, and biotechnological industries and their applications such as the effect of biomaterials, medical implants, and	10	1,2,4,7	A,B,D

artificial organs etc. on health			
4) Ability to select current research articles on the recent development of products in chemical, and biotechnological industries and present these articles orally, and with the preparation of the Project report on a selected topic, ability to communicate efficiently in English both orally and in writing.	8	2,4,7	A,B,C

Teaching Methods:	1: Lecture, 2: Lecture with Discussion, 4: Case Study, 7: Seminar
Assessment Methods:	A: Testing, B: Case study presentation: C: Project

COURSE CONTENT

Week	Topics	Study Materials
1	Biomaterials.: Introduction -I	Literature Search - Lecture Notes
2	Biomaterials -II	Literature Search - Lecture Notes
3	Polymers: Biomedical applications, polymeric biomaterials-I	Literature Search - Lecture Notes
4	Polymers: Biomedical applications, polymeric biomaterials -II	Literature Search - Lecture Notes
5	Composites: Biomedical applications, composite biomaterials-I	Literature Search - Lecture Notes
6	Composites: Biomedical applications, composite biomaterials - II	Literature Search - Lecture Notes
7	Nanoporous materials (polymeric nanoporous materials and zeolite based composites..)-I	Literature Search - Lecture Notes
8	Nanoporous materials (polymeric nanoporous materials and zeolite based composites..)-II	Literature Search - Lecture Notes

9	Tissue Engineering: Applications, scaffold materials - I	Literature Search - Lecture Notes
10	Tissue Engineering: Applications, scaffold materials -II	Literature Search - Lecture Notes
11	Medical implant applications (bone implants, stents etc..)-I	Literature Search - Lecture Notes
12	Medical implant applications (bone implants, stents etc..) -II	Literature Search - Lecture Notes
13	Tissue replacements: bone,skin, heart valve etc.. -I	Literature Search - Lecture Notes
14	Tissue replacements: bone,skin, heart valve etc.. -II	Literature Search - Lecture Notes

RECOMMENDED SOURCES	
Textbook	Review articles (General concepts of the topic), reseach articles on recently developed products in chemical, and biotechnological industries
Additional Resources	"Biomaterials Principles and Practices", J.Y. Wong, J.D. Bronzino, D.R. Peterson, CRC Press; 1st edition, 2012, ISBN-10: 1439872511

MATERIAL SHARING	
Documents	Review and research articles
Assignments	-
Exams	-

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Case-study (article) presentations	7	100 (7x14,3)
Total		**100**
Contribution of final examination and project to overall grade	1+1	40 (20+20)

Contribution of in-term studies to overall grade		60
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.					
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.					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.					
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 (14 x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, literature search, practice)	14	8	112
Project	1	60	60
Final examination	1	(38+2)	40
Total Work Load			254
Total Work Load / 25 (h)			10.2
ECTS Credit of the Course			10