COURSE INFORMATON						
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*	
SPECIAL TOPICS in CHBE II: Green Engineering and Sustainability	CHBE585	2	3 + 0	3	10	

Prerequisites	

Language of Instruction	English
Course Level	Master's Degree (Second Cycle)
Course Type	Elective
Course Coordinator	
Instructors	
Assistants	
Goals	The aim of this course is i) to aid postgraduate students in becoming environmentally knowledgeable and skilled and dedicated chemical engineers who are willing to work toward achieving and maintaining a sustainability in their chemical engineering practices, both economically and environmentally ii) to acquaint them with "green engineering" principles and practices; iii)to develop their skills for conducting Life Cycle Assesment (LCA) in chemical engineering processes.
Content	Sustainability and sustainable development; Formation of the Earth, evolution of life; The biosphere, the Earth and its environment; Resources of the Earth and their utilization, pollution; Green engineering and the responsibilities of chemical engineers; Industrial ecology, Life Cycle Assessment (LCA).

Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Understanding of the uniqueness of the biosphere and the role of the engineer in upsetting the delicate balances required;	10	1,2	A
2) Practice of the profession with awareness and respect for the environment;	10	1,2,4	A,D
3) Understanding the requirements for sustainable development;	10	1,2	A

4) Ability and skill in applying green engineering principles when and where needed;	1,3	1,2,4	A,D
5) Ability and skill to conduct LCA and to research/find/adapt the necessary data for the analysis;	1,3,4,7,11	1,2,4	A,D
6) Presention of the term project and communication in English of the methodology and findings.	8	1,2,4	D

Teaching Methods:	1: Lecture, 2: Question-Answer, 4: Case-study
Assessment Methods:	A: Testing, D: Project

COURSE CONTENT

Week	Topics	Study Materials
1	Current environmental issiues and sustainability	(RS)
2	Sustainable development	(RS)
3	Formation of the Earth, evolution of life	(RS)
4	The Biosphere and its workings	(RS)
5	The Earth, its resources and environment	(RS)
6	Pollution	(RS)
7	Midterm Exam	
8	Green Engineering	(RS)
9	Industrial ecology, “zero waste” concept	(RS)
10	Introduction to Life Cycle Assesment (LCA)	(RS)
11	LCA: case studies/ practices	Student research
12	LCA: case studies/practices	“”
13	LCA Project presentations/discussions	“”
14	LCA Project presentations/discussions	“”

RECOMMENDED SOURCES (RS)

ENERGY: Principles, problems, alternatives, J. Priest
Pollution Prevention: Fundamentals and Practice, Paul L. Bishop, McGraw-Hill International Editions

Introduction to Engineering and the Environment, Edward S. Rubin, McGraw-Hill International Editions
Environmental Science, K. Arms, Saunders College Publishing
Environment, P.H.Rawen, L.R. Berg, G.B. Johnson, Saunders College Publishing
ÇEVRE:Bilinci, Bilgisi ve Eğitimi, S. Ünal, E.Mançuhan ve A.A. Sayar, Marmara Üniversitesi Yayınları

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	50
Projects	1	50
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
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.					
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				**X**	
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				**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 the exam days: 13x Total course hours)	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Midterm examination	1	2	2
LCA (practice) Project / Presentation	1	20	20
LCA term Project / Presentation	1	36	36
Final examination	1	3	3
Total Work Load			240
Total Work Load / 25 (h)			
ECTS Credit of the Course			10