COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Advanced Biotechnology	ChBE 573	1	3 + 0	3	10

Prerequisites	-

Language of Instruction	English
Course Level	Graduate's Degree
Course Type	Elective
Course Coordinator	Assist. Prof. Dr. Adnan Aydemir
Instructors	
Assistants	
Goals	The aim of this course is to teach the basic concepts of chemical engineering applied for biotechnology
Content	Advanced unit operations, transport phenomena and thermodynamics as applied to biological systems with extensive computer applications and analytical mathematical analysis through selected examples about industrial and metabolic processes

Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Expresses the Basic Principles of Biotechnology		1	C
2) Enzyme technique and the biocatalysis		1,2	C
3) Living organism applied in biotechnology		1,2,3	,C
4) Design of the Bioreactors and Fermentors		1,2,3	A,C
5) Unit operations and transport phenomena in Biotechnology.		1, 9,12	A,C
6) Industrial applications of Biotechnology.		1,3	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 9: Term paper, 12: Case Study
Assessment Methods:	A: Testing, C: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction	
2	Basic Principles of Biotechnology	Text Book
3	Proteins and their synthesis	Additional Resources
4	Proteins and enzymes	Additional Resources
5	Basics of enzyme kinetics	Additional Resources
6	Fundamentals of designing bioreactors	Text Book
7	Midterm Exam	
8	A little Microbiology	Text Book
9	Kinetcis of substrate Utilization and biomass production	Text Book
10	Transport Phenomena in Bioprocess Systems	Text Book
11	Industrial Applications of Biotechnology	Text Book
12	Project respresentation	oral
13	General Revision	
14	Midterm Exam II	

RECOMMENDED SOURCES	
Textbook	Bailey, James E., and David F. Ollis. " Biochemical Engineering Fundamentals. " New York, NY: McGraw-Hill Education, 1986
Additional Resources	Alan Wiseman, " Principles of Biotechnology", Surrey Uni. Press. David L. Nelson, Michael M. Cox, " Lehninger – Principles of Biochemistry ",W. H. Freeman; 5th ed. Ghasem D. Najafpour, " Biochemical Engineering and Biotechnology ", Elsevier

MATERIAL SHARING	
Documents	

Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	20
Term Paper Project	1	20
Homeworks	1	15
seminar (oral representation)	1	25
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.				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					X	
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.				X		
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						X

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	9	126
Homework	1	20	20
Term project	1	40	40
Midterm examination	2	3	6
Final examination	1		5
Total Work Load			239
Total Work Load / 25 (h)			
ECTS Credit of the Course			10