AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Biology For Engineers								
Course Code	MME508		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The purpose of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools								
Course Content	Principles from the sciences and their application in biology, Responses of living systems, Scaling factors including golden ratio and fractal scaling within an organism, and using living systems in engineering.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Problem Solving								
Name of Lecturer(s)	Assoc. Prof. Adem ÖZÇELİK								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	50
Assignment	3	10
Project	1	20

Recommended or Required Reading	
1	1. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2019
2	2. A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013
3	3. Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction: Science and Engineering, Biological engineering
2	Theoretical	Principles of Physics
3	Theoretical	Principles of Physics
4	Theoretical	Principles of Mathematics and Engineering
5	Theoretical	Principles of Biology: Genetic basis
6	Theoretical	Principles of Biology: Competition and Selection
7	Theoretical	Biological Responses in Context: Water, Oxygen, Nutrients
8	Intermediate Exam	Midterm Exam
9	Theoretical	Biological Responses in Context: Waste, Heat sources, interactions with the Environment
10	Theoretical	Stress on Biological Systems
11	Theoretical	Interaction with other biological units I
12	Theoretical	Interaction with other biological units II
13	Theoretical	Biological cycles
14	Theoretical	Allometric Relationships
15	Theoretical	Biological Engineering Solutions
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	5	3	112
Assignment	3	6	0	18
Term Project	1	20	10	30
Midterm Examination	1	16	2	18

Final Examination	1	20	2	22
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	1. To be able to understand how engineering principles apply to living cells.
2	2. To be able to understand what engineering principles can tells us about how cells function.
3	3. To be able to understand the established and emerging, equations, models, and design curves that can be used to tune, re-engineer, or build new cells.
4	4. To be able to generate a framework for measuring and controlling cells as microdevices.
5	5. To be able to form an understanding of emerging biohybrid devices.

Programme Outcomes *(Mechanical Engineering (English) Master)*	
1	To be able to access wide and deep information with scientific researches in the field of Engineering, evaluate, interpret and implement the knowledge gained in his/her field of study
2	To be able to complete and implement “limited or incomplete data” by using the scientific methods
3	To be able to consolidate engineering problems, develop proper method(s) to solve and apply the innovative solutions to them
4	To be able to develop new and original ideas and method(s), to develop new innovative solutions at design of system, component or process
5	To be able to gain comprehensive information on modern techniques, methods and their borders which are being applied to engineering
6	To be able to design and apply analytical, modeling and experimental based research, analyze and interpret the faced complex issues during the design and apply process
7	To be able to gain high level ability to define the required information and data
8	To be able to work in multi-disciplinary teams and to take responsibility to define approaches for complex situations
9	To be able to transfer of the process and results of studies at national and international environments systematic and clear verbal or written
10	To be able to be aware of social, scientific and ethical values guarding adequacy at all professional activities and at the stage of data collection, interpretation, and announcement
11	To be able to become aware of new and developing application of profession and ability to analyze and study on those applications
12	To be able to interpret engineering application’s social and environmental dimensions and it’s compliance with the social environment

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5
P1	5	4	5	4	3
P2	4	5	4	5	5
P3	5	4	4	5	5
P4	4	5	4	4	4
P5	4	4	4	5	5
P6	4	3	5	4	4
P7	4	5	4	5	5
P8	5	4	5	4	4
P9	4	2	4	5	5
P10	3	4	5	4	3
P11	5	5	4	5	5
P12	5	4	5	4	4