



## AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Bioenergetics							
Course Code		BYF523		Course Level		Second Cycle (Master's Degree)			
ECTS Credit	3	Workload	75 (Hours)	Theory	2	Practice	0	Laboratory	0
Objectives of the Course		The purpose of the course is to be able to explain the concept of energy according to the laws of thermodynamics and to introduce the energy alterations in the cell							
Course Content		Energy notion and basic principles of thermodynamics, the first law of thermodynamics, entropy and second law of thermodynamics, enthalpy and chemical potential, energy and electron transfer, application of the free energy function, and cellular energy alteration.							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Discussion, Individual Study					
Name of Lecturer(s)									

### Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	60

### Recommended or Required Reading

1	Gülbüz Çelebi (Biophysics)
2	Medical Physiology (Guyton & Hall)

Week	Weekly Detailed Course Contents	
1	Theoretical	Basic concepts of thermodynamics
2	Theoretical	Laws of thermodynamics
3	Theoretical	Enthalpy and entropy
4	Theoretical	Gibbs free energy
5	Theoretical	Bioenergetic principles
6	Theoretical	Biological energy flows
7	Intermediate Exam	Midterm exam
8	Theoretical	Energy flow in biomolecular systems
9	Theoretical	Thermodynamic properties of ATP hydrolysis
10	Theoretical	Reactions and the effects of catalysis
11	Theoretical	Biosynthesis
12	Theoretical	Bioenergetic properties of muscle contraction
13	Theoretical	Energy need in humans
14	Theoretical	The energy flow in photosynthesis and respiration
15	Theoretical	The energy flow in photosynthesis and respiration
16	Final Exam	Final exam

### Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	2	28
Reading	14	0	2	28
Midterm Examination	1	7	2	9
Final Examination	1	8	2	10
Total Workload (Hours)				75
[Total Workload (Hours) / 25*] = ECTS				3

\*25 hour workload is accepted as 1 ECTS



**Learning Outcomes**

1	To be able to explain the relation in between energy and thermodynamics, the laws of thermodynamics and the concept of entrophy
2	To be able to tell about the fluctuations in energy in the cell
3	To comprehend the energy flow in biomolecular systems
4	To comprehend the energy need and sources of energy in human
5	To comprehend the energy flow in photosynthesis and respiration

**Programme Outcomes (Biophysics Master)**

1	To be able to acquire an up-to-date teoritical and pratical background on biophysical and electrobiophysical research
2	To be able to acquire a background needed for basic biophysical research and having the ability to use the teoritical and practical knowledge in the field
3	To be able to attain the ability to get access to the up-to-date knowledge, interpret and improve the information in the field of biophysics
4	To be able to attain the ability to perform experimental methods in the field, produce new approaches and ability to produce analytical solutions to the problems faced during application of new methods
5	To be able to reach a level to follow research in the field, to possess written and spoken communication skills and be able to join discussions
6	To be able to acquire knowledge and skill to apply scientific principles of ethics.
7	To be able to gain knowledge and skill about the basic issues of electric and magnetic fields, the interaction of light with matter, spectroscopy, radiation biophysics such as radiation, electromagnetic spectrum, ionizing radiation and radioactivity; learn about the physical properties of these issues and to be able to evaluate biological effects of radiation on tissues
8	To be able to construct knowledge and skill about the molecular structure and function in living systems, bioenergetic concepts, information theory and the processing of information in living systems
9	To be able to master about the basic principles of bioelectrical incidents that ocur in cells, such as transport across membranes, electrical properties of membranes, resting membrane potential, and to be able to discuss the bioelectrical behaviour of excitable membranes
10	To be able to define the kinds,sources and biophysical properties of bioelectrical signals, to store knowledge in areas of biophysical concepts and characteristics such as nerve action potential and compound nerve action potential and to record to record these potential variants ,analyze and evaluate the results
11	To be able to define basic biophysical principles of the visualization techniques used in medical field and the techniques used to determine biological signals, such as electromyigraphy (EMG), electroencephalography (EEG), and electrocardiography (ECG), and attain the ability to apply these techniques
12	To be able to attain knowledge on molecular biophysics and its basic principles
13	To be able to attain the ability to plan and conduct projects in the field of biophysics, and attain the ability to write and publish scientific results
14	To be able to acknowledge the national and international laws and regulations about the concepts related to biophysics
15	To be able to attain the skills to organize activities together with non-governmental organizations or to conduct collaborative projects with other disciplines
16	To be able to acquire the ability of critical thinking, making judgements and solving problems in the field of biophysics
17	To be able to able to use statistical, computational and communicational tools, which can be applied in the field of biophysics
18	To be able to use basic knowledge and skills of the field; be able to evaluate data, identify problems and propose solutions

**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	5	5	5	5
P2	3	3	3	3	2
P3	5	5	5	4	4
P4	3	3	3	3	2
P5	5	5	5	4	4
P6	2	1	1	1	1
P7	1	1	1	1	1
P8	5	5	5	4	4
P9	1	4	3	3	4
P10	1	1	1	1	1
P11	1	1	1	1	1
P12	3	3	3	3	2
P13	3	3	3	3	2
P14	1	1	1	1	1



P15	3	2	2	2	2
P16	3	3	3	3	3
P17	2	2	2	2	3
P18	3	3	3	4	3

