AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Introduction to Electrophysiology								
Course Code	BYF521		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	6	Workload	151 *(Hours)*	Theory	2	Practice	2	Laboratory	0
Objectives of the Course	The purpose of the course is to be able to tell about formation of cellular membrane potential and physical basis of this potential, recorded electrical activity samples from excitable tissues, measurements error and artifact sources with protective procedures, electro-diagnostic methods (ECG, EMG, EOG, evoked potentials).								
Course Content	Formation of cellular membrane potential and physical basis of this potential, recorded electrical activity samples from excitable tissues, measurements error and artifact sources with protective procedures, electro-diagnostic methods (ECG, EMG, EOG, evoked potentials).								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Experiment, Discussion, Individual Study								
Name of Lecturer(s)	Prof. Mehmet Dinçer BİLGİN								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	50
Assignment	2	10
Practice Examination	1	20

Recommended or Required Reading	
1	.Nuhan Puralı, Hücre elektrofizyolojisi ve görüntülemenin temelleri, Veri Medikal, Ankara, 2008.
2	Gürbüz Çelebi, Medical Physics, Barış yayınları fakülte kitapevi, İzmir 2010
3	Ferit Pehlivan, Biophysics, Hacettepe-Taş yayınevi, Ankara, 2011.
4	Guyton ve Hall, Medical Physiology, 2010
5	Şefik Dursun (ed.) Biophysics Lecture Notes, CTF Yayınevi, İstanbul, 2010.
6	E.R.Kandel et al (eds), Principles of Neural Sciences, 2000.
7	Lodish&Baltimore et al (eds.), Moleculer Cell Biology, 2004.
8	GG Matthews (ed.), Neurobiology 2000
9	J.E. Blankenship (ed.), Neurophysiology, 2003.

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to electrophysiology
	Practice	Electrodes and transducers
2	Theoretical	Osmosis and aquaporins
	Practice	Osmotic events in the cell
3	Theoretical	Gibbs-Donnan equilibrium, Nerst equation, GHK rule
	Practice	Introduction to MP 100 data analysis system
4	Theoretical	Ion channels
	Practice	Introduction to MP 100 data analysis system
5	Theoretical	Membrane potential
	Practice	Applications of MP 100 data analysis system
6	Theoretical	Electrical properties of membranes
	Practice	Evaluation of data in MP 100 data analysis system
7	Theoretical	Action potential
	Practice	Evaluation of data in MP 100 data analysis system
8	Intermediate Exam	Midterm exam
9	Theoretical	Action potential in different tissue types
	Practice	EOG applications
10	Theoretical	Electrical properties of the heart

10	Practice	GSR applications
11	Theoretical	The basis and properties of ECG
	Practice	ECG applications
12	Theoretical	EMG, compound muscle action potential and nerve conduction velocity
	Practice	EMG, nerve conduction velocity in rats and the measurement of compound muscle action potential
13	Theoretical	Evoked potentials
	Practice	Evoked potentials
14	Theoretical	Electrophysiological data analysis
	Practice	Electrophysiological data analysis
15	Theoretical	Discussion
	Practice	Practical examination
16	Final Exam	Final exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	2	28
Assignment	2	0	3	6
Laboratory	13	1	2	39
Reading	13	0	5	65
Practice Examination	1	0	2	2
Midterm Examination	1	4	1	5
Final Examination	1	4	2	6
			Total Workload (Hours)	151
			[Total Workload (Hours) / 25*] = **ECTS**	6

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	To be able to tell about the physical basis and formation of membrane potentials, and on properties of excitable cells
2	To comprehend the electrical properties of membranes and the action potential
3	To be able to explain and apply evoked potentials and electrophysiological measurement methods, such as ECG, EOG and GSR
4	To gain knowledge on the electrophysiological data analysis
5	To be able to explain how to measure nerve conduction velocity and compound muscle action potential

Programme Outcomes *(Biophysics Master)*

1	To be able to acquire an up-to-date theoritical 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 judjements 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	5	5	5	5	5
P3	5	5	5	5	5
P4	4	4	5	5	5
P5	5	5	5	5	5
P6	3	2	2	2	3
P7	3	2	2	2	1
P8	4	2	2	2	2
P9	5	5	5	5	5
P10	5	5	5	4	5
P11	4	5	5	4	5
P12	2	1	1	1	1
P13	4	3	4	3	3
P14	2	2	3	2	2
P15	2	4	4	3	2
P16	5	5	4	4	4
P17	4	4	4	5	4
P18	5	5	5	5	5