



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

| | | | | | | | | | |
|--|---|---|----------------------|--|---|--------------------------------|---|------------|---|
| Course Title | | Topic in Physics For Biology and Medicine | | | | | | | |
| Course Code | | BYF526 | | Course Level | | Second Cycle (Master's Degree) | | | |
| ECTS Credit | 6 | Workload | 153 (<i>Hours</i>) | Theory | 2 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | | The purpose of the course is to be able to tell about the physical rules used in biophysics, the formulas and their use in biophysics to the students having BS degrees other than physics | | | | | | | |
| Course Content | | Transport in an infinite medium, Boltzmann constant, Fick's laws, transport through neutral membranes, osmotic pressure, artificial kidney, impulses in nerve and muscle cells, coulomb's law, gauss's law, ohm's law, exterior potentials and electrocardiogram. | | | | | | | |
| Work Placement | | N/A | | | | | | | |
| Planned Learning Activities and Teaching Methods | | | | Explanation (Presentation), Discussion, Individual Study | | | | | |
| Name of Lecturer(s) | | Prof. Mehmet BİLGEN | | | | | | | |

Assessment Methods and Criteria

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

Recommended or Required Reading

| | |
|---|---|
| 1 | Biophysics Lecture Book (İÜ cerrahpaşa) |
| 2 | Biophysics (Ferit Pehlivan) |
| 3 | Physics Books |

| Week | Weekly Detailed Course Contents | |
|------|---------------------------------|---|
| 1 | Intermediate Exam | International units |
| 2 | Theoretical | Living organisms as open systems |
| 3 | Theoretical | The rules for the transfer of energy and materials in living organisms |
| 4 | Theoretical | Poiseuille's law |
| 5 | Theoretical | Fourier's law |
| 6 | Theoretical | Fick's law |
| 7 | Intermediate Exam | Midterm exam |
| 9 | Theoretical | Elements of a circuit: resistance, reosta, condensator, diot, transistor |
| 10 | Theoretical | Ohm's law |
| 11 | Theoretical | Calculation of the current and resistance in circuits, connecting the ampermeter and voltmeter to a circuit |
| 12 | Theoretical | Alternative and direct currents and their acquisition |
| 13 | Theoretical | Inductive and capacitive reactance |
| 14 | Theoretical | Electric field: Gauss's law |
| 15 | Theoretical | Discussion |
| 16 | Final Exam | Final exam |

Workload Calculation

| Activity | Quantity | Preparation | Duration | Total Workload |
|---------------------------------------|----------|-------------|----------|----------------|
| Lecture - Theory | 14 | 0 | 2 | 28 |
| Assignment | 5 | 6 | 4 | 50 |
| Reading | 14 | 0 | 4 | 56 |
| Midterm Examination | 1 | 6 | 2 | 8 |
| Final Examination | 1 | 8 | 3 | 11 |
| Total Workload (Hours) | | | | 153 |
| [Total Workload (Hours) / 25*] = ECTS | | | | 6 |

*25 hour workload is accepted as 1 ECTS



Learning Outcomes

| | |
|---|--|
| 1 | To comprehend the rules for the transfer of energy and materials in living organisms |
| 2 | To be able to tell about the diffusion in gases and liquids and Fick's law of diffusion |
| 3 | To comprehend the physical laws in circulatory system |
| 4 | To gain knowledge on elements of electrical circuits and to learn about inductive and capacitive reactance |
| 5 | To be able to explain electric field, Gauss's law, Ohm's law, the interaction of charged particles |

Programme Outcomes (Biophysics Master)

| | |
|----|--|
| 1 | To be able to acquire an up-to-date theoretical and practical background on biophysical and electrophysiological research |
| 2 | To be able to acquire a background needed for basic biophysical research and having the ability to use the theoretical 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 occur 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 electromyography (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 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 | 4 | 4 | 4 | 4 | 5 |
| P4 | 4 | 4 | 4 | 4 | 4 |
| P5 | 5 | 5 | 5 | 5 | 5 |
| P6 | 1 | 2 | 1 | 1 | 3 |
| P7 | 1 | 2 | 1 | 2 | 4 |
| P8 | 3 | 4 | 3 | 3 | 2 |
| P9 | 4 | 5 | 4 | 4 | 4 |
| P10 | 4 | 3 | 3 | 3 | 4 |
| P11 | 3 | 2 | 3 | 3 | 4 |
| P12 | 3 | 2 | 3 | 3 | 2 |
| P13 | 3 | 3 | 3 | 3 | 4 |
| P14 | 3 | 2 | 3 | 3 | 2 |
| P15 | 3 | 4 | 3 | 3 | 3 |



| | | | | | |
|-----|---|---|---|---|---|
| P16 | 3 | 4 | 3 | 3 | 4 |
| P17 | 4 | 3 | 3 | 3 | 4 |
| P18 | 4 | 5 | 4 | 4 | 5 |

