# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

| Course Title | Computer Applications in Biophysics | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | BYF536 | | Couse Level | Second Cycle (Master's Degree) | | | |
| ECTS Credit | 4 | Workload | 100 *(Hours)* | Theory | 1 | Practice | 2 | Laboratory | 0 |
| Objectives of the Course | The purpose of the course is to be able to use the computer programmes that can be required in biophysical research | | | | | | |
| Course Content | Introducing the Mathematica software and performing its applications, introducing the MATLAB software and performing its applications, introduction of the LATEX program and preparing an article, assay book and project with this software. | | | | | | |
| 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 |
| Assignment | 2 | 60 |

## Recommended or Required Reading

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

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Mathematica |
| | Practice | Applications of Mathematica |
| 2 | Theoretical | Mathematica |
| | Practice | Applications of Mathematica |
| 3 | Theoretical | Mathematica |
| | Practice | Applications of Mathematica |
| 4 | Theoretical | Mathematica |
| | Practice | Applications of Mathematica |
| 5 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 6 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 7 | Intermediate Exam | Midterm exam |
| 8 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 9 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 10 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 11 | Theoretical | Matlab |
| | Practice | Applications of Matlab |
| 12 | Theoretical | Lateks |
| | Practice | Applications of Lateks |
| 13 | Theoretical | Lateks |
| | Practice | Applications of Lateks |
| 14 | Theoretical | Lateks |
| | Practice | Applications of Lateks |
| 15 | Theoretical | Lateks |

| 15 | Practice | Applications of Lateks |
|----|----------|------------------------|
| 16 | Final Exam | Final exam |

## Workload Calculation

| Activity | Quantity | Preparation | Duration | Total Workload |
|----------|----------|-------------|----------|----------------|
| Lecture - Theory | 14 | 0 | 1 | 14 |
| Lecture  - Practice | 14 | 0 | 2 | 28 |
| Assignment | 2 | 4 | 4 | 16 |
| Reading | 14 | 0 | 2 | 28 |
| Midterm Examination | 1 | 4 | 2 | 6 |
| Final Examination | 1 | 6 | 2 | 8 |
| | | | Total Workload (Hours) | 100 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 4 |

*25 hour workload is accepted as 1 ECTS*

## Learning Outcomes

| 1 | To be able to use the computer programmes having mathematical basis, which can be used in biophysics |
|---|---|
| 2 | To be able to explain the analysis programmes that can be used in data analysis of biophysical research |
| 3 | To be able to explain  the principles of the programmes |
| 4 | To gain knowledge and experience on the usage of Mathematica and Matlab |
| 5 | To gain knowledge and experience on the usage of Lateks |

## 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  | 4  | 5  | 5  | 5  | 5  |
| P2  | 5  | 5  | 4  | 4  | 4  |
| P3  | 5  | 5  | 5  | 5  | 5  |
| P4  | 5  | 5  | 5  | 5  | 5  |
| P5  | 5  | 5  | 5  | 5  | 5  |
| P6  | 3  | 3  | 3  | 2  | 3  |
| P7  | 4  | 4  | 4  | 4  | 4  |
| P8  | 4  | 4  | 4  | 4  | 4  |
| P9  | 4  | 4  | 4  | 4  | 4  |
| P10 | 4  | 4  | 4  | 4  | 4  |
| P11 | 4  | 4  | 4  | 4  | 4  |
| P12 | 4  | 4  | 4  | 4  | 4  |
| P13 | 4  | 4  | 4  | 4  | 4  |
| P14 | 4  | 4  | 4  | 4  | 4  |
| P15 | 4  | 4  | 4  | 4  | 4  |
| P16 | 5  | 5  | 5  | 5  | 5  |
| P17 | 5  | 5  | 5  | 5  | 5  |
| P18 | 5  | 5  | 5  | 5  | 5  |