AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Numerical and Symbolic Computation in Biophysics								
Course Code	BYF508		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	4	Workload	104 *(Hours)*	Theory	2	Practice	1	Laboratory	0
Objectives of the Course	This course aims to gain knowledge on the analysis of biophysics problems using numerical and symbolic computational tools								
Course Content	The analysis of biophysics problems using numerical and symbolic computational tools								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Demonstration, Discussion								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	60

Recommended or Required Reading	
1	Related e-books
2	Related web sites
3	Related scientific articles

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to computer hardware and computational software
2	Theoretical	Introduction to computer hardware and computational software
3	Theoretical	Differential equations governing 1D, 2D and 3D problems in biophysics
4	Theoretical	Differential equations governing 1D, 2D and 3D problems in biophysics
5	Theoretical	Review of Linear Algebra and Matrix theory
6	Theoretical	Review of Linear Algebra and Matrix theory
7	Theoretical	Review of Linear Algebra and Matrix theory
8	Theoretical	Midterm exam
9	Theoretical	Review of Optimization Theory and Iterative Solutions
10	Theoretical	Review of Optimization Theory and Iterative Solutions
11	Theoretical	Symbolic Programming
12	Theoretical	Symbolic Programming
13	Theoretical	Numerical and Symbolic Solutions of Example Biophysics Problems and Comparisons of the Results
14	Theoretical	Numerical and Symbolic Solutions of Example Biophysics Problems and Comparisons of the Results
15	Theoretical	Numerical and Symbolic Solutions of Example Biophysics Problems and Comparisons of the Results
16	Theoretical	Final exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	1	2	42
Lecture - Practice	14	2	1	42
Midterm Examination	1	8	2	10
Final Examination	1	8	2	10
			Total Workload (Hours)	104
			[Total Workload (Hours) / 25*] = **ECTS**	4

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes	
1	At the end of this course, students will gain insight, experience and knowledge on numeric and symbolic computation and existing programs, and will be able to use them in the solution of biophysical problems
2	To be able to comprehend the usage of differential equations governing 1D, 2D and 3D problems in biophysics
3	To be able to comprehend the review of Linear Algebra and Matrix theory
4	To learn the review of Optimization Theory and Iterative Solutions
5	To be able to comprehend and use Symbolic Programming

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	5	5	5	5	5
P5	5	5	5	5	5
P6	3	3	3	2	2
P7	5	4	4	3	3
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	3	3	3	2	2
P16	3	3	3	2	2
P17	5	4	4	5	5
P18	5	4	4	5	5