



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Analytical Methods							
Course Code		BYF507		Course Level		Second Cycle (Master's Degree)			
ECTS Credit	4	Workload	102 (<i>Hours</i>)	Theory	2	Practice	1	Laboratory	0
Objectives of the Course		This course will provide understanding the analytical methods to solve real life biophysics problems. Ordinary and partial differential equations will be derived to describe the mathematical problems and solved analytically whenever possible with the help of symbolic algorithms and programming.							
Course Content		This course will provide understanding the analytical methods to solve real life biophysics problems. Ordinary and partial differential equations will be derived to describe the mathematical problems and solved analytically whenever possible with the help of symbolic algorithms and programming.							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Demonstration, Discussion, Project Based 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	Related web sites
2	Related e-books
3	Related scientific articles

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to biophysics problems solvable analytically
2	Theoretical	Introduction to biophysics problems solvable analytically
3	Theoretical	Examples demonstrating the derivations of ordinary and partial differential equations concerning 1D, 2D and 3D problems
4	Theoretical	Examples demonstrating the derivations of ordinary and partial differential equations concerning 1D, 2D and 3D problems
5	Theoretical	Examples demonstrating the derivations of ordinary and partial differential equations concerning 1D, 2D and 3D problems
6	Theoretical	Generalized and Basis Functions used in solving in 1D, 2D and 3D problems
7	Theoretical	Generalized and Basis Functions used in solving in 1D, 2D and 3D problems
8	Theoretical	Midterm exam
9	Theoretical	Symbolic Programming with Mathematica and Matlab
10	Theoretical	Symbolic Programming with Mathematica and Matlab
11	Theoretical	Symbolic Programming with Mathematica and Matlab
12	Theoretical	Conanical Formulations and Obtaining Closed Form Solutions for the example problems
13	Theoretical	Conanical Formulations and Obtaining Closed Form Solutions for the example problems
14	Theoretical	Conanical Formulations and Obtaining Closed Form Solutions for the example problems
15	Theoretical	Conanical Formulations and Obtaining Closed Form Solutions for the example problems
16	Theoretical	Final exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	1	2	42
Lecture - Practice	14	1	1	28
Assignment	1	10	2	12
Midterm Examination	1	8	2	10



Final Examination	1	8	2	10
Total Workload (Hours)				102
[Total Workload (Hours) / 25*] = ECTS				4
*25 hour workload is accepted as 1 ECTS				

Learning Outcomes

1	At the end of the course, students will be able to understand and comprehend problems in field of biophysics.
2	Students will be able to make the mathematical formulations of the problems, and will comprehend the methods to reach the functional and serial solutions analytically
3	To learn the symbolic programming with Mathematica and Matlab
4	To be able to comprehend the derivations of ordinary and partial differential equations concerning 1D, 2D and 3D problems
5	To be able to comprehend the use of canonical formulations and obtaining closed form solutions for the analysis of problems

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	5	5	5	5	5
P4	5	5	5	5	5
P5	3	3	2	3	3
P6	3	3	2	2	2
P7	5	5	5	5	5
P8	4	4	4	3	4
P9	4	4	4	3	3



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	3	3
P16	3	3	2	2	2
P17	5	5	5	4	4
P18	5	5	5	4	5

