AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Computer Simulations in Physics								
Course Code	FİZ424		Couse Level	First Cycle (Bachelor's Degree)					
ECTS Credit	7	Workload	180 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	To simulate some simple problems of physics.								
Course Content	Fortran programming, random walk problem, Monte Carlo method								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Demonstration, Individual Study								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	70
Quiz	2	10

Recommended or Required Reading	
1	An Introduction to Computer Simulation Methods (H.Gould, J. Tobochnik)
2	Fortran 90/95 for Scientists and Engineers (S. J. Chapman)

Week	Weekly Detailed Course Contents	
1	Theoretical	Overview
2	Theoretical	Algorithms
3	Theoretical	Fundamental Fortran Programming and basic programs
4	Theoretical	Coffee cooling problem
5	Theoretical	Simple linear and nonlinear systems
6	Theoretical	Random Walk problem
7	Theoretical	Percolation problem
8	Intermediate Exam	Midterm exam
9	Theoretical	Diffussion Problem
10	Theoretical	Monte Carlo Method
11	Theoretical	Some Applications of Monte Carlo Method
12	Theoretical	Dynamical Systems and Chaos
13	Theoretical	Fractals
14	Theoretical	Quantum Random Walk Problem
15	Theoretical	Quantum Monte Carlo Method

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	7	3	140
Quiz	2	2	1	6
Midterm Examination	1	10	2	12
Final Examination	1	20	2	22
			Total Workload (Hours)	180
			[Total Workload (Hours) / 25*] = **ECTS**	7
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	The students should be able to express the meaning of the simulation
2	The students should be able to write algorithm.

3	The students should be able to use a programing efficently.
4	The students should be able to use basic programming methods.
5	The students should be able to use simulation methods to solve some problems in classical physics.
6	The students should be able to use simulation methods to solve some problems in quantum physics.

Programme Outcomes *(Physics)*	
1	To understand the importance of physics by understanding the general concepts of physics, matter and energy
2	To be able to define the movements of matter and to distinguish the characteristics of movements under different force (potential)
3	Be able to say the meaning of Lagrange and Hamiltonian formulations of the movement and apply them to simple problems,
4	To be able to express the fundamental concepts such as time, space, force, momentum and energy in the movements of matter close to the speed of light and be able to solve and interpret the simple problems related to
5	To be able to establish the relationship between electric and magnetic forces and to be able to illustrate their applications to technology and solve problems related to the movement of particles in electric and magnetic fields
6	Be able to say the basic laws of electromagnetics and apply them to problems, illustrate their applications to simple technology
7	To be able to tell the reasons of the differences between the classical cases and the quantum scale and explain the reasons
8	Explain the concepts of discontinuity, uncertainty, matter-antimatter, indecisiveness of quantum physics with examples and explain simple problems related to the subject.
9	To be able to solve the problems of micro-particles under different simple potentials and be able to say their meanings
10	To be able to establish the relationship between the movements and properties of multi-particle systems and the laws of probability and solve simple problems
11	To be able to illustrate the laws, meanings and applications of thermodynamics and use them
12	Be able to use their knowledge about quantum physics and mechanics in explaining some properties of atoms and nuclei
13	To be able to show the meanings of some theoretical concepts by experimenting, and develop a strong relationship between thought and the real world, develop analytical thinking
14	To be able to apply the meanings of the basic laws of physics, their comprehension of universality and the relations between them and the unity of the laws of nature.
15	Use computer to solve physics problems
16	To be able to understand the problems by using their analytical knowledge skills and to propose solutions by dealing with the laws of physics
17	Be able to use the knowledge of physics to understand new technologies
18	To be able to tell the relations between symmetry and conservation laws in laws of physics

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6
P1	3	2	2	2	4	3
P2	3	3	2	3	4	4
P3	1	3	2	3	4	3
P4	1	3	2	2	3	3
P5	2	3	2	3	4	3
P6	2	3	2	4	3	3
P7	4	2	2	2	3	4
P8	2	3	2	2	2	4
P9	4	3		3	4	4
P10	4	3	2	4	4	4
P11	3	2	2	2	4	3
P12	3	2	2	2	2	5
P13	2	2	2	3	2	3
P14	2	2	2	4	3	3
P15	5	5	5	5	5	5
P16	3	1	2	2	3	4
P17	3	2	2	2	4	4
P18	2	1	2	2	3	3