AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Computer Simulations in Physics I								
Course Code	FZK509		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	6	Workload	149 *(Hours)*	Theory	2	Practice	2	Laboratory	0
Objectives of the Course	To provide abilities and the knowledge about the basics of application of computer in physics and working principles of these application.								
Course Content	Introduction to programming and its application to solve physical problems, finding roots of equation, numerical integration methods, numerical solution of physical differantial equations:Euler and Runge-Kutta methods, solution of some probability related problems in physics								
Work Placement									
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Demonstration, Project Based Study, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	15
Final Examination	1	25
Quiz	4	10
Assignment	13	20
Project	1	30

Recommended or Required Reading	
1	Sayısal Fizik, B. KARAOĞLU, Seyir Yayıncılık, 2004, İstanbul
2	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK, Addison-Wesley, 1996, New York.

Week	Weekly Detailed Course Contents	
1	Practice	Introduction to computational programming (Summary)
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 1.Bölüm
2	Practice	Basic numerical solutions of motion in one dimension. (Euler Method)
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK:Chapter 2
3	Practice	Basic numerical solutions of equations of motion in two dimension.
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 3.Bölüm
4	Practice	Numerical solutions of the motion whose components are independent of each other.
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK: Chapter 3
5	Practice	Numerical solutions of the motion whose components depend on each other.
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK Chapter 4
6	Practice	Runge-Kutta method and comparison of it with Euler method.
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 3.Bölüm
7	Practice	Numerical solutions of dynamical equations by Runge-Kutta method.
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK:Chapter 5
8	Practice	Midterm Exam
9	Practice	Numerical solutions of equations of motion by using the inner programs systematically.
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK :Chapter 6
10	Practice	Analysis of the boundary condition problems in physics and solution of these by Runge-Kutta method.
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK : Chapter 6
11	Practice	Arbitrary numbers and basic applications of these on integration.(Monte-Carlo)
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 4.Bölüm
12	Practice	The application of probability laws on particles moving under the influence of different potentials. (Path Integrals)
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK :Chapter 7

13	Practice	The application of probability laws on particles moving under the influence of different potentials. (Path Integrals)
	Preparation Work	An Introduction to Computer Simulations Methods, H. GOULD, J: TOBOCHNICK :Chapter7
14	Practice	Numerical solutions of some Schrödinger problems (I).
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 5.Bölüm
15	Practice	Numerical solutions of some Schrödinger problems (II).
	Preparation Work	Sayısal Fizik, B. KARAOĞLU 5.Bölüm
16	Practice	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Practice	14	3	2	70
Assignment	14	2	0	28
Term Project	1	15	0	15
Quiz	4	3	1	16
Midterm Examination	1	6	2	8
Final Examination	1	10	2	12
			Total Workload (Hours)	149
			[Total Workload (Hours) / 25*] = **ECTS**	6

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	To be able to analyze the input-output commands and using these
2	To be able to distinguish the data types, constants and the examples in physics and studying on these
3	To be able to analyze the foldering techniques, graphing techniques and applications of these in physics and using these while analyzing the other physical problems
4	to be able to identify modern programming methods and describe the extent and limitations of computational methods in physics
5	to be able to account for the role as computer models and simulations play at studies of physical systems within material technology

Programme Outcomes *(Physics Master)*

1	The student should conceive the concepts in physics and may apply them on her/his own
2	The student should be able to conceive the relationship between the different physics laws and integrity of them and apply them in solving different physics problems
3	The student should know the basic principles of classical, quantum and relativistic physics and use them in the solutions of problems
4	The student should be able to do research in a specific area of physics
5	The student should be able to prepare reports on papers on the subject of her/his research and present her/his research subject in scientific conferences
6	The student should be able to explain the relationship between complicated problems and basic physics laws.
7	The student should be able to use computers for solving complicated physics problems
8	The student should be able to interrelate between the theory and the experiment. If she/he is experimentalist he/she has to explain the theory behind her/his work. If she /he is a theorist she/he should has to know the experiments in her/his subject.

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	3	4	5	4	3
P2	3	4	4	5	4
P3	4	3	3	3	4
P4	5	4	4	3	3
P5	2	3	3	3	5
P6	3	4	4	5	4
P7	5	5	5	5	4
P8	4	4	5	4	4