AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Numerical Solution of Differential Equations								
Course Code	MTK527		Couse Level		Second Cycle (Master's Degree)				
ECTS Credit	7	Workload	175 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	This course aims to acquaint students with the basic knowledge of numerical solution of some differential equations. Students will be familiar with classification of equations initial and boundary value problems and relation between Volterra and Fredholm integrals. They may easily understand the features of topics used at the area of information other courses. They will be able to make applications related to biology, and other sciences.								
Course Content	Introduction to MATLAB and integral theory, Local truncation errors, Butcher table and Runge-Kutta method And Adams methods, Linear and Nonlinear Volterra integral equations of the second kind, Numerical stability of Multi-step methods.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)	Res. Assist. İclal GÖR								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	50
Assignment	1	20

Recommended or Required Reading	
1	Clay C. Rose, (2004), Differential Equations, Springer, second edition.
2	B. R. Hunt, R. L. Lipsman, J. E. Osborn, J. M. Rosenberg, (2005), Differential Equations with MATLAB

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction of MATLAB and differential equations
2	Theoretical	Ordinary differential equations., Initial and boundary value problems and solution of methods,
4	Theoretical	Numerical solution of IVP and Volterra integral equations
5	Theoretical	Local truncation errors and order of convergence
6	Theoretical	Linear and non-linear differential equations
7	Theoretical	Single step methods for differential equations
8	Intermediate Exam	Midterm exam
9	Theoretical	Linear and Nonlinear Volterra integral equations of the second kind
10	Theoretical	Numerical stability of Single step methods
11	Theoretical	Taylor series and Runge-Kutta methods
12	Theoretical	Butcher table and Runge-Kutta method And Adams methods
13	Theoretical	Numerical stability analysis of Multi-step methods
14	Theoretical	Stability Analysis
15	Theoretical	Stability Analysis
16	Final Exam	FINAL EXAM

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	3	3	84
Assignment	1	10	2	12
Midterm Examination	1	32	2	34

Final Examination	1	43	2	45
			Total Workload (Hours)	175
			[Total Workload (Hours) / 25*] = **ECTS**	7
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	To be able to comprehend the importance of the some basic concepts of the integral equations
2	To be able to write numerical programming with MATLAB.
3	To be able to design numerical quadrature.
4	To be able to implement Butcher table and their algorithms.
5	To be able to use mathematical concepts in solving certain types of problems

Programme Outcomes *(Mathematics Master)*	
1	To be able to have an adequate theoretical and practical domain knowledge.
2	To be able to comprehend the interdisciplinary interaction associated with Mathematics.
3	To be able to use theoretical and practical domain knowledge gained in the field of Mathematics.
4	To be able to interpret knowledge from different disciplines integrating knowledge in the field of mathematics and produce new information.
5	To be able to define, analyse, model and to solve the problems by scientific methods in Mathematics.
6	To be able to conduct a math related specialistic study independently.
7	To be able to develop new strategic approaches to solve problems occurred in unforeseen and complex math-related applications by taking responsibility.
8	To be able to lead in situations that require solving problems related to the mathematics.
9	To be able to criticize his/her knowledge and skills acquired in the field mathematics.
10	To be able to transfer his/her ideas and suggestions for solutions to problems by supporting quantitative or qualitative data verbally and in writing.
11	To be able to communicate both orally and written in a foreign language.
12	To be able to use computer hardware and information technologies with software required by Mathematics.
13	To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and being able to support the development of social, scientific, cultural and ethical values.
14	To be able to develop mathematics-related strategies, policies and operational plans, and to evaluate the results obtained within the framework of quality processes.
15	To be able to use his/her knowledge in the field of mathematics and practical problem-solving skills in interdisciplinary studies.

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	4	4	4
P2	3	4	4		
P3	3	4	4	4	4
P4	3	4	4		4
P5		4	4		
P7		4	4		4
P12	3			5	4
P15	4	4	4	3	3