AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Differential Equations and Applications								
Course Code	MME528		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	195 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	To instruct the students analytical solutions and real life applications of ordinary and partial differential equations in Mechanical Engineering								
Course Content	Basic concepts and classifying differential equations, First-order differential equations and their engineering applications, Second and higher order differential equations and engineering applications, Power series solutions of linear equations with variable coefficients, Systems of linear differential equations: Scalar and Matrix methods, Laplace transformations, Numerical methods for ordinary differential equations.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Project Based Study, Individual Study								
Name of Lecturer(s)	Assoc. Prof. Adem ÖZÇELİK								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	60
Assignment	1	5
Term Assignment	1	5

Recommended or Required Reading	
1	1. Stephen H. Saperstone, Introduction to Ordinary Differential Equations, Brooks/Cole Publishing Company, 1998.
2	2. C. Henry Edwards and David E. Penney, Elementary Differential Equations, Prentice Hall, Inc., 2000.
3	3. William E. Boyce and Richard C. DiPrima, Elementary Differential Equations and Boundary Value Problems, John Wiley & Sons, Inc., 1997.

Week	Weekly Detailed Course Contents	
1	Theoretical	First Order Differential Equations
2	Theoretical	Application of First Order Differential Equations
3	Theoretical	Second Order Differential Equations
4	Theoretical	Application of Second Order Differential Equations
5	Theoretical	Higher Order Linear Differential Equations
6	Theoretical	Various Solution of Higher Order Linear Differential Equations
7	Theoretical	Various Solution of Higher Order Linear Differential Equations
8	Intermediate Exam	Midterm Exam
9	Theoretical	Systems of Linear Differential Equations
10	Theoretical	Non-linear Differential Equations
11	Theoretical	Partial Differential Equations and Fourier Series
12	Theoretical	Laplace Transforms
13	Theoretical	Solutions of Differential Equations with Laplace Transforms
14	Theoretical	Boundary Value Problems and Sturm-Liouville Theorems
15	Theoretical	Boundary Value Problems and Sturm-Liouville Theorems
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	16	2	4	96
Assignment	5	0	3	15
Term Project	1	15	10	25
Quiz	4	4	1	20

Midterm Examination	1	15	2	17
Final Examination	1	20	2	22
			Total Workload (Hours)	195
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	1. develop a clear understanding of differential, differential equation concepts and their physical meanings,
2	2. learn the definitions and solution methods of the first order differential equations,
3	3. apply the first order differential equation to related physics problems,
4	4. learn the definitions and solution methods of the high order differential equations and apply them to the related physics problems,
5	5. become familiar with the Laplace transforms use them to solve differential equations

Programme Outcomes *(Mechanical Engineering (English) Master)*	
1	To be able to access wide and deep information with scientific researches in the field of Engineering, evaluate, interpret and implement the knowledge gained in his/her field of study
2	To be able to complete and implement “limited or incomplete data” by using the scientific methods
3	To be able to consolidate engineering problems, develop proper method(s) to solve and apply the innovative solutions to them
4	To be able to develop new and original ideas and method(s), to develop new innovative solutions at design of system, component or process
5	To be able to gain comprehensive information on modern techniques, methods and their borders which are being applied to engineering
6	To be able to design and apply analytical, modeling and experimental based research, analyze and interpret the faced complex issues during the design and apply process
7	To be able to gain high level ability to define the required information and data
8	To be able to work in multi-disciplinary teams and to take responsibility to define approaches for complex situations
9	To be able to transfer of the process and results of studies at national and international environments systematic and clear verbal or written
10	To be able to be aware of social, scientific and ethical values guarding adequacy at all professional activities and at the stage of data collection, interpretation, and announcement
11	To be able to become aware of new and developing application of profession and ability to analyze and study on those applications
12	To be able to interpret engineering application’s social and environmental dimensions and it’s compliance with the social environment

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	4	5	4	5
P2	4	5	4	5	4
P3	3	4	5	4	4
P4	5	5	4	3	5
P5	4	4	3	5	4
P6	3	3	5	4	3
P7	5	5	4	3	5
P8	4	4	5	5	4
P9	5	3	5	4	5
P10	4	5	3	3	5
P11	5	4	5	5	3
P12	5	3	4	4	5