AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Differential Equations								
Course Code	MAT253		Couse Level		First Cycle (Bachelor's Degree)				
ECTS Credit	6	Workload	151 *(Hours)*	Theory	4	Practice	0	Laboratory	0
Objectives of the Course	To introduce the basic concepts required to understand, construct, solve and interpret differential equations, to teach methods to solve differential equations of various types, and to give an ability to apply knowledge of mathematics on engineering problems.								
Course Content	Introduction to differential equations, first order differential equations, second order linear equations, solutions for system of linear differential equations								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)	Lec. Ahmet GENÇ, Lec. Seçkin GÜNSEN								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	70

Recommended or Required Reading	
1	Introduction to Ordinary Differential Equations 4 th. Edition, Shepley L. Ross, Wiley, 1989
2	Çözümlü Diferansiyel Denklem Problemleri, Doç. Dr. Cevdet Cerit, İ.T.Ü. Fen-Edebiyat Fakültesi, 2009

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to differential equations, Definitions, Classifications of differential equations, solutions, The elimination of arbitrary constants, initial and value problems, Solutions and the existence uniqueness theorem
2	Theoretical	First-Order Equations for Which Exact Solutions are Obtainable
3	Theoretical	Linear Equations and Bernoulli Equations, Special Integrating Factors and Transformations
4	Theoretical	Applications of First-Order Equations
5	Theoretical	Explicit Methods of Solving Higher-Oreder Linear Differential Equations, Basic Theory of Linear Differential Equations, The Homogeneous Linear Equation with Constant Coefficients
6	Theoretical	The Method of Undetermined Coeeficients, Variation of parameters, The Cauchy-Euler Equation
7	Theoretical	Applications of Second-Order Linear Equation with Constant Coefficients
8	Intermediate Exam	Midterm Exam
9	Theoretical	Series Solutions of Linear Differential Equations
10	Theoretical	Solutions About Singular Points; The Method of Frobenius, Bessel’s Equations and Bessel Functions
11	Theoretical	System of of Linear Differential Equations, Differential operators and an Operator Method
12	Theoretical	Basic Theory of Linear system in Normal Form: Two Equations in Two Unknown Functions, homogeneous Linear Systems with Constant Coefficient: Two Equations in Two Unknown Functions
13	Theoretical	Matrices and Vectors, The Matrix method for Homogeneous Linear Systems with Constant Coefficients
14	Theoretical	Laplace Transforms
15	Theoretical	Laplace Transforms Solution of Linear Differential Equations with Constant Coefficients, Laplace Transforms Solution of Linear Systems

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	2	4	84
Midterm Examination	1	25	2	27

Final Examination	1	38	2	40
			Total Workload (Hours)	151
			[Total Workload (Hours) / 25*] = **ECTS**	6
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Classify differential equations according to certain features
2	Solve first order linear equations and nonlinear equations of certain types and interpret the solutions
3	Understand the conditions for the existence and uniqueness of solutions for the linear differential equations
4	Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions
5	To be able to solve higher order linear differential equations

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
P1	4		4		
P2	4	4			
P13	4	4	4	4	
P14				4	4
P16	4		4		
P17	4	4			