

School of Engineering and Natural Sciences / Industrial Engineering (English)

2023 - 2024 Academic Year

DIFFERENTIAL EQUATIONS

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
DIFFERENTIAL EQUATIONS	IND2114258	Fall Semester	2+0	2	4
Prerequisites Courses	MATEMATİK II				
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Required				
Course Coordinator	Assist.Prof. Cihan Bilge KAYASANDIK				
Name of Lecturer(s)	Assist.Prof. Cihan Bilge KAYASANDIK, Lect. Seçil TUNALI ÇIRAK				
Assistant(s)					
Aim	To provide the recognition of differential equations and to give solution techniques and to give also its applications for the study of Engineering. To provide supports on studies and researches in the area of Engineering.				
Course Content	This course contains; Preliminaries/Differential Equations,Definitions and Terminology, Initial-Value Problems ,Methods of Solving First Order Differential Equations: Separable Differential Equations,Linear Differential Equations,Exact Differential Equations, Making non-exact Differential Equations to Exact,Solutions by Substitutions ,Differential Equations as Mathematical Models, Linear Models ,Preliminaries: Higher Order Linear Differential Equations,Methods of Solving Higher Order Linear Differential Equations: Reduction of Order,Homogeneous Linear Equations with Constant Coefficients,Undetermined Coefficients—Superposition and Annihilator Approaches,Variation of Parameters and Cauchy-Euler Differential Equations,Definition of the Laplace Transform, Inverse Transforms,Transforms of Derivatives and Solving Initial Value Problems from Laplace Transform.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
2.Apply the methods for solving first-order differential equations.			12, 14, 6, 9	A	
1. Recognize the classification of differential equations, solutions of differential equations, systems of differential equations, initial value problems and apply Existence and Uniqueness Theorem for first-order differential equations.			12, 14, 6, 9	A	
3. Recognize and solve differential equations as mathematical models and higher-order linear differential equations and apply Existence and Uniqueness Theorem for higher-order equations.			12, 14, 6, 9	A	
4. Recognize linearly dependent and independent solutions and Wronskian and apply the methods for solving higher-order linear differential equations.			12, 14, 6, 9	A	
5. Solve Cauchy-Euler differential equations and calculate initial value problems by Laplace transforms.			12, 14, 6, 9	A	
Teaching Methods	12: Problem Solving Method, 14: Self Study Method, 6: Experiential Learning, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Preliminaries/Differential Equations	Book Chapter 1.1			
2	Definitions and Terminology, Initial-Value Problems	Book Chapters 1.1, 1.2			
3	Methods of Solving First Order Differential Equations: Separable Differential Equations	Book Chapter 2.2			
4	Linear Differential Equations	Book Chapter 2.3			
5	Exact Differential Equations, Making non-exact Differential Equations to Exact	Book Chapter 2.4			
6	Solutions by Substitutions	Book Chapter 2.5			
7	Differential Equations as Mathematical Models, Linear Models	Book Chapters 1.3, 3.1			
8	Preliminaries: Higher Order Linear Differential Equations	Book Chapter 4.1			
9	Methods of Solving Higher Order Linear Differential Equations: Reduction of Order	Book Chapter 4.2			
10	Homogeneous Linear Equations with Constant Coefficients	Book Chapter 4.3			
11	Undetermined Coefficients—Superposition and Annihilator Approaches	Book Chapters 4.4, 4.5			
12	Variation of Parameters and Cauchy-Euler Differential Equations	Book Chapters 4.6, 4.7			
13	Definition of the Laplace Transform, Inverse Transforms	Book Chapters 7.1, 7.2			
14	Transforms of Derivatives and Solving Initial Value Problems from Laplace Transform	Book Chapter 7.2			
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Dennis G. Zill - A First Course in Differential Equations with Modeling Applications 11th Edition.