## Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering Department of Genetic and Bioengineering 2024-2025 Fall Semester

Syllabus						
Code/Name	GBM 207 /Differential Equations					
Туре	Required					
Credit/ECTS	5/5					
Hour per Week	4 (4+0+0)					
Level/Year	Undergraduate/2					
Semester	Fall					
Classroom	WWF   A003					
Content	Introduction to differential equations with their definitions and terminology. Classification of Differential Equations. Initial Value Problems (IVPs). First-Order Ordinary Differential Equations (Separable, Homogeneous, Exact, Linear, Bernoulli and Riccati Differential Equations. Integrating Factors). Higher-order linear differential equations. Boundary Value Problems (BVPs). Solutions of higher-order homogeneous linear differential equations with constant coefficients. Solutions of higher-order nonhomogeneous linear differential equations with constant coefficients (The method of undetermined coefficients and the method of variation of parameters). Cauchy-Euler equation. Reduction of order. The Laplace Transform. Solving linear ordinary differential equations by the Laplace Transform. Series solutions of differential equations.					
Prerequisites	None					
Textbooks	<ul> <li>Primary</li> <li>Class Notes</li> <li>Supplementary</li> <li>Coddington, Earl A. An introduction to ordinary differential equations. Courier</li> <li>Corporation, 2012.</li> <li>Ross, Shepley. Introduction to ordinary differential equations. (2021) Wiley.</li> <li>Bronson, Richard. Schaum's Easy Outlines: Differential Equations. McGraw-Hill, 2012.</li> </ul>					
Objectives	<ul> <li>To be able to classify the differential equations with respect to their certain properties such as type, order and linearity</li> <li>To be able to solve first-order differential equations.</li> <li>To be able to solve the higher order homogeneous and nonhomogeneous linear differential equations with constant coefficients.</li> <li>To be able to solve system use the Laplace transform in finding the solution of linear differential equations of linear first order differential equations with constant coefficients,</li> <li>To be able to use the Laplace transform in finding the solution of linear differential equations</li> <li>To be able to use the Laplace transform in finding the solution of linear differential equations</li> </ul>					
Course Outcomes	In this course you will be able to: CO1 Classify the differential equations CO2 Express a real-world problem in the form of differential equation CO3 Analyze a mathematical model by using the methods and techniques of differential equations CO4 Sketch direction fields and interpret what they tell about a differential equation and its solution CO5 Solve the first and higher order differential equations					

# Weekly Schedule of Topics

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1	Introduction to differential equations with their definitions and terminology. Classification of Differential Equations				
2	First-Order Ordinary Differential Equations: Separable and Homogeneous equations				
3	First-Order Ordinary Differential Equations: Exact equation and Integrating factor				
4	First-Order Ordinary Differential Equations: Method of grouping, Linear and Bernoulli equations				
5	Physical applications of first order equations				
6	Higher order homogeneous differential equations with constant coefficients				
7	Higher order nonhomogeneous differential equations with constant coefficients: the method of undetermined coefficients and the method of variation of parameters				
8	Cauchy -Euler Equations				
9	Reduction of order				
10	Laplace transform				
11	Solving linear ordinary differential equations by the Laplace Transform.				
12	Solutions of system of differential equations				
13	Series solutions of differential equations				
14	Modelling higher order and system of differential equations				
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**Professional**Ability to model some physical problems by using ordinary differential equations and<br/>solve them.

### **Contribution to Program Outcomes\***

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011
C01	5	5	1	3	0	0	0	1	0	0	0
CO2	5	5	1	3	0	0	0	1	0	0	0
CO3	5	5	1	3	0	0	0	1	0	0	0
CO4	5	5	1	3	0	0	0	1	0	0	0
C05	5	5	1	3	0	0	0	1	0	0	0

\* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

<b>Special Conditions</b>	None			
Requirements	Knowledge of derivative and integration methods.			
<b>Course Policy</b>	<ul> <li>Be in the class on time.</li> <li>English should always be used to communicate with one another.</li> <li>At least 70% attendance is negurined athematics a grade of <b>P7</b> will be assigned.</li> </ul>			
Cheating & Plagiarism	<ul> <li>Copying or letting someone copy your work on exams, assignments, or reports is cheating.</li> <li>Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism.</li> <li>The consequence of academic dishonesty is to receive a grade of FF for the course.</li> </ul>			
Evaluation	Quizzes (2×10 pts.) Midterm Presentation <u>Final Exam</u> Total	0% 50% 0% <u>50%</u> 100%		

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Prepared by Ibrahim Tekin on October 17th, 2024.