

Syllabus

Code/Name	MEC209 /Differential Equations
Type	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	<p>Primary Class Notes</p> <p>Supplementary Coddington, Earl A. An introduction to ordinary differential equations. Courier Corporation, 2012. Ross, Shepley. Introduction to ordinary differential equations. (2021) Wiley. Bronson, Richard. <i>Schaum's Easy Outlines: Differential Equations</i>. McGraw-Hill, 2012.</p>
Objectives	<ul style="list-style-type: none"> • To be able to classify the differential equations with respect to their certain properties such as type, order and linearity • To be able to solve first-order differential equations. • To be able to solve the higher order homogeneous and nonhomogeneous linear differential equations with constant coefficients. • 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, • To be able to use the Laplace transform in finding the solution of linear differential equations • To be able to find the series solutions of differential equations
Course Outcomes	<p>In this course you will be able to:</p> <p>C01 Classify the differential equations</p> <p>C02 Express a real-world problem in the form of differential equation</p> <p>C03 Analyze a mathematical model by using the methods and techniques of differential equations</p> <p>C04 Sketch direction fields and interpret what they tell about a differential equation and its solution</p> <p>C05 Solve the first and higher order differential equations</p>

Weekly Schedule of Topics

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

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

Professional Contribution Ability to model some physical problems by using ordinary differential equations and solve them.

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	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
CO5	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

Special Conditions None

Requirements Knowledge of derivative and integration methods.

Course Policy

- Be in the class on time.
- English should always be used to communicate with one another.
- At least 70% attendance is required, otherwise a grade of **DZ** will be assigned.

Cheating & Plagiarism

- Copying or letting someone copy your work on exams, assignments, or reports is cheating.
- Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism.
- The consequence of academic dishonesty is to receive a grade of **FF** for the course.

Evaluation

Quizzes (2×10 pts.)	0%
Midterm	50%
Presentation	0%
<u>Final Exam</u>	50%
Total	100%

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Instructor

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Prepared by Ibrahim Tekin on October 17th, 2024.