The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Engineering Math I for Aeronautical Engineering Students	0994201	Fall

2025 Course Catalog Description

Ordinary differential equations, linear differential equations of second and higher order, systems of differential equations, phase plane, stability, series solutions of differential equations, orthogonal functions, Laplace transforms, linear systems of equations, matrices and determinants.

Instructors

Name	E-mail	Section	Office Hours	Lecture Time

Text Books

	Text book 1	Text book 2
Title	Advanced Engineering Mathematics	
Author(s)	E. Kreyszig	
Publisher, Year, Edition	10th Edition	

References

Books	1) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, 5th edition. 2) Advanced Engineering Mathematics, K. A. Stroud and Dexter J. Booth, 5th edition.
Journals	
Internet links	

Prerequisites

Prerequisites by topic	-
Prerequisites by course	Calculus III 0301201
Co-requisites by course	Computer Programming for Engineers 0914202
Prerequisite for	Engineering Math II for Aeronautical Engineering Students Engineering Numerical Methods Fluid Mechanics

Topics Covered

Week	Topics	Chapter in Text

1	Classification of ODEs Separable ODEs First order linear ODEs	
2	Bernoulli ODEs Homogeneous first-order ODEs Exact ODEs	
3	Exact ODEs Integrating factors	
4	Second-Order ODEs: Basic concepts Independent Solutions and Wronskian x and y missing	
5	Reduction of order Characteristic equation: distinct and equal roots Characteristic equation: complex roots	
6	Cauchy-Euler Equations Undetermined Coefficients Undetermined Coefficients	
7	Variation of Parameters Modeling (spring) Higher-Order Homogeneous ODEs	
8	Undetermined Coefficients for Higher-Order ODEs Variation of Parameters for Higher-Order ODEs Variation of Parameters for Higher-Order ODEs	
9	System of linear first-order ODEs-Introduction Homogeneous 2x2 linear system-Complex Eigen Values	
10	Homogeneous 2x2 linear system-Equal Eigen Values Nonhomogenous Linear system-Undetermined Coefficients Nonhomogenous Linear system-Undetermined Coefficients	
11	Nonhomogenous Linear System-Variation of Parameters Review of Power Series Power Series Solution about Ordinary Points	
12	Power Series Solution about Ordinary Points Regular Singular Points (classification) Solutions about regular singular points	
13	Solutions about regular singular points Laplace Transform-Definitions and basic concepts Inverse Laplace Transform	

14	Inverse Laplace Transform Unit Step Function Dirac's Delta Function	
15	Transforms of derivatives and integrals Solutions (using Laplace) of linear ODEs Solutions(using Laplace) of system of 2x2 linear ODEs	

Mapping of Course Outcomes to ABET Student Outcomes	
SOs	**Course Outcomes**
1,2,5	1- Master the basic concepts of ordinary differential equation (ODE). 2- Select a proper procedure to solve a given ODE 3- Model applications in Mechanics 4- Find series solutions of 2nd order linear differential equations. 5- Find the Laplace (and inverse Laplace) transforms of given functions 6- Solve IVPs using Laplace transform 7- Solve 2x2 linear system of ODEs

Evaluation

Assessment Tools	Expected Due Date	Weight
First Exam	7th weak	20%
Midterm Exam	11th weak	30%
Final Exam	16th weak	50%

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	X	X			X		

Relationship to Aeronautical Engineering Program Objectives (AEPOs)

AEPO1	AEPO2	AEPO3	AEPO4	AEPO5

ABET Student Outcomes (SOs)

The University of Jordan
School of Engineering

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
Updated by ABET Committee, 2025	