



Jordan University of Science and Technology
Faculty of Engineering
Civil Engineering Department

CE701 Advanced Applied Mathematics - JNQF Level: 9
First Semester 2024-2025

Course Catalog
3 Credit Hours. 3 Credit hours (3 Hr. Lectures). Complex functions, application of conformal mapping, Fourier series and integrations, special functions, Legendre polynomials, Bessel functions, Laplace Transforms and its application to ODE's in engineering practice, Partial Differential Equations.
Teaching Method: On Campus

Text Book	
Title	Advanced Engineering Mathematics
Author(s)	Kreyszig, E.
Edition	11th Edition
Short Name	Text Book
Other Information	(2016), John Wiley, New York.

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #1	Advanced Engineering Mathematics	Greenberg, M. D.	2nd Edition	(1998), Prentice Hall, New Jersey.
Ref #2	Advanced Engineering Mathematics	Wylie, C. R. and Barrett, L. C.	6th Edition	(1995), McGraw-Hill, New York.

Instructor	
Name	Dr. Jumah Amayreh
Office Location	N2 L2

Office Hours	Sun : 12:00 - 13:30 Mon : 08:30 - 10:00 Tue : 09:00 - 10:30 Wed : 13:00 - 14:30
Email	jumah@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun : 13:30 - 16:30 Room: C2009

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Importance of ODE/PDE in Engineering Applications and Modeling	Chapter 1 From Text Book
Week 2	ODE Classifications and Solutions of different types of First Order Linear/Nonlinear ODEs	Chapter 1 From Text Book
Week 3	Solutions of different types of Second Order Linear ODEs	Chapter 2 From Text Book
Week 4	Solutions of Homogenous/Nonhomogeneous Higher Order ODEs	Chapter 3 From Text Book
Week 5	Systems of ODEs as Models in Engineering Applications	Chapter 4 From Text Book
Week 6	Series Solutions of ODEs: Power, Legendre, and Bessel polynomials and functions	Chapter 5 From Text Book
Week 7	Laplace Transforms	Chapter 6 From Text Book
Week 8	Fourier Series and Transforms	Chapter 11 From Text Book
Week 9	Partial Differential Equations	Chapter 12 From Text Book
Weeks 10, 11	Complex Analysis	(selected topics from Chapters 13-17) From Text Book
Weeks 12, 13	Advanced Techniques of Numerical Solutions for ODEs and PDEs	Chapter 21 From Text Book
Weeks 14, 15, 16	Advanced Regression, Interpolation and Optimization techniques: Applications to Civil Engineering	(selected topics from Chapters 19-23) From Text Book

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Be able to solve different types of ODEs using analytical methods such as integrating factors, Bernoulli equation, Euler-Cauchy equation, undetermined coefficients, variations of parameters, and Laplace transform techniques. [1PI-1a] [1L9S1]	35%	

Be able to apply special series and polynomial functions such as Power series, Legendre's equation, Bessel function, Fourier series, and Complex functions to solve different types of ODEs and PDEs. [1PI-1a] [1L9S1]	20%	
Be able to to apply advanced numerical methods to solve initial and boundary value OD and PD problems using Finite Difference Method. Employ different types of singlestep and multistep Euler and Runge-Kutta numerical methods. [1PI-1a] [1L9S2]	25%	
Be able to analyze experimental and historical data in civil engineering practices and interpret results using advanced numeric methods and techniques. [1PI-6a] [1L9S2]	20%	

Relationship to Program Student Outcomes (Out of 100%)											
PI-1a	PI-2a	PI-2b	PI-2c	PI-2d	PI-3a	PI-4a	PI-4b	PI-5a	PI-6a	PI-6b	PI-7a
80									20		

Relationship to NQF Outcomes (Out of 100%)	
L9S1	L9S2
55	45

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