King Fahd University of Petroleum & Minerals

Department of Mathematics

MATH 333 Syllabus, Semester 252 (2026)

Instructor: Rajai Alassar (alassar@kfupm.edu.sa)

Office Hours: UTR 9:00-9:50 and 11:00-11:50 **Office Location:** 5-311

Course Code and Title: MATH333, Methods of Applied Mathematics I

Course Credit Hours: 3-0-3

Textbook: Advanced Engineering Mathematics by D. G. Zill (Sixth Edition), 2018.

Course Objective: The objective of the course is to introduce students to calculus of vector functions, Laplace and Fourier transforms, Fourier series, and partial differential equations.

Course Description: Special functions. Bessel's functions and Legendre polynomials. Vector analysis including vector fields, divergence, curl, line and surface integrals, Green's, Gauss' and Stokes' theorems. Sturm -Liouville theory. Laplace transforms. Fourier series and transforms. Introduction to partial differential equations and boundary value problems in rectangular, cylindrical and spherical coordinates.

Prerequisite: MATH 201 and (MATH 202 or MATH 208)

Course Learning Outcomes: Upon successful completion of the course, a student should be able to

1. Calculate the line integral along plane or space curves and the surface integral over surfaces in 3-space.
2. Compute different types of integrals using Green's, Stokes' and Divergence theorems.
3. Evaluate Laplace transform, inverse Laplace transform, and Fourier integral of a function.
4. Find Fourier series, Fourier cosine/sine series, Bessel and Legendre series of a function.
5. Evaluate eigenvalues and eigenfunctions for a Sturm-Liouville boundary-value problem.
6. Solve boundary-value problems for wave, heat, and Laplace equations in various coordinate systems by variable separable methods.
7. Use Laplace, inverse Laplace, Fourier, and inverse Fourier transforms to solve linear initial and boundary-value problems.

Grading Policy:

	Date	Time	Place	Material	Percentage
Exam I	TBA	TBA	TBA	Chapter 9	25%
Exam II	TBA	TBA	TBA	Chapters 4 and 12	25%
Final Exam	Announced by Registrar			Comprehensive	35%
Class Work					15%
Total					100%

- You need to bring some official physical ID to the exam hall.
- You are not allowed to possess any electronic devices during exams.
- The questions of the exams will be primarily based on your textbook.

Misconduct in Exams: Cheating in Exams: Cheating or attempting to cheat will result in a DN grade along with reporting the incident to the higher university administration. All KFUPM policies regarding ethics apply to this course. Please see the Undergraduate Bulletin on the Registrar's website.

Missing an Exam: If you miss an exam for a legitimate reason (such as medical emergencies), you must show an official excuse from Students Affairs.

Attendance: Students are expected to attend all classes.

- If a student misses a class, he/she is responsible for any announcements made in that class.
- Keep track of your attendance. As per the University policy, a DN grade is reported to any student who exceeds 9 unexcused absences or exceeds 15 whether excused or unexcused absences.

Usage of Mobile Phones in Class: Students are not allowed to use mobile phones for any purpose during class time. Students who wish to use electronic devices to take notes must ask for permission from the instructor.

Attributes & Skills: **https://math.kfupm.edu.sa/bsinmathematics/graduate-attributes .**

Coverage Plan

Week	Date	Section	Suggested Problems
1	Jan. 11-15	9.1 Vector Functions	4,6,14,15,20,22,23,26,29,32,36, 39,44,45,47,51
		9.5 Directional Derivative (Self Review-Math 201)	11, 20, 25
2	Jan. 18-22	9.7 Curl and Divergence	11,16,19,21,23,26,29,30,33,35, 37,41
		9.8 Line Integrals	4,6,10,16,20,23,24,28,30,34,38
3	Jan. 25-29	9.9 Independence of the Path	
		9.12 Green's Theorem	
4	Feb. 1-5	9.13 Surface Integrals	
5	Feb. 8-12	9.14 Stokes' Theorem	
		9.16 Divergence Theorem	
6	Feb. 15-19	4.1 Definition of the Laplace Transform	
		4.2 Inverse Transform and Transform of Derivatives	
Sunday, Feb 22: Saudi Founding Day			
Tuesday, Feb 24: Exam I			
7	Feb. 23-26	4.3 Translation Theorems	
		4.4 Additional Operational Properties	
8	Mar. 1-5	4.5 The Dirac Delta Function	
		12.1 Orthogonal Functions	
9	Mar. 8-12	12.2 Fourier Series	
		12.3 Fourier Cosine and Sine Series	
March 15-26 Eid Al-Fitr Holidays			
10	Mar. 29-Apr. 2	12.5 Sturm-Liouville Problem	
		12.6 Bessel and Legendre Series	
11	Apr. 5-9	12.6 Bessel and Legendre Series (continued)	
		13.1 Separable Partial Differential Equations	
Monday, Apr. 13: Exam II			
12	Apr. 12-16	13.3 Heat Equation	
		13.4 Wave Equation	
13	Apr. 19-23	13.5 Laplace's Equation	
		14.2 Problems in Cylindrical Coordinates	
14	Apr. 26-30	14.3 Problems in Spherical Coordinates	
		15.2 Applications of the Laplace Transform	
15	May 3-7	15.3 Fourier Integrals	
		15.4 Fourier Transforms	
16	May 10	Catching Up	