

King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 192

Coordinator: Dr. N.-e. Tatar, tatarn@kfupm.edu.sa

Course Code:	MATH 302
Title:	Engineering Mathematics
Textbook:	Advanced Engineering Mathematics (Fifth Edition) by D.G. Zill and W.S. Wright, International Edition. Elements of Electrodynamics , 6 th edition, by M. N. O. Sadiku, Oxford University Press.
Objectives:	This course is designed to expose electrical and other engineering students to some basic ideas in vector calculus, linear algebra and complex numbers.
Catalogue Description	Vector spaces and subspaces. Linear independence, basis and dimension. Solution of linear equations. Orthogonality. Eigenvalues and eigenvectors. Vector calculus including vector fields, gradient, divergence, curl, line and surface integrals, Green's theorem, Gauss' and Stokes' theorems. Introduction to complex variables.

Grading Policy

Major Exam I: 25% (75 points)	Material: 7.6-8.12 Feb. 26, 2020, Location and time: TBA
Major Exam II: 25% (75 points)	Material: 9.9 (Zill), Ch 2, Ch 3, 4.7, 4.8, 9.9, 17.1-17.5 April 1st, 2020, Location and time: TBA
Final Exam: 35% (105 points)	Comprehensive. May 02, 2020 at 1pm
Class Work: 15% (45 points)	Quizzes + Attendance + HMWs

No makeup exam will be given under any circumstance. When a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on an existing formula, which depends on his performance in the non-missed exam and in the final exam.

Attendance: compulsory. KFUPM policy regarding attendance will be strictly enforced.

A DN grade will be awarded to any student who accumulates 9 unexcused absences.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by your instructor.

Learning Outcomes: Math 302 Engineering Mathematics

Upon completing this course student should be able to

1. Define a vector space, subspace, basis and dimension of a vector space and spanning set.
2. Solve systems of linear algebraic equations.
3. Compute eigenvalues, eigenvectors and inverse of a square matrix and rank of a matrix.
4. Construct an orthogonal matrix using eigenvectors of a symmetric matrix.
5. Evaluate simple line and surface integrals.
6. Apply the fundamental vector calculus integral theorems of Green, Stokes' and divergence to line and surface integrals.
7. Manipulate and calculate with complex numbers and complex functions including polynomials, roots and arguments, trigonometric, hyperbolic, exponential and logarithmic functions.
8. Identify analytic and harmonic functions.
9. Apply the Cauchy-Goursat theorem and Cauchy's integral formula to line integrals.
10. Calculate the Taylor and Laurent series of a function of a complex variable about a given point.
11. Compute residues and integrals using the Residue theorem.

TBA = To be announced.

Wk	Date	Sec.	Material	Homework
1	Jan. 19-23	7.6	Vector Spaces (<i>restricted to \mathbb{R}^n only</i>)	1, 2, 3, 22, 23,26
2	Jan. 26-30	8.2	Systems of Linear Algebraic Equations	1,6, 7, 10, 12,
		8.3	Rank of a Matrix	4, 8,9, 10, 14
3	Feb. 02-06	8.6	Inverse of a Matrix (<i>only using Theorem 8.6.4</i>)	1,2,19,25,28,30, 51,52
		8.8	The Eigenvalue Problem	1,6, 8,16,20
4	Feb. 09-13	8.10	Orthogonal Matrices (<i>excluding example 4</i>)	5,6,8,9,16, 18 1,2,4,12, 14, 26, 28
		8.12	Diagonalization (<i>excluding example 6</i>)	
5	Feb. 16-20	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
6	Feb. 23-27	Ch 3	Line, Surface and Volume Integrals Gradient	3.3, 3.4, 3.5, 3.8 3.10, 3.11
			Feb. 06: Major 1	
7	Mar. 01-05	Ch 3	Stokes' Theorem, Divergence Theorem The Laplacian	3.14, 3.22, 3.23, 3.26, 3.33 3.38, 3.39, 3.41
8	Mar. 08-12	9.9 Ch	Independence of Path Calculation of Potential	2,4,5,9,13,19,25
		4.7	Application: Electric Potential	Examples 4.11, 4.12(b)
9	Mar. 15-19	17.1	Complex Numbers	2,4,6, 18, 30, 34,40
		17.2	Powers and Roots	6,8,12,16,33,34
		17.3	Sets in the Complex Plane	4,5,8,23

10	Mar. 22-26	17.4	Functions of a Complex Variable	6,8,10,12,14,21,28
		17.5	Cauchy-Riemann Equations	1,2,4,5,6,8,22
		17.6	Exponential and Log. Functions	2,4,8,13, 28,32, 47
11	Mar. 29- Apr. 02	17.7	Trigonometric and Hyperbolic Functions	6,8,10, 16
		18.1	Contour Integrals (excluding Theorem 18.1.3)	1,3,6,7,9
			Apr. 01: Major 2	
12	Apr. 05-09	18.2	Cauchy-Goursat Theorem	2,4,5,8,12,15
		18.4	Cauchy's Integral Formulas	3,4,8, 10,14,23
13	Apr. 12-16	19.2	Taylor Series (<i>Definition & Examples</i>)	2,4,6,12
		19.3	Laurent Series (<i>Definition & Examples</i>)	2,6,10,21,25,26,27,28
		19.4	Zeros and Poles	2,4,6,8,10,14,16
14	Apr. 19-23	19.5	Residues and Residue Theorem	1,2,8,10,22, 24
15	Apr. 26-30	19.6	Evaluation of Real Integrals	4,11,12,32
			Review/Catch up	