

King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 191

Coordinator: Dr. Izhar Ahmad, drizhar@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% (100 points)	Material: 7.6-8.12 Oct. 09, 8.30-10.30PM, B#57
Major Exam II: 25% (100 points)	Material: 9.9(Zill), Ch 2, Ch 3, 4.7, 4.8 Nov. 13, B#54, 8.30-10.30PM
Final Exam: 35% (140 points)	Comprehensive. Follow the registrar final schedule on his webpage.
Class Work: 15% (60 points)	Quizzes + HW + Attendance

Attendance: compulsory. KFUPM policy regarding attendance will be strictly enforced. A DN grade will be awarded to any student who accumulates 9 unexcused absences.

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.

Wk	Date	Sec.	Material	Homework
1	Sept 01 – 05	7.6	Vector Spaces (<i>restricted to \mathbb{R}^n only</i>)	1, 2, 3, 22, 23,26
2	Sept 08-12	8.2	Systems of Linear Algebraic Equations	1,6, 7, 10, 12
		8.3	Rank of a Matrix	4, 8,9, 10, 14
3	Sept. 15-19	8.6	Inverse of a Matrix (<i>only using Theorem 8.6.4</i>)	1,2,19,25,28,30, 51,52 1,6, 8,16,20
		8.8	The Eigenvalue Problem	
4	Sept 22 & Sept24-26	8.10	Orthogonal Matrices (<i>excluding example 4</i>)	5,6,8,9,16, 18
		8.12	Diagonalization (<i>excluding example 6</i>)	1,2,4,12, 14, 26, 28
September 23 National Day Holiday				
Major 1: October 09				
5	Sept29-30& Oct 01-03	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
6	Oct 06-10	Ch 3	Line, Surface and Volume Integrals Gradient	3.3, 3.4, 3.5, 3.8 3.10, 3.11
7	Oct 13-17	Ch 3	Stokes's Theorem, Divergence Theorem The Laplacian	3.14, 3.22, 3.23, 3.26, 3.33 3.38, 3.39, 3.41
8	Oct 20-24	9.9	Independence of Path	2,4,6,12,15,22,25
		Ch 4	Calculation of Potential Application: Electric Potential	Examples 4.11, 4.12(b)

9	Oct 27-31	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
Major 2: November 13				
10	Nov 03-07	17.4	Functions of a Complex Variable	6,8,10,12,14,21,28,32
		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	Nov 10-14	17.7	Trigonometric and Hyperbolic Functions	6,8,10, 16
		18.1	Contour Integrals <i>(excluding Theorem 18.1.3)</i>	1,3,6,7,9
12	Nov 17-21	18.2	Cauchy-Goursat Theorem	2,4,5,8,12,15
		18.4	Cauchy's Integral Formulas	3,4,8, 10,14, 23
13	Nov 24-28	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	Dec 01-05	19.5	Residues and Residue Theorem	1,2,8,10,22, 24
15	Dec 08-12	19.6	Evaluation of Real Integrals Review/Catch up	14,11,12,32

Final Exam (Comprehensive): Follow the registrar final schedule on his webpage.