

King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 153

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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: 9.9, Ch 2, Ch 3, 4.7, 4.8 Time: July 27, 10:30-13:30pm & Venue: 59-1010
Major Exam II: 25% (100 points)	Material: 7.6-8.12 Time: Aug 10, 10:30-12:30pm & Venue: Bldg 59-1010
Final Exam: 35% (140 points)	Comprehensive; Time: Aug 31, 8:00-11:00am.
Class Work: 15% (60 points)	Quizzes + Homework + 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.

TBA = To be announced.

WK	Date	Sec.	Material	Exercises
1	July 11 – 14	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
		Ch 3	Line, Surface and Volume Integrals Gradient	3.3, 3.4, 3.5, 3.8 3.10, 3.11
2	July 17 – 21	9.9	Indepndence of Path	2,4,6,12,15,22,25
		4.7, 4.8 Ch 3	Application: Electric Potential Stokes's Theorem, Divergence Theorem The Laplacian	Examples 4.11, 4.12(b) 3.14, 3.22, 3.23, 3.26, 3.33 3.38, 3.39, 3.41
3	July 24-28	7.6	Vector Spaces (<i>restricted to \mathbb{R}^n only</i>)	1, 2, 3, 22, 23, 26
		8.2	Systems of Linear Algebraic Equ.	1,6, 7, 10, 12
		8.3	Rank of a Matrix	4, 8,9, 10, 14
Major I: July 27 Material: Week 1-2				
4	July 31- August 4	8.6	Inverse of a Matrix (<i>only using Theorem 8.6.4</i>)	1,2,4,12, 14, 26, 28
		8.8	The Eigenvalue Problem	1,6, 8,16,20
		8.10	Orthogonal Matrices (<i>excluding example 4</i>)	
		8.12	Diagonalization (<i>excluding example 6</i>)	1,2,4,12, 14, 26, 28
5	August 7-11	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
		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
6	August 14-18	17.6	Exponential and Log. Functions	2,4,8,13, 28,32, 47
		17.7	Trigonometric and Hyperbolic Functions	6,8,10, 16
		18.1	Contour Integrals (excluding Theorem 18.1.3)	1,3,6,7,9
		18.2	Cauchy-Goursat Theorem	2,4,5,8,12,15
		18.4	Cauchy's Integral Formulas	3,4,8, 10,14, 23

Major Exam II: Aug 10, Material: 7.6 – 8.12

7	August 21-25	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
		19.5	Residues and Residue Theorem	1,2,8,10,22, 24
		19.6	Evaluation of Real Integrals	4,11,12,32
8	August 28-29		Review/Catching up	

Final Exam: Aug 31, 8:00-11:00am(Comprehensive)

Homework problems will be assigned during the class or on the Blackboard.