

King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 152

Coordinator: Dr. Nadeem A. Malik, namalik@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)	Feb 14, 2016 Material: 7.6 – 9.5; time and venue TBD.
Major Exam II: 25% (100 points)	April 6, 2016 Material: 9.6 – 17.6; time and venue TBD.
Final Exam: 35% (140 points)	May, 2016 Comprehensive; time, date and venue TBD.
Class Work: 15% (60 points)	Quizzes + Homework + Attendances

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.

TBD = To be decided.

Week	Date	Sec.	Material	Homework
1	January 17 – 21	7.6	Vector Spaces (<i>restricted to \mathbb{R}^n only</i>)	1*, 2*, 3*, 22*, 23*, 26*
2	January 24 – 28	8.2 8.3	Systems of Linear Algebraic Equations Rank of a Matrix	1*, 6, 7*, 10*, 12* 4*, 8*, 9*, 10, 14*
3	January 31- February 4	8.6 8.8	Inverse of a Matrix (<i>only using Theorem 8.6.4</i>) The Eigenvalue Problem	1*, 2, 19*, 25*, 28, 3 0*, 51, 52*
4	February 7- 11	8.10 8.12	Orthogonal Matrices (<i>excluding example 4</i>) Diagonalization (<i>excluding example 6</i>)	5*, 6, 8*, 16*, 20 1, 2*, 4, 12, 14*, 26, 28*

[Chapter 9, below, will be replaced by Chapters 1-3 from M. Sadiku's text book]

5	February 14-18	9.1 9.5	Vector Functions Directional Derivatives	
6	February 21 – 25	9.6 9.7 9.8	Tangent Planes and Normal Lines Curl and Divergence Line Integrals	Questions to be decided.

Major Exam I: Wednesday, February 24, 2016 at TBD, Loc.: TBD, Material: 7.6 – 9.5

Midterm Vacation: March 13 - 17, 2016

7	February 28 – March 3	9.9 9.12	Independence of Path Green's Theorem	
8	March 6 – 10	9.13 9.14	Surface Integrals Stoke's Theorem	
9	March 20 – 24	9.16	Divergence Theorem	

		17.1	Complex Numbers	2*,4*,6, 18*, 30*, 34*,40
10	March 27 – 31	17.2	Powers and Roots	6*,8*,12,16,33*,3
		17.3	Sets in the Complex Plane	4*
		17.4	Functions of a Complex Variable	4*,5*,8*,23 6*,8*,10*,12*,14,2 1*,28,32*
11	April 3 – 7	17.5	Cauchy-Riemann	1*,2*,4*,5,6*,8,22
		17.6	Equations Exponential and Log. Functions	* 2*,4,8*,13*, 28*,32*, 47*

Major Exam II: Wednesday, April 6, 2016 at TBD, Loc.: TBD, Material: 9.6 – 17.6

12	April 10 – 14	17.7	Trigonometric and	6,8*,10*, 16*
		18.1	Hyperbolic Functions Contour Integrals (excluding Theorem 18.1.3)	1,3,6*,7*,9*
13	April 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
14	April 24 – 28	19.2	Taylor Series (<i>Definition &</i>	2*,4*,6*,12
		19.3	<i>Examples</i>)	2*,6*,10*,21*,25*,
		19.4	Laurent Series (<i>Definition</i> & <i>Examples</i>)	26,27*,28* 2*,4*,6*,8*,10*,14 *,16*
15	May 1 – 3	19.5	Residues and Residue	1*,2*,8*,10*,22*,
		19.6	Theorem Evaluation of Real Integrals	24 4*,11*,12*,32*
16	May 5		Review/Catching up	

Final Exam: To Be Decided (Comprehensive)

Homework problems with * should be submitted for grading.