King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 162

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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**, 6th 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** **March 09 & Venue: TBA**
Major Exam II: 25% (100 points)	Material: **9.9(Zill), Ch 2, Ch 3, 4.7, 4.8** **April 18 & Venue: TBA**
Final Exam: 35% (140 points)	Comprehensive. **TBA**
Class Work: 15% (60 points)	Quizzes + 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**	**Homework**
1	Feb. 05 – 09	7.6	Vector Spaces *(restricted to* $\mathbb{R}n$ *only)*	1, 2, 3, 22, 23,26
2	Feb. 12-16	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. 19-23	8.6	Inverse of a Matrix	1,2,19,25,28,30, 51,52
			(only using Theorem 8.6.4)	1,6, 8,16,20
		8.8	The Eigenvalue Problem	
4	Feb.26-March 02	8.10	Orthogonal Matrices *(excluding example 4)*	5,6,8,9,16, 18
		8.12	Diagonalization *(excluding example 6)*	1,2,4,12, 14, 26, 28
			Major 1: March 09	
5	March 05-09	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
6	March 12-16	Ch 3	Line, Surface and Volume Integrals	3.3, 3.4, 3.5, 3.8
			Gradient	3.10, 3.11
7	March 19-23	Ch 3	Stokes's Theorem, Divergence Theorem	3.14, 3.22, 3.23, 3.26, 3.33
			The Laplacian	3.38, 3.39, 3.41
8	March 26-30	9.9	Independence of Path	2,4,6,12,15,22,25
		Ch 3	Calculation of Potential	
			Application: Electric Potential	Examples 4.11, 4.12(b)

9	April 9-13	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: April 18	
10	April 16-20	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	April 23-27	17.7	Trigonometric and Hyperbolic Functions	6,8,10, 16
		18.1	Contour Integrals *(excluding Theorem 18.1.3)*	1,3,6,7,9
12	April 30-May 4	18.2	Cauchy-Goursat Theorem	2,4,5,8,12,15
		18.4	Cauchy's Integral Formulas	3,4,8, 10,14, 23
13	May 7-11	19.2	Taylor Series *(Definition & Examples)*	2,4,6,12
		19.3	Laurent Series *(Definition & Examples)*	2,6,10,21,25,26,27,28
		19.4	Zeros and Poles	2,4,6,8,10,14,16
14	May 14-18	19.5	Residues and Residue Theorem	1,2,8,10,22, 24
15	May 21-25	19.6	Evaluation of Real Integrals	14,11,12,32
			Review/Catch up	

Final Exam (Comprehensive): May 27, 2017