King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics

MATH 302: Syllabus – Term 171

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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** **October 25 (5:45 to 7:45pm) & Venue: TBA**
Major Exam II: 25% (100 points)	Material: **9.9 (Zill), Ch 2, Ch 3, 4.7, 4.8, 9.9, 17.1-17.3** **November 27 (5:45 to 7:45pm) & Venue: TBA**
Final Exam: 35% (140 points)	Comprehensive. **Jan. 01, 2018 at 8:00am**
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	Sept. 17-21	7.6	Vector Spaces *(restricted to* $\mathbb{R}n$ *only)*	4,6,7,23,25
			Sept. 24: National Day Holiday	
2	Sept. 24-28	8.2	Systems of Linear Algebraic Equations	5,8,14,16
		8.3	Rank of a Matrix	3,7,13,15,16
3	Oct. 01-05	8.6	Inverse of a Matrix *(only using Theorem 8.6.4)*	18,21,27,47,50,53
		8.8	The Eigenvalue Problem	3,4,5,18
			Oct. 07: Normal Sunday Classes	
4	Oct. 08-12	8.10	Orthogonal Matrices *(excluding example 4)*	2,4,7,18,19
		8.12	Diagonalization *(excluding example 6)*	6,16,23,26,35
5	Oct. 15-19	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
			Major 1: October 25	
6	Oct. 22-26	Ch 3	Line, Surface and Volume Integrals	3.3, 3.4, 3.5, 3.8
			Gradient	3.10, 3.11

7	Oct 29- Nov. 02	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	Nov. 05-09	9.9 Ch 3	Independence of Path Calculation of Potential Application: Electric Potential	3,6,8,14,20,26 Examples 4.11, 4.12(b)
9	Nov. 12-16	17.1 17.2 17.3	Complex Numbers Powers and Roots Sets in the Complex Plane	3,7,24,29,32,37,39 10,14,18,32,33 6,8,12,16,25
10	Nov. 19-23	17.4 17.5 17.6	Functions of a Complex Variable Cauchy-Riemann Equations Exponential and Log. Functions	5,14,22,34,36 2,4,7,10,16,18,26 6,16,26,34,38,41
			Major 2: November 27	
11	Nov. 26-30	17.7 18.1	Trigonometric and Hyperbolic Functions Contour Integrals *(excluding Theorem 18.1.3)*	4,7,8,12,16,22 2,4,9,12,20,23,34
12	Dec. 03-07	18.2 18.4	Cauchy-Goursat Theorem Cauchy's Integral Formulas	1,6,9,14,17 2,12,15,20
13	Dec. 10-14	19.2 19.3 19.4	Taylor Series *(Definition & Examples)* Laurent Series *(Definition & Examples)* Zeros and Poles	3,6,25,30 4,6,8,12,22,24,27 2,5,8,10,12,15,22
14	Dec. 17-21	19.5	Residues and Residue Theorem	4,6,12,16,18,21,26
15	Dec. 24-28	19.6	Evaluation of Real Integrals Review/Catch up	13,16,24,32