King Fahd University of Petroleum & Minerals

Department of Mathematics and Statistics
MATH 302: Syllabus – Term **163**

Coordinator: Dr. Mohammad Kafini

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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)	Tuesday, Jul. 25 (19:00 – 21:00)	(7.6-8.12)+Ch.2
Major Exam II	25% (100 points)	Wednesday, Aug. 9 (19:00 – 21:00)	Ch.3+(**9.9-**17.3)
Final Exam	35% (140 points)	Monday, Aug. 21 (19:00 – 22:00)	Comprehensive
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 8 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.

Material Distribution:

Week	Date	Sec.	Material	HW
1	Jul. 9-13	7.6	Vector Spaces *(restricted to $\mathbb{R}^n$ only)*	1, 2, 3, 22, 23,26
		8.2	Systems of Linear Algebraic Equations	1,6, 7, 10, 12
		8.3	Rank of a Matrix	4, 8,9, 10, 14
		8.6	Inverse of a Matrix (only using Theorem 8.6.4)	1,2,19,25,28,30, 51,52
		8.8	The Eigenvalue Problem	1,6, 8,16,20
2	Jul. 16-20	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
		Ch.2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
Exam 1: Tuesday, Jul. 25th (19:00 – 21:00) (7.6-8.12)+Ch.2				
3	Jul. 23-27	Ch.3	Line, Surface and Volume Integrals Gradient	3.3, 3.4, 3.5, 3.8 3.10, 3.11
		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
4	Jul.30- Aug.3	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)
		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
Exam 2: Wednesday, Aug. 9th (19:00 – 21:00) Ch.3+(9.9-17.3)				
5	Aug. 6-10	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
		17.7	Trig. 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
6	Aug. 13-17	18.4	Cauchy's Integral Formulas	3,4,8, 10,14, 23
		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
		19.5	Residues and Residue Theorem	1,2,8,10,22, 24
		19.6	Evaluation of Real Integrals	14,11,12,32
7	Aug. 20		Review/Catch up	