King Fahd University of Petroleum & Minerals

Department of Mathematics

MATH 302: Syllabus – Term 212

Coordinator/Instructor: Dr. Mohammad Kafini, mkafini@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**, 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

Exam I : 25% (75 points) Material: **7.6- 8.12** Date: **Wednesday 23 Feb, 2022.**
Exam II : 25% (75 points) Material: **Ch. 2- 17.5** Date: **Wednesday 23 Mar, 2022.**
Final Exam : 35% (105 points) Comprehensive Date: **TBA**
Class Work : 15% (45 points) HW, Attendance, quizzes.
Interval for CW should be in [31.5, 33.75] which is [70%, 75%] of 45 points.
Exam Questions: The questions of the exams are based on the examples, homework problems, and exercises in the textbook.
Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from Students Affairs. Otherwise, he will get zero in the missed exam.
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 vector space, subspace, basis, dim and spanning of a vector space.
2. Compute eigenvalues, eigenvectors, inverse, and rank of matrices.
3. Construct an orthogonal matrix using eigenvectors of a symmetric matrix.
4. Compute different types of integrals using Green's, Stokes' and Divergence theorems
5. Explain geometry of a complex plane and state properties of analytic functions.
6. Calculate the Taylor and Laurent series of a function of complex variable about a given point.
7. Compute integrals using Cauchy-Goursat theorem, Cauchy's integral formula and Residue theorem.

The Pacing Schedule

WK#	Date	SEC	Material	HW
1	Jan 16-20	7.6	Vector Spaces *(restricted to $\mathbb{R}^n$ only)*	1, 2, 3, 22, 23,26
2	Jan 23-27	8.2	Systems of Linear Algebraic Equations	1,6, 7, 10, 12
		8.3	Rank of a Matrix	4, 8,9, 10, 14
3	Jan 30- Feb 03	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 06- 10	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
5	Feb 13- 17	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
6	Feb 20-24	Ch 3	Line, Surface and Volume Integrals	3.3, 3.4, 3.5, 3.8
			Gradient	3.10, 3.11
7	Feb 27- Mar 03	Ch 3	Stokes's Theorem,	3.14, 3.22, 3.23, 3.26, 3.33
			Divergence Theorem, The Laplacian	3.38, 3.39, 3.41
8	Mar 06- 10	9.9	Independence of Path	2,4,6,12,15,22,25
		Ch 4	4.7 Calculation of Potential	
			Application: Electric Potential	Examples 4.11, 4.12(b)
9	Mar 13- 17	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
10	Mar 20-24	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	Mar 27-31	17.7	Trigonometric and Hyperbolic Functions	6,8,10, 16
		18.1	Contour Integrals *(excluding Thm 18.1.3)*	1,3,6,7,9
12	Apr 03-07	18.2	Cauchy-Goursat Theorem	2,4,5,8,12,15
		18.4	Cauchy's Integral Formulas	3,4,8, 10,14, 23
13	Apr 10- 14	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	Apr 17-21	19.5	Residues and Residue Theorem	1,2,8,10,22, 24
			Eid Al-Fitr Holidays, April 24-May 07	
15	May 08-12	19.6	Evaluation of Real Integrals	14,11,12,32

Final Exam (Comprehensive): Follow the registrar final schedule on his webpage.