

# King Fahd University of Petroleum & Minerals

Department of Mathematics

## MATH 302: Syllabus – Term 211

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<b>Course Code:</b>	MATH 302
<b>Title:</b>	Engineering Mathematics
<b>Textbook:</b>	<b>Advanced Engineering Mathematics</b> (Fifth Edition) by D.G. Zill and W.S. Wright, International Edition. <b>Elements of Electromagnetics</b> , 6 <sup>th</sup> edition, by M. N. O. Sadiku, Oxford University Press.
<b>Objectives:</b>	This course is designed to expose electrical and other engineering students to some basic ideas in vector calculus, linear algebra and complex numbers.
<b>Catalogue Description</b>	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.

### Learning Outcomes: Math 302 Engineering Mathematics

Upon completing this course student should be able to:

1. Define vector space, subspace, basis, dimension and spanning set 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.

### Weekly Distribution of the Material

Wk	Date	Sec.	Material	Homework
1	Aug.29-Sept. 02	7.6	Vector Spaces ( <i>restricted to <math>\mathbb{R}^n</math> only</i> )	1, 2, 3, 22, 23,26
2	Sept. 05-09	8.2	Systems of Linear Algebraic Equations	1,6, 7, 10, 12,
		8.3	Rank of a Matrix	4, 8,9, 10, 14
3	Sept.12-16	8.6	Inverse of a Matrix ( <i>only using Theorem 8.6.4</i> )	1,2,19,25,28,30, 51,52
		8.8	The Eigenvalue Problem	1,6, 8,16,20
4	Sept.19-22	8.10	Orthogonal Matrices ( <i>excluding example 4</i> )	5,6,8,9,16, 18
		8.12	Diagonalization ( <i>excluding example 6</i> )	1,2,4,12, 14, 26, 28

**Sept 23, 2021: The National**

			<b>Day Holiday</b>	
5	Sept. 26-30	Ch 2	Cylindrical and spherical Coordinates	2.5, 2.7, 2.17, 2.18, 2.19, 2.20
6	Oct. 3-7	Ch 3	Line, Surface and Volume Integrals Gradient	3.3, 3.4, 3.5, 3.8 3.10, 3.11
			<b>Oct.06, Major I</b>	
7	Oct 10-14	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
			<b>Oct.17,2021, Student Break</b>	
8	Oct. 18-21	9.9 Ch 4.7, 4.8	Independence of Path Calculation of Potential Application: Electric Potential	2,4,5,9,13,19,25  Examples 4.11, 4.12(b)
9	Oct. 24-28	17.1 17.2 17.3	Complex Numbers Powers and Roots Sets in the Complex Plane	2,4,6, 18, 30, 34,40 6,8,12,16,33,34 4,5,8,23
10	Oct.31-Nov.04	17.4 17.5 17.6	Functions of a Complex Variable Cauchy-Riemann Equations Exponential and Log. Functions	6,8,10,12,14,21,28 1,2,4,5,6,8,22 2,4,8,13, 28,32, 47
11	Nov. 07- 11	17.7  18.1	Trigonometric and Hyperbolic Functions Contour Integrals <i>(excluding Theorem 18.1.3)</i>	6,8,10, 16  1,3,6,7,9
			<b>Nov. 10, Major II</b>	
12	Nov. 14- 18	18.2 18.4	Cauchy-Goursat Theorem Cauchy's Integral Formulas	2,4,5,8,12,15 3,4,8, 10,14,23
13	Nov. 21- 25	19.2 19.3 19.4	Taylor Series ( <i>Definition &amp; Examples</i> ) Laurent Series ( <i>Definition &amp; Examples</i> ) Zeros and Poles	2,4,6,12 2,6,10,21,25,26,27,28 2,4,6,8,10,14,16
			<b>Midterm Break: Nov.28-Dec.02</b>	
14	Dec.5-9	19.5	Residues and Residue Theorem	1,2,8,10,22, 24
15	Dec. 12-16	19.6	Evaluation of Real Integrals	4,11,12,32
16	Dec.19-20		Review/Catch up	<b>Normal Thursday Class</b>

## Grading Policy:

### Exam I:

25% (75 points) **Material: 7.6-8.12,**  
**Oct. 06, 2021, Location and Time:**

**Exam II:** 25% (75 points) 9.9 (Zill), Ch 2, Ch 3, 4.7, 4.8, 9.9, 17.1-17.5  
**Nov. 10, 2021, Location and Time: TBA**

**Final Exam:** 35% (900 points) Comprehensive TBA

**Class Work:** 15% (45 point) It is based on quizzes, HWs, and other class activities.  
The average  $x$  (out of 45) of the class work of each section should be in the interval  $[31.5, 33.75]$  ([70%, 75%] of the class work grade).

**The total grade** is out of 300.

**Exam Questions:** The questions of the exams are based on the examples, homework problems, and exercises in the textbook.

**Misconduct in Exams:** Cheating or attempting to cheat will result in a grade of **F** in the course, along with reporting the incident to the higher university administration. Cheating in exams includes (but is not limited to) receiving help from anyone or any other outside source, disabling webcams, and unauthorized use of books, course notes, calculators, phones, or websites.

**Attendance:** Compulsory. KFUPM policy regarding attendance will be strictly enforced. A **DN** grade will be awarded to any student who accumulates 9 unexcused absences.

**TBA** = To be announced.