King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 302 Syllabus, Term 183

Coordinator/Instructor: Dr. Muhammad Yousuf

The Course Code and Name: Math 302, Engineering Mathematics

The Course Credit Hours: 3-0-3

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.

The Course Objective: This course is designed to expose electrical and other engineering students to some basic ideas in vector calculus, linear algebra and complex numbers.
The Course Content: 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.

The Course Prerequisite: One year preparatory mathematics or its equivalent.

The Course Learning Outcomes: 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.

The Course Grading Policy:

	Date	**Time**	**Place**	**Materials**	**Percentage**
Exam I (MCQ)	June 27	05 – 08 pm		7.6 – 8.12	25% (100 pts)
Exam II (MCQ)	July 11	05 – 08 pm		9.9, Ch2, Ch3	25% (100 pts)

				Ch 4 (4.7), 9.9, 17.1 – 17.4	
Final Exam (MCQ)	July 31	07:30 – 10:30 am		Comprehensive	35% (140 pts)
Homework	Homework for all the sections covered in a week is due on Sunday of the next week.				5% (20 pts)
Class Work	▪ It is based on quizzes.				10% (40 pts)

The Course Passing Grade: A student must score at least 50% (200/400) to pass the course.

Upgrade Policy: The upgrade policy is applied when 4 points out of 400 are needed to get the next higher grade. For instance, the passing grade (D) starts at 200/400. If a student gets 198/400 or 199/400, then his grade will be automatically upgrade to D. However, if a student gets 197/400 or 196/400, his grade will be upgraded to D only if his final exam score is greater than or equal 200/400 (70/140).

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

Cheating in Exams: Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud 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)

- Looking at the papers of other students
- Talking to other students
- Using mobiles or any other electronic devices

Missing an Exam:

Exam I or II: No make-up exam will be given under any circumstances. In case a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula which depends of his performance in the non-missed exam and in the final exam.

Final Exam: If a student misses the final exam for a legitimate reason (such as medical emergencies), he will be given a make-up final exam.

Attendance: Students are expected to attend all lecture classes.

- If a student misses a class, he is responsible for any announcement made in that class.
- A DN grade will be awarded to any student who accumulates
  - 8 unexcused absences in lecture classes.
  - 13 excused and unexcused absences in lecture classes.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by your instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.

The Pacing Schedule

Week	Date	Sec.	Material	Homework
1	June 09 – 13	7.6 8.2 8.3 8.6	The Vector Spaces $\mathbb{R}^n$ only System of Linear Algebraic Equations Rank of a Matrix Inverse of a Matrix (Using only Theorem 8.6.4)	1, 3, 22, 23, 26 1, 7, 12 8, 9, 10, 14 1, 2, 19, 30, 52
2	June 16 – 20	8.8 8.10 8.12	Eigenvalue Problem Orthogonal Matrices (excluding example 4) Diagonalization	1, 8, 16, 20 5, 8, 9, 16 2, 14, 28
3	June 23 – 27	Ch 2 Ch 3	Cartesian, Cylindrical and spherical Coordinates Line, Surface and Volume Integrals	2.5, 2.7, 2.17, 2.18, 2.19, 2.20 3.3, 3.4, 3.5, 3.8, 3.10, 3.11
4	June 30 – July 04	Ch 3 9.9 Ch 4 (4.7)	Stokes's Theorem, Divergence Theorem, The Laplacian Independence of Path Calculation of Potential Application: Electric Potential	3.14, 3.22, 3.23, 3.26, 3.33, 3.38, 3.39, 3.41 2, 4, 6, 12, 15, 22, 25, 26 Examples 4.11, 4.12(b)
5	July 07 – 11	17.1 17.2 17.3 17.4 17.5	Complex Numbers Powers and Roots Sets in complex planes Functions of a Complex Variable Cauchy Riemann Equations	2, 4, 6, 18, 30, 34, 40 6, 8, 12, 16, 33, 34 4, 5, 8, 23 6, 8, 10, 12, 14, 21, 32 1, 2, 4, 5, 6, 8, 22
6	July 14 – 18	17.6 17.7 18.1 18.2	Exponential and Log. Function Trigonometric and Hyperbolic Functions Contour Integrals Cauchy- Goursat Theorem	2, 4, 8, 13, 28, 32, 47 6, 8, 10, 16 1, 3, 6, 7, 9 2, 4, 5, 8, 15
7	July 21 – 25	18.4 19.2 19.3 19.4 19.5	Cauchy Integral Formula Taylor Series Laurent Series Zeros and Poles Residue Theorem	3, 4, 8, 10, 14 2, 4, 6, 12 2, 6, 21, 26, 28 2, 4, 6, 10, 16 1, 2, 8, 10, 22
8	July 28 – 29	19.6	Evaluation of Real Integrals	4, 11, 12, 32

Please let me know if there is any mistake or error in the syllabus.