East West University

Department of Mathematical and Physical Sciences

Semester: Spring 2025

Course Outline: MAT 205

Course Title : **Linear Algebra and Complex Variables**
Course Code : MAT 205
Prerequisite : MAT 101 and MAT 102
Credit Hour : 3
Course Instructor : Md. Anowar Hossain, Assistant Professor, Dept. of MPS.
Office Room : Room: FUB-1004, 9th Floor.
E-mail Address : anowar.hossain@ewubd.edu
Class Hours :

Section	Days	Time	Room No.
10	TR	11:50 am - 01:20 pm	FUB-803

Office Hours:

Days	Time
Tuesday	01:30 pm-03:00 pm
Thursday	01:30 pm-03:00 pm

Course Goal: For the students of any branch of science, knowledge of Mathematics is essential. Linear Algebra develops the basic concept on matrix, determinant, vector space, linear transformation and some other important topics, which will help the students to develop the analytical ability. Theories of Complex Variables are very important for all branches of Science and Engineering. This will help in developing the theories of Laplace Transformation, Fourier series and Fourier Transformation.

Course Learning Outcomes: At the end of this course, students will be able to

1. solve systems of linear equation by differnent methods using matrix (including inverse and factorization of matrix) and can able to use the solution in differnt applications.
2. use different matrices in applied fields.
3. know detail about real vector spaces and subspaces.
4. find out eigenvalues, eigenvectors and also find out bases of eigenspaces.

5. understand linear transformation of vectors from a vector space to other vector space.
6. know about complex number system, complex variable, complex function
7. understand Cauchy-Riemann equations and calculate complex conjugate function using these equations.
8. know about complex integration and use Cauchy's integral formalae.

Course Contents **:** 1. Linear Algebra
2. Complex Variables

Description : The following topics will be covered throughout the semester.

Linear Algebra: Matrices and operations with matrices, Systems of linear equations, Vector spaces, Linear independences, Basis and dimension, Linear transformations, Eigenvalues and eigenvectors, Diagonalization of matrices, Orthogonal sets and least square approximation, QR-decomposition, LU-decomposition, Applications.

Complex Variables: Functions of a complex variable and their derivatives; Analytic function; Singularities; Cauchy integral theorem and formula; Power series and Laurent expansions; Calculus of residues and contour integrals; Applications.

Text Book **:** (a) Elementary Linear Algebra-Applications Version, Howard Anton, Chris Rorres, 11th Edition, Wiley-India.
(b) Theory and Problems of Complex Variables, Murray R Spiegel, Seymour Lipschutz, Schaum's Outline Series, Second Edition, McGraw-Hill.

Reference Book **:** (a) Complex Variables and Its Applications - R. V. Churchill
(b) Experiments in Computational Matrix Algebra - David R. Hill
(c) Higher Engineering Mathematics- Grewel (36 th edition)

Term Examinations:

Examinations	Dates
Mid Term	10 April (Thursday)
Final	27 May (Tuesday)

Score Distribution:

Assessment Tools	Marks
1. Class Test/ Quiz	20
2. Class Attendance/Performance	10
3. Assignment/Presentation/Viva	10
4. Mid Exam	30
5. Final Exam	30

Grading Policy:

Numerical Scores	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
J S% to less than 50%	C	2.25
JO% to less than 45%	D	2.00
Less than 40%	F	0.00

Special Instructions:

♣ Students are requested to silent their mobile phone during the class hour.

♣ There is zero tolerance for cheating at EWU. Students caught with cheat sheets in their possession, whether used or not used, &/or copying from cheat sheets, writings on the palm of hand, back of calculators, chairs or nearby walls, etc. would be treated as cheating in the exam hall. The only penalty for cheating is expulsion from EWU.

Md. Anowar Hossain