

**DEPARTMENT OF MATHEMATICS,
UNIVERSITY OF KARACHI,
Course Outline
MATH 301: ALGEBRA**

Course contents:

NUMBER SYSTEM: Real and complex number systems, De Moivre's theorem with applications, exponential, trigonometric, hyperbolic, logarithmic, inverse hyperbolic and inverse circular functions.

INFINITE SERIES: Sequences, limits and bounds of sequences, infinite series, basic comparison test, limit comparison test, integral, ratio and root tests, alternating series, absolute and conditional convergence.

SET THEORY: Binary relations, functions and their graphs, composition of functions.

GROUP THEORY: Groups and their properties, subgroups, order of a group, cyclic groups, cosets, Lagrange's theorem, permutation groups, rings, fields, vector spaces, subspaces, linear combinations and spanning set, linear dependence and basis, dimension, linear transformations.

MATRICES: Elementary row operations, echelon and reduced echelon forms, inverse, rank and normal form of a matrix, matrix of linear transformation, partitioning of a matrix.

DETERMINANTS: Axiomatic definition of a determinant, determinant as sum of product of elements, Adjoint and inverse of a matrix.

SYSTEMS OF LINEAR EQUATIONS: Gaussian elimination and Gauss-Jordan methods, Cramer's rule, consistent and inconsistent systems.

EQUATIONS: Solutions of cubic and biquadratic equations, numerical solution of equations, Newton-Raphson, regula falsi and bisection methods.

PROBABILITY: Axioms of Probability, conditional probability, discrete and continuous random variables, probability distributions, binomial, Poisson and normal distributions.

Books Recommended:

1. Yousuf, S. M., Mathematical Methods, Fourth Edition, Ilmi Kitab Khana, Lahore, 2003.
2. Calvert, J. and Voxman, W., Finite Mathematics, McGraw Hill, N.Y., 1994.
3. Kreyszig, E., Advanced Engineering Mathematics, Ninth Edition, John Wiley, 2005.
4. Jain, M. K., Iyengar, S.R.K. and Jain, R.K., Numerical Methods For Scientific and Engineering Computations, Six Edition, Wiley Eastern Ltd., 1991.
5. Anton, H., Elementary Linear Algebra, Eight Edition, John Wiley, 1997.
6. Thorde, J. A. and Kumpel, P.G., Elementary Linear Algebra, Saunders College Publishers, N.Y., 1984.
7. Talpur, N. M., Calculus and Analytic Geometry, Ferozesons, 1971.
8. Thomas and Finney, Calculus and Analytic Geometry, Addison Wesley, 2005.
9. Boyce, W. E. and Prima, R. C., Elementary Differential Equations and Boundary Value Problems, John Wiley, 1992.

10. Flus, R., Calculus and Analytic Geometry, Prindle, Weber and Schmidt, Boston, Mass, 1983.
11. Swokowski, E. W., Calculus and analytic geometry, Prindle, Weber and Schmidt Bosten, Mass, 2000.
12. Adler, F. R., Modeling the Dynamics of Life Calculus and Probability for Life Science, Second Edition, Thomson Brooks / Cole, 2005.

13. Sharma, S. C., Complex Variable, First Edition, Discovery Publishing House, New Delhi, 2007.
14. Sharma, A.K., Power Series, First Edition, Discovery Publishing House, New Delhi, 2007.
15. Jain, R. K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Third Edition, Narosa Publishing House, New Delhi, 2007.
16. O'Neil, P. V., Advanced Engineering Mathematics, Fifth Edition, 2003
17. Mathews, J. H. and Howell, R. W., Complex Analysis for Mathematics and Engineering, Fifth Edition, Jones and Bartlett Publishers, Boston, 2006
18. Steward, Precalculus Mathematics for Calculus, Forth Edition, with CD, Brooks Cole, 2002.
19. Kishan H., Differential Calculus, Atlantic Publishers and Distributors Pvt. Ltd., 2007.