DEPARTMENT OF MATHEMATICS,
UNIVERSITY OF KARACHI,
Course Outline
MATH 302: CALCULUS

Course contents:

DIFFERENTIAL CALCULUS**:** Bounds, limits and continuity, properties of continuous functions, derivatives, Leibnitz and Rolle's theorems, Lagrange's and Cauchy's mean value theorems, generalized mean value theorems, indeterminate forms, Taylor's and Maclaurin's series.

INTEGRAL CALCULUS**:** Anti-derivatives, techniques of integration, Riemann integral, properties of definite integrals, mean value theorem, reduction formulae, improper integrals and Beta and gamma integrals.
FOURIER SERIES**:** Periodic function, periodic extensions, even and odd functions, Fourier coefficients, expansion of functions in Fourier series, functions with arbitrary periods, Fourier sine and cosine series.

DIFFERENTIAL EQUATIONS I**:** Differential equations, formation and solution, equations of first order, initial and boundary value problems, various methods of solving first order differential equations: Separable, Exact & Homogeneous equation, integration factor and orthogonal trajectories. Non-Linear First Order Equations, Envelopes and Singular solutions.

DIFFERENTIAL EQUATIONS II**:** Higher order Homogeneous Differential equations with constant coefficients, superposition of solutions, Cauchy-Euler's equations, systems of two first order linear homogenous equations, nonlinear equations.

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., Iyengam, S. R. K. and Jain, R.K., Numerical Methods For Scientific and Engineering Computations, Six Edition, Wiley Esastern 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, Addision 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, J. N., Numerical Methods for Engineers and Scientists, Second Edition, Narosa Publishing House, New Delhi, 2007.

14. Birkhoff, G. and Rota, G. C. ,Ordinary Differential Equations, Forth Edition, John Wiley and Sons, New York, 1989.
15. Sharma, A. K., Linear Transformations, First Edition, Discovery Publishing House, New Delhi, 2007.
16. Jain, R. K. and Iyengar, S. R. K., Advanced Engineering Mathematics, Third Edition, Narosa Publishing House, New Delhi, 2007.
17. O'Neil, P. V., Advanced Engineering Mathematics, Fifth Edition, 2003
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