DEPARTMENT OF MATHEMATICS,

UNIVERSITY OF KARACHI,

Course Outline

MATH 506: NUMERICAL ANALYSIS – II   (2 +1)

Numerical Methods for solving Initial Value Problems: Taylor's Series method, Euler's and Modified Euler's methods. The Runge Kutta Methods. Higher order Initial Value problems and Systems of First order Initial Value problems. Multi-step Methods of Milne and Adams-Moulton. Numerical Methods for solving Boundary Value Problems: The Shooting Method, The Difference Equation Methods, Rayliegh-Ritz, Collocation and Galerkin's methods. Introduction to Finite Element methods. Characteristic Value Problems: Determination of eigenvalues iteratively, Power and the Inverse Power methods, the QR method for finding eigenvalues of a matrix. Numerical Methods for solving Partial Differential Equations: Representation as difference equations, Laplace and Poisson equation in rectangular coordinates and their solutions.

Books Recommended:

1. Allen III, M. B. and Isaacson, E. L., Numerical Analysis for Applied Sciences (Pure and Applied Mathematics A. Willy-interscience series texts), John Wiley and Sons Inc. N.Y. 1998
2. Jain, M. K., Iyengar, S. R. K. and Jain, R. K., Computational methods for Partial Differential Equations. Wiley Eastern Limited, New Delhi, 1991.
3. Jain, M. K., Iyengar, S. R. K. and Jain, R. K., Numerical Methods for Scientific and Engineering Computations. Wiley Eastern Limited, New Delhi, 1991.
4. Atkinson, K. E., An Introduction to Numerical Analysis, John Wiley and Sons, N.Y., 1989.
5. Hager, W. W., Applied Numerical Linear Algebra, Prentice Hall International Inc. Toronto, Canada, 1995.
6. Chapra, S. C. and Canale, R. P., Numerical Methods for Engineers, Mc Graw Hill Book Co. Toronto, 2000.
7. Mathews, J. H., Numerical Methods for Mathematics, Science and Engineering, Pentice Hall International Inc, N.J., 1984.
8. Gerald, C. F. and Patric, O.W., Applied Numerical Analysis, Addison Wesley Pub. Com., 1984.
9. King, J. T., Introduction to Numerical Computation, Mc Graw Hill, N. Y., 1984.
10. Vendergraft, J. S., Introduction to Numerical Computation, Academic Press, New York, 1983.

11. Sharma, J. N., Numerical Methods for Engineers and Scientists, Second Edition, Narosa Publishing House, New Delhi, 2007.
12. Jain, R. K. and Iyengar, S. R. K., Advanced Engineering Mathematics, Third Edition, Narosa Publishing House, New Delhi, 2007.
13. Griffiths, D. V. and Smith, I. M., Numerical Methods for Engineers, Second Edition, Chapman and Hall/CRC, New York, 2006.
14. Chapra, S. C., Applied Numerical Method, with MATLAB: For Engineers and Scientist, Second Edition, Tufts University, McGraw Hill, 2007.
15. Karris, S. T., Numerical Analysis using MATLAB and Excel, Third Edition, Orchant Pub., 2007.