

Syllabus Applied Mathematics

- Error analysis in numerical methods.
- Solution of non-linear equations: bisection, fixed point, Newton and quasi Newton methods.
- Solution of linear systems: Jacobi and Gauss-Seidel methods.
- Polynomial interpolation: definition, Lagrange polynomial. Divided differences. Newton interpolation formula. Spline interpolation.
- Least squares (data fitting): linear and non-linear problem (normal equations).
- Numerical differentiation: finite-difference formulae for functions of one and two variables.
- Numerical quadrature: simple and composite rules. Gaussian-Legendre quadrature.
- Numerical ordinary differential equations: introduction, initial value problem. Taylor and Runge-Kutta methods.
- Numerical partial differential equations: classification of second order equations. Parabolic equations: solution of heat, diffusion-reaction and diffusion-convection equation with the method of lines and Crank-Nicolson.

Bibliography

- [1] Akrivis, G., Dougalis, V. (1995), Introduction to Numerical Analysis, Crete University Press, Athens, ISBN 978-9605240226 (in Greek).
- [2] Bratsos, A. (2011), Applied Mathematics, Stamoulis Publications, Athens, ISBN 978-9603518747 (in Greek).
- [3] Burden, Richard L. and Faires, J. Douglas (2000), Numerical Analysis, Brooks/Cole, ISBN 978-0534382162.
- [4] Golub, G. FL and C. F. Van Loan (1996), Matrix Computations (3rd ed.), Johns Hopkins University Press, ISBN 978-0801854149.
- [5] Kendall A. Atkinson (1989), An Introduction to Numerical Analysis (2nd ed.), John Wiley & Sons, ISBN 978-0471500230.
- [6] Schatzman, M. (2002), Numerical Analysis: A Mathematical Introduction, Clarendon Press, Oxford, ISBN 978-0198502791.
- [7] Sli, E. and Mayers, D. (2003), An Introduction to Numerical Analysis, Cambridge University Press, ISBN 978-0521007948.

Mathematical data bases

- http://en.wikipedia.org/wiki/Main_Page
- <http://eqworld.ipmnet.ru/index.htm>
- <http://mathworld.wolfram.com/>
- <http://eom.springer.de/>