**PH 528: Computational Lab (0-0-6: 3)**

1. Uniform random number generation – Park and Miller method
2. Gaussian random number generation – Box and Muller method
3. Matrix addition, subtraction and multiplication
4. Transpose of a matrix
5. Roots of algebraic equations – Newton–Raphson method
6. Least-squares curve fitting – Straight-line fit and Exponential fit
7. Solution of simultaneous linear algebraic equations – Gauss elimination method
8. Solution of simultaneous linear algebraic equations – Gauss-Seidel method
9. Interpolation – Lagrange method
10. Numerical differentiation
11. Numerical Integration – Trapezoidal, Simpson and Gaussian Quadratures rules
12. Solution of ordinary differential equations – Runge-Kutta 2nd /4th order method
13. Monte Carlo simulation of Ising model

**Text Books and References**

1. G. L. Squires, “Practical Physics”, Cambridge University Press.
2. V. Rajaraman, “Computer Oriented Numerical Methods”, PHI Learning Publishers.
3. H. M. Antia, “Numerical Methods for Scientists and Engineers”, Hindustan Book Agency.
4. K. P. N. Murthy, “Monte-Carlo Methods in Statistical Physics”, University Press.