Benefits of this course include the following.

1. Practice using Matlab
2. Review of basic math (algebra, trigonometry, calculus, and linear algebra)
3. Introduction to differential equations and numerical analysis
4. Ability to compute reliable solutions to many computational problems
5. Understanding of the basic numerical methods, including their capabilities and limitations, for the selected problem areas
6. Exposure to several scientific computing problems
7. Understanding of the problems that arise from the limited precision of floating-point arithmetic
The topics to be treated are as follows.

1. Floating-point Arithmetic
2. Linear Systems of Equations
3. Interpolation and Approximation
4. Quadrature
5. Ordinary Differential Equations (ODE’s)
6. Nonlinear Equations
Additional categories of numerical methods include the following:

1. Linear and Nonlinear Least Squares and Eigenvalue Problems
2. Optimization (Linear and Nonlinear Programming) and Nonlinear Systems
3. Partial Differential Equations (PDE’s) and Integral Equations
4. Statistical Computation (Random number generation, Monte Carlo simulations, etc.)
5. Special Functions
6. Fast Fourier Transforms