**Statistics and Numerical Methods Syllabus**

**Unit 1: Testing of Hypothesis**

* **Sampling Distributions**
  + Tests for single mean
  + Tests for single proportion
  + Tests for difference of means (Large and small samples)
  + Tests for single variance
  + Tests for equality of variances
  + Chi-square test for goodness of fit
  + Chi-square test for independence of attributes

**Unit 2: Design of Experiments**

* **Classifications**
  + One-way classification
  + Two-way classification
* **Designs**
  + Completely randomized design
  + Randomized block design
  + Latin square design
  + 2^2 factorial design

**Unit 3: Solution of Equations and Eigenvalue Problems**

* **Solution Methods**
  + Solution of algebraic and transcendental equations
  + Fixed point iteration method
  + Newton-Raphson method
  + Solution of linear systems of equations
    - Gauss elimination method
    - Pivoting
    - Gauss-Jordan method
  + Iterative methods
    - Gauss-Jacobi method
    - Gauss-Seidel method
* **Eigenvalues**
  + Eigenvalues of a matrix by Power method
  + Jacobi's method for symmetric matrices

**Unit 4: Interpolation, Numerical Differentiation, and Numerical Integration**

* **Interpolation Methods**
  + Lagrange's interpolation
  + Newton's divided difference interpolation
  + Newton's forward difference interpolation
  + Newton's backward difference interpolation
* **Numerical Differentiation**
  + Approximation of derivatives using interpolation polynomials
* **Numerical Integration**
  + Numerical single integration using Trapezoidal rule
  + Numerical double integration using Simpson's 1/3 rule

**Unit 5: Numerical Solution of Ordinary Differential Equations**

* **Single Step Methods**
  + Taylor's series method
  + Euler's method
  + Modified Euler's method
  + Fourth order Runge-Kutta method for solving first-order differential equations
* **Multi-Step Methods**
  + Milne's method
  + Adams-Bashforth predictor-corrector methods for solving first-order differential equations