Course Timeline

Here is a suggested timeline to cover the topics in a 3-month course:

Month 1: Weeks 1-4

* Week 1: Introduction to Numerical Analysis, Error Analysis
■+ Overview of Numerical Analysis
■+ Types of errors: Round-off, Truncation, and Absolute errors
■+ Floating-point arithmetic: IEEE 754 standard, representation, and operations
■+ Introduction to Error Analysis: Sources of errors, Error propagation
* Week 2: Error Analysis (continued)
■+ Approximations and errors: Approximation errors, Truncation errors, and Round-off errors
■+ Error bounds: Absolute and relative errors, Error analysis for functions
* Week 3: Methods for the Solution of Nonlinear Equations
■+ Introduction to Nonlinear Equations: Types, Importance, and Challenges
■+ Bisection Method: Algorithm, Convergence, and Error analysis
* Week 4: Methods for the Solution of Nonlinear Equations (continued)
■+ Regula Falsi Method: Algorithm, Convergence, and Error analysis
■+ Fixed Point Iteration Method: Algorithm, Convergence, and Error analysis

Month 2: Weeks 5-8

* Week 5: Methods for the Solution of Nonlinear Equations (continued)
■+ Newton-Raphson Method: Algorithm, Convergence, and Error analysis
■+ Secant Method: Algorithm, Convergence, and Error analysis
* Week 6: Interpolation and Polynomial Approximation
■+ Introduction to Interpolation: Importance, Types, and Applications
■+ Lagrange Interpolation: Algorithm, Error analysis, and Applications
* Week 7: Interpolation and Polynomial Approximation (continued)
■+ Newton's Divided Difference Formula: Algorithm, Error analysis, and Applications
■+ Forward, Backward, and Centered Difference Formulae: Algorithm, Error analysis, and Applications
* Week 8: Numerical Differentiation
■+ Introduction to Numerical Differentiation: Importance, Types, and Applications
■+ Forward, Backward, and Central Difference Formulae: Algorithm, Error analysis, and Applications

Month 3: Weeks 9-12

* Week 9: Numerical Integration
■+ Introduction to Numerical Integration: Importance, Types, and Applications
■+ Rectangular Rule: Algorithm, Error analysis, and Applications
■+ Trapezoidal Rule: Algorithm, Error analysis, and Applications
* Week 10: Numerical Integration (continued)
■+ Simpson's 1/3 and 3/8 Rules: Algorithm, Error analysis, and Applications
* Week 11: Numerical Solution of a System of Linear Equations
■+ Introduction to Numerical Solution of Linear Systems: Importance, Types, and Applications
■+ Indirect/Iterative Methods: Jacobi Method, Gauss-Seidel Method
* Week 12: Review and Practice
■+ Review of all topics covered in the course
■+ Practice problems and assignments to reinforce understanding

This is just a suggested timeline and can be adjusted according to the class size, student progress, and i