Numerical Analysis (2026)

Instructor: Tiejun Li (Professor of Math, PKU)

Required Background: Mathematical analysis, linear algebra and ODEs. Elementary probability is also preferred.

Outline

Lect01	Introduction
Lect02	Lagrange Interpolation and Runge Phenomenon
Lect03	Newton's Formula and Piecewise Interpolation
Lect04	Cubic and B-Splines
Lect05	Least Squares Approximation
Lect06	Topics: Uniform Approximation, Sparse Grid, Neural Network
Lect07	Numerical Quadrature
Lect08	Error Analysis, Gaussian Quadrature
Lect09	Topics: Spectral Accuracy, Adaptivity
Lect10	Multidimensional quadrature, Numerical Differentiation
Lect11	Monte Carlo Integration: Basics
Lect12	Metropolis Algorithm
Lect13	Numerical Solution of Nonlinear Equation: Scalar
Lect14	Numerical Solution of Nonlinear Equations: System
Lect15	Fast Fourier Transform: Basics
Lect16	Fast Fourier Transform: Applications
Lect17	Topics: Fast Gauss Transform
Lect18	Numerical ODEs: Background and Basics
Lect19	Numerical Stability and Convergence Theory
Lect20	Runge-Kutta Methods
Lect21	Stiff and Multiscale ODEs
Lect22	Symplectic Methods and Boundary Value Problems