

Maths for AI

Course Duration: 05 days (40 hours)

Module 1: Introduction to Linear Algebra

- Basic algebra & Functions
- Scalars, Vectors, and Matrices
- Matrix Operations and Properties
Linear Independence and Span
Basis and Dimension
- Eigenvalues and Eigenvectors

Module 2: Calculus for AI

- Trigonometry
- Limits, Derivatives, and Integrals
Chain Rule and Gradient Descent
- Optimization Techniques
- Multivariable Calculus and Partial Derivatives
Convex Optimization

Module 3: Probability and Statistics

- Probability Theory
- Random Variables and Distributions
Bayesian Inference and Bayes Rule
Expectation and Variance
- Hypothesis Testing and Confidence Intervals
- Markov chains

Module 4: Mathematical Reasoning

- Set Theory and Its Applications in AI
- Mathematical Induction and Recursion
- Graph Theory and Network Models
- Decision Theory and Game Theory in AI

Module 5: Optimization for AI

- Convex Optimization
- Gradient Descent and Stochastic Gradient Descent Newton's Method and Quasi-Newton Methods Conjugate Gradient Method
- Applications in Machine Learning

Module 6: Linear Regression and Regularization

- Linear Regression
- Least Squares Estimation Ridge Regression and Lasso Logistic Regression
- Model Evaluation and Selection

Module 7: Neural Networks

- Introduction to Neural Networks Backpropagation Algorithm
- Activation Functions and Architectures
- Convolutional Neural Networks
- Recurrent Neural Network

