Course Outline

Week 1: Introduction to Statistics

- Overview of statistics and its importance
- Types of data: qualitative vs. quantitative
- Levels of measurement: nominal, ordinal, interval, ratio
- Basic statistical terminology

Week 2: Data Visualization and Descriptive Statistics

- Measures of central tendency: mean, median, mode
- Measures of dispersion: range, variance, standard deviation
- Measures of position: percentiles, quartiles
- Graphical representation of data: histograms, bar charts, pie charts
- Box plots and scatter plots
- Interpretation of graphs

Week 3: Probability Basics

- Definition of probability
- Rules of probability: addition and multiplication rules
- Conditional probability and independence

Week 4: Random Variables and Probability Distributions

- Random variables
- Expectation and variance
- Joint probability distributions

Week 5: Discrete and Continuous Distributions

- Discrete distributions such as binomial, Poisson, geometric etc.
- Continuous distributions such as uniform, normal, exponential etc.

Week 6: Sampling and Sampling Distributions

- Population vs. sample
- Types of sampling methods: random, stratified, cluster
- Sampling distribution of the sample mean
- Central Limit Theorem

Week 7: Estimation and Confidence Intervals

- Point estimation and properties of estimators
- Confidence intervals for means and proportions

- Margin of error

Week 8: Hypothesis Testing

- Null and alternative hypotheses
- Type I and Type II errors
- Steps in hypothesis testing
- P-values and significance levels

Week 9: Comparing Two Means or Proportions

- Independent samples t-test
- Paired samples t-test
- Chi-square test for independence

Week 10: Basic Matrix Theory

- Types of matrices and their properties
- Eigenvalues and eigenvectors
- Singular value decomposition

Week 11: Basics of Linear Regression

- Correlation coefficient
- Simple linear regression
- Interpretation of regression output
- Assumptions of regression analysis

Week 12: Review Session and Practical Use cases

- Review key concepts
- Practice problems and solutions
- Overview of use cases of the discussed material