Module 1: Probability and Set Theory

Deterministic experiment, Probabilistic experiment, Sample space, Event, Universal set, Set theory (Union, Intersection, Complement, mutually exclusive, Exhaustive, Independent events),

Conditional probability, Law of total probability, Bayes' theorem, Empirical probability, Theoretical probability

Module 2: Descriptive Statistics and Probability Distributions

Descriptive statistics (Mean, Median, Mode, Range, Variance, Standard deviation), Weighted average, IQR (Quartile, Percentile), Box plot,

Random variable (Discrete RV, Continuous RV), Probability distribution, Distribution functions (PDF, PMF, CDF), Binomial distribution, Bernoulli distribution, Uniform distribution (Discrete uniform distribution, Continuous uniform distribution), Normal/Gaussian/Bell-shaped distribution, Log-normal distribution, Poisson distribution, Exponential distribution, Geometric distribution

Module 3: Sampling, Inference, and Central Limit Theorem

Sample, Population, Sample statistics (Sample mean, Sample median), Sampling techniques (Probability sampling, non-probability sampling), Standard error, Law of large numbers,

Central limit theorem, Confidence intervals, Z-score, PPF (Percent Point Function), Standard normal/Z distribution, Empirical rule (68/95/99)

Module 4: Hypothesis Testing and Errors

Hypothesis testing, P-value, Confidence interval, Significance level, Types of errors (Type 1 error, Type 2 error),

Tailed tests (Left-tailed test, Right-tailed test, Two-tailed test), Z-test (One-sample Z-test, Two-sample Z-test), T-test (One-sample T-test, Two-sample T-test, Paired T-test), Statistical power, Factors influencing statistical power

Module 5: Advanced Statistical Tests and Analysis

Chi-square test, Degree of freedom, ANOVA test (One-way ANOVA, Two-way ANOVA), Kruskal-Wallis's test, Parametric vs. Non-parametric tests, Normality tests (QQ plot, Shapiro-Wilk test, Levene test, KS test), A/B testing

Module 6: Data Distribution and Relationships

Covariance vs. Correlation, Correlation (Pearson correlation, Spearman correlation), Skewness (Right (Positive) skew, Left (Negative) skew, No skew),

Kurtosis (Leptokurtic (Pointy), Mesokurtic (Normal), Platykurtic (Flat)), Box-Cox transformation