
COURSE NAME

**Review Course in Maths and Statistics:
*Probability & Statistics***

COURSE OUTLINE

Part 1: Introduction to probability

- a. Probability and counting rules
- b. Conditional probability, independence
- c. Bayes theorem
- d. Probability distributions

Part 2: Random variables

- a. Discrete random variables
- b. Cumulative distribution function
- c. Expectation of a random variable, variance
- d. Sums and averages of i.i.d random variables
- e. Discrete models
- f. Continuous random variables, probability density
- g. Continuous models: gaussian, chi-squared, t and F distributions
- h. Moments of a random variable, moment generating function
- i. Central limit theorem
- j. Other continuous models

Part 3: Basics of inference

- a. Sampling distributions
- b. Point estimation
- c. Confidence intervals
- d. Non parametric tests
- e. Hypothesis testing
- f. Power of a test

Part 4: Joint distributions

- a. Joint, marginal and conditional distributions
- b. Conditional moments, iterated expectation
- c. Covariance and correlation
- d. The continuous case
- e. The multivariate normal
- f. Linear combinations of normals

Part 5: Inference revisited

- a. Simple regression model, analysis of variance
 - b. Properties of estimators
 - c. Maximum likelihood estimation
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