1 Probability Models

- Sample space, outcome, events
- Interpretation of probability
- Review of set theory
- Properties of probability
- Finite sample space and counting rules
- Sampling from a finite population
- Conditional probability and multiplication rule
- Law of total probability
- Bayes' theorem
- Independent events

2 Random Variables and Distributions

- Definition of rv
- Probability distribution of discrete rv: pmf
- Binomial, negative binomial, hypergeometric and Poisson distributions
- Probability density function (pdf) of a continuous rv
- Uniform, normal, gamma, exponential, and beta distributions

- Cumulative distribution functions
- Quantile function (percentiles)
- Distribution of a function of a random variable
- Joint distributions
- Discrete joint pmf for two variables
- Marginal distributions for discrete rvs
- Continuous joint pdf for two variables
- Bivariate distribution functions
- Marginal distributions for continuous joint distributions
- Bivariate normal distribution
- Independence of X and Y
- Conditional distributions for discrete rvs
- Condtional densities for continuous rvs
- Distributions of functions of random variables–minimum, maximum, convolution