STATISTICS 251 SYLLABUS
FALL TERM 2017
INSTRUCTOR: S. P. LALLEY

(1) **Week 1** (Pitman Ch. 1)
   (a) Discrete Probability Spaces
   (b) Counting Principles
   (c) Conditional Probability & Bayes Rule

(2) **Week 2** (Pitman Ch. 2 Secs. 2.1, 2.4, 2.5)
   (a) Binomial Distribution
   (b) Sampling with and without replacement
   (c) Poisson Approximation to Binomial Distribution

(3) **Week 3** (Pitman Ch. 3 Secs. 3.2, 3.2, 3.4, & Supplementary Notes)
   (a) Random Variables
   (b) Discrete Distributions
   (c) Expectation, Variance, & Standard Deviation
   (d) Generating Functions
   (e) Independence

(4) **Week 4** (Pitman Ch. 3, Secs. 3.3, 3.5; Ch. 2, Secs. 2.2, 2.3)
   (a) Chebyshev and Markov Inequalities
   (b) Normal Approximation (CLT): Statement & Applications
   (c) Stirling's Formula & Normal Approximation to Binomial

(5) **Week 5** (Pitman Ch. 4, Secs. 4.1, 4.5)
   (a) Continuous Random Variables
   (b) Probability Densities
   (c) Expectation & Variance for Continuous RVs
   (d) Uniform Distribution & Bernoulli RVs
   (e) **Midterm Exam Thursday October 26 7:00–9:00 p.m.** (tentative)

(6) **Week 6** (Pitman Ch. 4, Secs. 4.2, 4.4, 4.6)
   (a) Transformations & Change of Variables (univariate)
   (b) Exponential & Gamma Distributions
   (c) Poisson Processes
   (d) Order Statistics & Beta Distributions

(7) **Week 7** (Pitman Ch. 5, Secs. 5.1, 5.2, 5.3; Ch. 6, Secs. 6.1, 6.2, 6.3)
   (a) Independence & Joint Densities
   (b) Conditional Distributions & Densities

(8) **Week 8** (Pitman Ch. 5, Secs. 6.4, 6.5)
   (a) Independent Gaussian Random Variables
   (b) Bivariate Gaussian Distributions
   (c) Chi-Square & t-Distribution
   (d) Transformations & Jacobians (multivariate)

(9) **Week 9** (Supplementary Notes)
   (a) Random Walk & Gambler's Ruin

(10) **Week 10** (Supplementary Notes)
    (a) Branching Processes

(11) **Finals Week**
    (a) **Final Exam Wednesday December 6 1:30 - 3:30**