MATH 130B– Suggested Syllabus
Textbook: *A First Course in Probability*, by S. Ross, 9th ed

Week	Chapter	Topics
1	6	JOINTLY DISTRIBUTED RANDOM VARIABLES: Joint PMF's, PDF's, joint continuity, marginal distributions, examples, multinomial distributions
2	6 (cont.)	INDEPENDENT RANDOM VARIABLES: Examples, Poisson together with binomial is Poisson with different mean, symmetry characterization of normal distributions, characterization of independence in terms of separation of variables, half-lives.
3	6 (cont.)	SUMS OF INDEPENDENT RANDOM VARIABLES, convolutions, sums of uniform, Gamma, Normal, lognormal rv's, Poisson and binomial, rv's.
4	6 (cont.)	CONDITIONAL DISTRIBUTIONS. Discrete case, Continuous case, Examples: t-distribution, Chi-squared, bivariate normal, distribution of the range of a random sample. joint pdf's of functions of more than one random variable.
5	7	PROPERTIES OF EXPECATION**:** Expectation of sums, estimators, sample mean vs. expected value, examples: binomial, hypergeometric. MIDTERM.
6	7 (cont.)	PROPERTIES OF EXPECTATION (cont.), MOMENTS**.** Expected numbers of runs, Using indicator functions for counting: unions of events and inclusion/exclusion, maximum-minimums identity, Moments of number of events.
7	7 (cont.)	MOMENTS (cont.), VARIANCE, COVARIANCE, CORRELATION**:** Examples of moment calculations: binomial, hypergeometric, negative hypergeometric, Variance, Covariance: independent RV's, variance and covariance of sums.
8	7 (cont.)	CONDITIONAL EXPECTATIONS**:** Conditional expectations as a method for computing probabilities, examples: geometric distribution, conditional variance and covariance, prediction using conditional expectations.
9	7 - 8	MOMENT GENERATING FUNCTIONS, MULTIVARIATE GAUSSIANS, LIMIT THEOREMS**:** Computations of moment generating functions, descriptions of multivariate Gaussians using covariance matrices, correlations, Matlab visualizations. Markov and Chebyshev inequalities.
10	8 (cont.)	LIMIT THEOREMS: Weak and strong laws of large numbers, Central Limit theorem, Other inequalities.