

TENTATIVE MATERIAL COVERAGE

EEL 5542 – FALL 2001

INTRODUCTION TO PROBABILITY THEORY

- Stochastic vs. deterministic modeling
- Elements of Set Theory
- Fundamentals of Probability Theory
 - Axioms, derived properties
- Initial probability assignment
- Conditional Probability
- Bayes Theorem
 - Independence of events
 - Applications

RANDOM VARIABLES

- Probability distributions
 - Discrete vs. Continuous
 - PMF/PDF, CMF/CDF
- Expected Values
- Generating/Characteristic Functions
- Moments
- Function of a single RV
- Special types of distributions
 - Bernoulli, Binomial, Poisson, etc.
 - Gaussian, Exponential, Gamma, etc.
- Conditional probability distributions

MULTIPLE RANDOM VARIABLES

- Joint Distributions
- Conditional Joint Distributions
- Jointly Gaussian Random Variables
- Functions of Two Random Variables
- Transformation of a Pair of Random Variables
- Expected Values and Correlation
- Conditional Expected Values
- Multivariate Probability Distributions
- Multivariate Conditional Distributions
- Expected Values
- The Multivariate Gaussian Distribution
- Estimating Parameters of a Distribution
- The Central Limit Theorem
- Random Sums

STOCHASTIC PROCESSES

- Probabilistic Description of Stochastic Processes
- Expected Values and Autocovariance Functions
- Poisson and Affiliated Stochastic Processes
- Transformations of Stochastic Processes
- Spectral Density of a Stationary Stochastic Process
- Gaussian Stochastic Processes
- Response of Linear Systems to Random Signals
- Measurement of Stochastic Processes

SPECIAL TOPICS

- Confidence Intervals
- Test of Hypothesis
- Estimation of parameters
- Mean Square Error, Maximum Likelihood, etc.
- Entropy & Information
- A glimpse into Markov Chains
- A glimpse into ARMA processes