

# EE 60563: Probability and Random Processes

## Fall 2018

Instructor: Assoc. Prof. Ken Sauer  
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Office hrs.: Open  
Lecture: TTh, 9:30 - 10:45 AM, DeBartolo 240  
Homework: Old exams and homework sets with solutions; not graded  
Grading: 40% final exam, 30% ea. for 2 mid-terms  
Text: John A. Gubner, *Probability and Random Processes for Electrical and Computer Engineers*, Cambridge University Press, NY, NY 2006.  
Web site: <http://www.nd.edu/~sauer/random>

### Course Outline

- 1. Introductory Probability Theory and Random Variables**, ch. 1-5.  
Probability spaces, axiomatic theory, independence, conditional probabilities, Bernoulli trials, Bayes' theorem, distribution and density functions, pairs of random variables, conditional distributions, correlations, transformations of random variables, expectations.
- 2. Random Vectors and Transformations**, ch. 7-9.  
Finite-dimensional collections of RVs, correlation/covariance matrices, eigenanalysis, orthogonalizing transformations, linear, least-mean-squared-error estimation from random vectors.
- 3. Random Processes and Filtering**, ch 10, (selections from)11,13,14  
Sequences of random variables, limit theorems, correlation functions, stationarity and ergodicity, Gaussian processes, Poisson processes, spectral properties, linear systems and stochastic processes, linear, least-mean-squared-error estimation, orthogonality, Wiener filtering.

### Example Additional References

1. H. Stark and J. Woods, *Probability, Random Processes, and Estimation Theory for Engineers*, any edition, Prentice-Hall.
2. A. Leon-Garcia, *Probability, Statistics, and Random Processes for Electrical Engineers*, any edition, Pearson Prentice Hall.
3. P.Z. Peebles, *Probability, Random Variables, and Random Signal Principles*, any edition, McGraw-Hill, New York.

## Miscellaneous Comments

- The text is relatively brief on some aspects of probability and basic random variables. There are many other books, including the texts by Garcia and Peebles, which give more complete coverage. If your background in the basics is lacking, or you need to review, please consider looking at other sources, too. Basic probability texts are also good places for finding sample problems for review.
- “This course includes too much material,” is a common complaint. Unfortunately, because of the varied backgrounds of people in the class, and the number of other courses and research which depend on your knowing something about stochastic processes, a lot is crowded into EE60563.
- Old exams from EE60563 are available for practice, and can be printed from the Website.
- Office hours are given as “open,” meaning they are not restricted to pre-set times. Just drop in any time, or email to make sure I’m available.