Study Guide - Probability Preliminary Exam

Department of Industrial and
Manufacturing Engineering
Wayne State University
http://mie.eng.wayne.edu
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Faculty Administration

Dr. Kenneth Chelst, kchelst@wayne.edu

Topics

- **Basic Concepts**: sample space, independence, conditional probability, union and intersection, Bayes rule, expected value and variance.
- **Discrete Random Variables**: Bernoulli, Binomial, Geometric, Negative Binomial, Hypergeometric, and Poisson
- **Continuous Random Variables**: Generic pdf and cdf, Uniform, Normal, Exponential, Erlang and Weibull.
- **Two Dimensional Random Variables**: joint, marginal and conditional - discrete and continuous
- **Other**:
    - Poisson Process and relationship to exponential distribution: (**see handout**)
    - Conditional expectation: for example, E(X| X> X0) or E(X| Y= Y0)
    - Sampling distributions based on the Normal
    - Central Limit Theorem, Sum of Random Variables and Law of Large numbers
    - Poisson and Normal approximations to Binomial
    - Mixed distributions (probability mass at specific value and continuous everywhere else)
    - Function of Random Variable(s): expected value and probability distribution
    - Moment Generating Functions

Suggested Textbooks

- Mendenhall and Sincich: Statistics for Engineering and the Sciences: with student solutions manual: Chapters 2-7
- Hines and Montgomery: Probability and Statistics in Engineering and Management Science: Chapters 2-8
- Most probability textbooks which emphasize applications

Exam Rules

- Open book, no notes