NetMath Online Math Courses, University of Illinois

Course Syllabus for MATH 461 (Introduction to Probability Theory)

Course description: Introduction to mathematical probability; includes the calculus of probability, combinatorial analysis, random variables, expectation, distribution functions, moment-generating functions, and central limit theorem.

Probability and Statistics Authors: Bill Davis and Jerry Uhl ©2006-2010 Publisher: Making Math, a division of O’Reilly Media

Credit: 3 hours.

Prerequisite: MATH 241 or equivalent.

Required Material: Please Visit - https://cas-ile.illinois.edu/

Syllabus:

Prob. 01 Monte Carlo Simulations
Estimating probabilities and measurements by Monte Carlo simulation.

Prob. 02 Data Analysis
Frequency, cumulative distribution functions and histograms for data sets of numbers. Expected value and variance for data sets and functions of data sets.

Prob. 03 Probabilities

Prob. 04 More Data Analysis

Prob. 05 Normal and Exponential
Normal distribution and the bell curve. Exponential distribution and the exponential curve. Recognizing data sets that are approximately normally or exponentially distributed. The memoryless property of the exponential distribution. Monte Carlo generation of normally or exponentially distributed data sets. Experiments with sample averages and the normal distribution.
Prob. 06 Random Variables


Prob. 07 Joint Distributions


Prob. 08 Generating functions and the Central Limit Theorem

Central limit theorem. Generating functions. Special attention to sums of independent normal and exponential random variables.

Prob. 09 Counting

Permutations, combinations, Bernoulli, Binomial, and Poisson distributions. Approximations by normal distributions.

Prob. 10 Statistics

Sampling for the mean and variance. Acceptance testing.