

6.041x Spring 2016 Syllabus

Unit 0: Overview (released Fri. Jan 29)

Unit 1: Probability models and axioms (released Fri. Jan 29; Sections 1.1-1.2)

L1: Probability models and axioms

Problem Set 1 due on Feb 10

Unit 2: Conditioning and independence (released Fri. Feb 5; Sections 1.3-1.5)

L2: Conditioning and Bayes' rule

L3: Independence

Problem Set 2 due on Feb 17

Unit 3: Counting (released Fri. Feb 12; Section 1.6)

L4: Counting

Problem Set 3 due on Feb 24

Unit 4: Discrete random variables (released Fri. Feb 19; Sections 2.1-2.7)

L5: Probability mass functions and expectations

L6: Variance; Conditioning on an event; Multiple r.v.'s

L7: Conditioning on a random variable; Independence of r.v.'s

Problem Set 4 due on Mar 2

Exam 1: Covers material from L1 to L7 (released Wed. Mar 2; due on Mar 9)

Unit 5: Continuous random variables (released Fri. Feb 26; Sections 3.1-3.5)

L8: Probability density functions

L9: Conditioning on an event; Multiple r.v.'s

L10: Conditioning on a random variable; Independence; Bayes' rule

Problem Set 5 due on Mar 16

Unit 6: Further topics on random variables (released Fri. Mar 11; Sections 4.1-4.3, 4.5)

L11: Derived distributions

L12: Sums of r.v.'s; Covariance and correlation

L13: Conditional expectation and variance revisited; Sum of a random number of r.v.'s

Problem Set 6 due on Mar 30

Unit 7: Bayesian inference (released Fri. Mar 25 Sections 3.6, 8.1-8.4)

L14: Introduction to Bayesian inference

L15: Linear models with normal noise

L16: Least mean squares (LMS) estimation

L17: Linear least mean squares (LLMS) estimation

Problem Set 7a due on Apr 6

Problem Set 7b due on Apr 13

Exam 2: Covers material from L8 to L17 (released Wed. Apr 13; due on Apr 20)

Unit 8: Limit theorems and classical statistics (released Fri. Apr 8; Sections 5.1-5.4, pp. 466-475)

L18: Inequalities, convergence, and the Weak Law of Large Numbers

L19: The Central Limit Theorem (CLT)

L20: An introduction to classical statistics

Problem Set 8 due on Apr 27

Unit 9: Bernoulli and Poisson processes (released Fri. Apr 22; Sections 6.1-6-2)

L21: The Bernoulli process

L22: The Poisson process

L23: More on the Poisson process

Problem Set 9 due on May 11

Unit 10: Markov chains (released Fri. Apr 29; Sections 7.1-7-4)

L24: Finite-state Markov chains

L25: Steady-state behavior of Markov chains

L26: Absorption probabilities and expected time to absorption

Problem Set 10 due on May 18

Final Exam (released Wed. May 18; due on May 24)

***Note: Problem set and exam due dates are at the end of the specified date, at 23:59 UTC.**