18.05 CALENDAR (SPRING 2007)

IGOR PAK, MIT 2-390

Abstract. We will follow the following schedule of lectures with roughly one book chapter per lecture. The textbook is Dekking et al. *A Modern Introduction to Probability and Statistics.*

Lecture 1 (Wed, Feb 7)
Course introduction.
Read: Chapter 1.

Lecture 2 (Fri, Feb 9)
Read: Chapter 2.

Lecture 3 (Mon, Feb 12)
Conditional probability. Independence. Bayes' rule. Is it intuitive or counter-intuitive?
Read: Chapter 3.

Lecture 4 (Wed, Feb 14)
Birthday paradox and other examples. Explicit calculations.
Read: web handout.

Lecture 5 (Fri, Feb 16)
Discrete random variables and their probability distributions. Fun examples.
Read: Chapter 4.

Lecture 6 (Tue, Feb 20; Monday schedule at MIT)
Continuous random variables and their probability distributions. Important examples (some of them fun).
Read: Chapter 5.

Lecture 7 (Wed, Feb 21)
Expectation in discrete and continuous case. Linearity of expectations. Markov inequality. Examples.
Read: Chapters 7.1, 7.2. HA1 is due.

Lecture 8 (Fri, Feb 23)
Variance in discrete and continuous case. Chebyshev inequality. Transforming random variables.
Read: Chapters 7.4, 8.1, 8.2, 13.2.

Date: 7 February 2007.

Lecture 9 (Mon, Feb 26)
More examples on expectation and variance. Coupon collector's problem.
Read: handout.

Lecture 10 (Wed, Feb 28)
Joint distribution of discrete random variables. Independence. Correlation and covariance.
Read: Chapters 9.1, 9.4. 11.1 HA2 is due.

Lecture 11 (Fri, Mar 2)
Joint distribution of continuous random variables. Correlation and covariance. Examples of explicit calculation.
Read: Chapters 9.2, 10, 11.2

Lecture 12 (Mon, Mar 5)
Joint distribution of continuous random variables. More examples.
Read: Chapters 9.2, 10.

Lecture 13 (Wed, Mar 7)
Review before first midterm.
Read: Chapter 11. HA3 is due.

First midterm. (Fri, Mar 9)

Lecture 14 (Mon, Mar 12)
Sums of identical random variables. Chernoff bound.
Read: Chapters 13.1-3, handout.

Lecture 15 (Wed, Mar 14)
The central limit theorem.
Read: Chapter 14.

Lecture 16 (Fri, Mar 16)
Examples and applications of the central limit theorem.

Lecture 17 (Mon, Mar 19)
Introduction to Statistics. What's all that about? Discussion.

Lecture 18 (Wed, Mar 21)
Data representation. Histograms.
Read: Chapter 15. HA4 is due.

Lecture 19 (Fri, Mar 23)
Numerical summaries. Quantitative reasoning. Regression.
Read: Chapter 16.

SPRING BREAK

Lecture 20 (Mon, Apr 2)
Statistical models.
Read: Chapters 17.1-3.

Lecture 21 (Wed, Apr 4)
Unbiased estimators.
Read: Chapter 19. HA5 is due.

Lecture 22 (Fri, Apr 6)
How do you compare the estimators?
Read: Chapter 20.

Lecture 23 (Mon, Apr 9)
More examples and explicit calculations.

Lecture 24 (Wed, Apr 11)
Review before second midterm.
HA6 is due.

Second midterm. (Fri, Apr 13)

Lecture 25 (Wed, Apr 18)
Maximum likelihood.
Read: Chapter 21.

Lecture 26 (Fri, Apr 20)
Least squares method. Making sense of it.
Read: Chapter 22.

Lecture 27 (Mon, Apr 23)
Introduction to confidence intervals.
Read: Chapter 23.

Lecture 28 (Wed, Apr 25)
More on confidence intervals.
Read: Chapter 24. HA7 is due

Lecture 29 (Fri, Apr 27)
Further examples of confidence intervals.

Lecture 30 (Mon, Apr 30)
Introduction to testing hypotheses.
Read: Chapter 25.

Lecture 31 (Wed, May 2)
More on testing hypotheses.
Read: Chapter 26. HA8 is due

Lecture 32 (Fri, May 4)
Further examples.

Lecture 33 (Mon, May 7)
The t-test. Examples.
Read: Chapter 27.

Lecture 34 (Wed, May 9)
Review before third midterm
HA9 is due

Lecture 35 (Fri, May 11)
Third midterm

Lecture 36 (Mon, May 15)
Comparing two samples.
Read: Chapter 28.

Lecture 37 (Wed, May 17)
More examples.