Syllabus for Statistics 200B:
Introduction to Probability and Statistics at an Advanced Level
University of California, Berkeley, Spring 2010

T/Th 9:30-11am Lecture, 220 Wheeler
F 10am-12pm (101 Section), 1-3pm (102 Section), 330 Evans
Instructor: Dr. Cari Kaufman
Office: 315 Evans Hall
Office Hours: Tues 4-5, Wed 3-4
e-mail: cgk@stat.berkeley.edu
GSI: TBA

About This Course

This course is the second part of a sequence of courses on probability (200A) and statistics (200B) at the masters level. We will cover the fundamentals of statistical inference, testing, and modeling; see the last page of the syllabus for specific topics. I assume that you have a strong background in calculus and a knowledge of basic linear algebra (vectors and matrices), and that you are familiar with the probability topics covered in 200A.

Textbook Readings

The textbook for this course is Larry Wasserman’s “All of Statistics.” We’ll cover Section II and parts of Section III. Section I is similar to the material covered in 200A. Each lecture has an assigned reading that you should complete beforehand. I will follow the topics from the book but will typically supplement the lectures with additional material and/or examples. Homework and exam questions will be based on both the book and the lectures.

Additional references you may find useful are
“Probability and Statistics” by DeGroot and Schervish – slightly lower level
“Statistical Inference” by Casella and Berger – similar level; “traditional” topics in more depth

Assessment

Problem sets will be assigned each Thursday, except when you have a midterm the following week, for a total of 11 assignments. You should download the assignments from the bSpace page for this class. Each problem set is to be turned in the following Thursday at the beginning of class. I will post solutions the day they are due, so no late assignments will be accepted. I will, however, drop the lowest homework grade when calculating your final scores. Not all problems will be graded, and you should review the solutions carefully for those problems for which you don’t get graded feedback.

Your final grade will be an equally weighted average of 1) your average homework score, 2) midterm 1, 3) midterm 2, and 4) the final exam. The final exam will be cumulative. If you miss either midterm for any reason, I will calculate your final score by increasing the weight given to the final.
### Tentative Schedule of Topics, Readings, and Assignments

<table>
<thead>
<tr>
<th>Week of</th>
<th>Tues</th>
<th>Thurs</th>
</tr>
</thead>
</table>
| 1/18    | Intro, Probability review | Probability review  
Ch 5, HW1 assigned |
| 1/25    | Intro to inference  
Ch 6 | Empirical CDF  
Ch 7, HW2 assigned |
| 2/1     | Bootstrap  
Ch 8 | Point estimation overview  
9-9.3, HW3 assigned |
| 2/8     | Properties of MLE  
9.4-9.8 | Delta method  
9.9-9.12, HW4 assigned |
| 2/15    | Intro to hypothesis testing  
10-10.1 | Review session |
| 2/22    | **Midterm 1 (Ch 6-9)** | Likelihood ratio tests  
10.6, HW5 assigned |
| 3/1     | p-values and testing history  
10.2 | Multinomials, multiple testing  
10.4, parts of 15.1-15.2, 10.7-10.8, HW6 assigned |
| 3/8     | Bayesian inference  
11-11.3 | Simulation in Bayesian models  
11.4,24.1-24.3, HW7 assigned |
| 3/15    | Choice of priors  
11.5-11.9 | Decision theory I  
12.1-12.3, HW8 assigned |
| 3/22    | **NO CLASS** | **NO CLASS** |
| 3/29    | Decision theory II  
12.4-12.7 | Review session  
(HW 8 due) |
| 4/5     | **Midterm 2 (Ch 10-12, 24)** | Linear regression  
13-13.4, HW9 assigned |
| 4/12    | Model selection  
13.5-13.6 | Generalized linear models  
13.7, HW10 assigned |
| 4/19    | Nonparametric curve estimation  
20-20.2 | Kernel density estimation  
20.3, HW11 assigned |
| 4/26    | Nonparametric regression  
20.4, 21.1, 21.3 | Classification  
22.1-22.4 |

**Computing:** The assignments will involve some computing. We will use R, which is available for free at [http://cran.r-project.org/](http://cran.r-project.org/). I will teach you everything you need to know about R for this course.

**Email:** It is very difficult to be responsive to email in a large course such as this. I ask that you please bring questions about the material to office hours.

**Academic integrity:** I encourage you to discuss homework problems with other students, but you may not copy any part of other students’ assignments. Any evidence of cheating will be subject to disciplinary action.

**Students with disabilities:** If you need accommodations for any disabilities, please speak to me after class or during office hours so that we can make the necessary arrangements.