# ORIE 6700
# Course Information

Fall 2013

Professor Dawn Woodard

## Class Times:

Lectures: MWF, 1:25–2:15, Phillips Hall 213
Section: R, 2:55–4:25, Upson Hall 211 (starts Aug. 29

## EXAM TIMES:

<u>Prelim:</u> **Oct. 17 (Thurs), 7:30-9:30 PM.**
<u>Final:</u> **Dec. 19 (Thurs), 9-11:30 AM.**
**Please contact Prof. Woodard by Sept. 5 if you have an existing conflict with one of these exam times.** These exams are open book and open note.

## Course objectives:

- The course discusses philosophies that allow one to think rationally about the scientific extraction of information from data. We introduce basic concepts and philosophies of statistical inference including random sampling, sufficiency, parameters, estimators, statistical hypotheses, tests, decision rules, prior distributions, confidence regions, and Bayesian methods.

- The course introduces a wide variety of statistical models including linear models, exponential families, and location/scale families. Students will develop a feel for how one analyzes practical problems within the framework of a statistical model. This is a "theory" course, but mathematical formulations will be motivated by applications.

## Prerequisites:

- Multivariate calculus including $\epsilon$-$\delta$ proofs as taught in advanced calculus or mathematical analysis courses, such as Math 4130 at Cornell.

- Linear algebra and matrices.

- One semester of undergraduate probability, including:

  - probabilities, random variables and vectors, probability mass functions and probability density functions. Cumulative distribution functions. Joint probability mass/density functions, independence

  - Expected values, moments, moment generating functions, variance and covariance

  - modes of convergence (convergence in distribution, convergence in probability, and almost sure convergence)

  - the law of large numbers and the central limit theorem

  - distributions of transformations of random variables (i.e., multivariate change of variables)

  - basic distributions (normal, uniform, exponential, gamma, beta, chi-square, $t$, $F$, binomial, Poisson, geometric, hypergeometric, negative binomial).

Probability prerequisites can mostly be found in Casella and Berger: Sections 1.1-6, 2.1-3, 3.1-3 & 3.6.1, 4.1-3, 4.5-4.6, 5.1-5. Make sure to read these sections carefully in the first week of class, to ensure that you're up to speed! They may give a more formal treatment of these topics than you have seen before. For a more basic reference, may also wish to consult the textbook, "A First Course in Probability," by Sheldon Ross, although you are required to understand the material at the level of Casella and Berger.

## Textbooks:

- **Required:** Casella, G. and Berger, R. (2002, 2nd edition). *Statistical Inference*, Wadsworth, Pacific Grove, CA.

- **Helpful:** Shao, J. (2003, 2nd edition). *Mathematical Statistics.*

- **Helpful:** Bickel, P.J. and Doksum, K.A. (2007, 2nd edition). *Mathematical Statistics.*

**Office Hours:** Prof. Woodard (dbw59; 228 Rhodes): T 3-4 and R 12-1 or by appointment. Leifur Thorbergsson (lt274; 431 Rhodes): ?.

**Web site:** Log in to `http://blackboard.cornell.edu` to access course material. You should be automatically given access to the course Blackboard site when you enroll in the course; all course communication is via Blackboard.

**Homework:** Homework assignments will be posted weekly on Wednesday, and are due the following Wednesday by noon to the course dropbox on the 2nd floor of Rhodes Hall. The first homework will be assigned Sept. 4. The 2 lowest HW grades are dropped before averaging to get the composite grade. No HWs accepted late or to any other location.

You may discuss problems if you find this educational but solutions must be written up individually. It is not hard to detect a solution that has been copied; copying is a violation of the honor code.

**Academic Integrity:** Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. See above for the policy regarding homework. The Code is available at: `http://cuinfo.cornell.edu/Academic/AIC.html`.

**Grading:** Grades will be according to:

| | |
|---|---|
| Homework: | 15% |
| Midterm: | 30% |
| Final: | 55% |

In case of grading error you may resubmit an assignment (to TA) or exam (to Prof.) within 1 week of when it was returned to you, with permission.