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## SS 222a: Econometrics I (Statistics)

**Instructor:** Matthew Shum  
e-mail: [mshum@caltech.edu](mailto:mshum@caltech.edu)  
office: 301D Baxter

**Course Website:** <http://www.hss.caltech.edu/~mshum/stats.html>

### 1 Organization

The course grade will be determined by:

1. Midterm exam (45%)
2. Final exam (55%)

There will be no makeup for the midterm; if a student misses the midterm, then the weight of the midterm shifts onto the final exam.

I will distribute problem sets and solutions regularly. These will not be graded, but you should work through all the problems (and check yourself).

Please register for the class. I will use the Caltech “REGIS” website to send classwide emails. Class announcements will also be posted on the class website.

### 2 Texts

The main text for this class is:

*Statistical Inference*, G. Casella and J. Berger (hereafter **CB**), Duxbury Press.

### 3 Topics

We will focus on the material in chapters 1,2,4,5,7,8,9 of CB, with some extra readings for some points.

- Basic probability theory (CB, chap. 1): probability spaces, random variables, distribution and density functions
- Properties of a random variable (CB, chap. 2): change of variables, moments and moment-generating functions
- Multivariate random variables (random vectors) (CB, chap. 4): joint and marginal distributions, conditional distributions, independence of random variables; covariance and correlation

- Basic large sample (asymptotic) theory (CB, chap 5): sums of independent random variables, convergence concepts (convergence in probability, convergence almost surely, convergence in distribution). Laws of large numbers. Central limit theorems.
- Point estimation (CB, chap. 7): maximum likelihood, method of moments, Bayesian inference
- Hypothesis testing (CB, chap. 8)
- Interval Estimation (CB, chap. 9)
- Data-resampling techniques
- Miscellaneous topics: causal inference, simulation techniques, structural estimation (as time permits)