

# GOV 391J: Statistical Analysis in Political Science I

Fall 2011  
Unique # 38960

Tuesday & Thursday 12:30-2:00pm  
Batts 5.108

Discussion Section: TBD

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This course will introduce students to the basic ideas of probability and statistics. This course is not primarily focused on data analysis and, therefore, little time will be devoted to actual applied political science research. Instead, the purpose of this course is to lay the foundation for a solid understanding of the basic tools and concepts of statistical analysis and inference. The tools learned in this course will be applicable not only to methods learned in Stats II and III and later, but also to basic political science inquiry, including qualitative and “small N” research, formal theory, and other areas.

I expect that the course will require a significant time commitment from most students. While the reading load for the course is not high in terms of the number of pages, students are expected to come to class prepared, having done the readings in advance and ready to ask questions on any topics they have trouble understanding. The course will move at a fairly rapid pace, covering a good deal of material, so it is especially important that students keep up with the material and readings and speak with the professor or teaching assistant if they have any questions or concerns.

# Course Materials

There is one required text for this course:

- Richard J. Larsen and Morris L. Marx. *An Introduction to Mathematical Statistics and Its Applications (Fifth Edition)*. Pearson/Prentice Hall.

The second book, dealing with the **R** statistical package that we will be using, is optional, but may be used in Stats II, so it is probably worth it to buy it now so that you will have it as a reference for both semesters:

- John Fox, *An R and S-Plus Companion to Applied Regression*. Sage Press.

Alternatively, students can consult the free online **R** introduction:

- <http://cran.r-project.org/doc/manuals/R-intro.pdf>

It is often helpful to have other texts as references. While these texts are not ordered through the University Coop, students are encouraged to purchase one or more of these books for extra discussion and examples. Some recommended (though not required) texts are:

- John Kmenta, *Elements of Econometrics (2nd Edition)*. Michigan Press.
  - A good, fairly rigorous text. Somewhat short on probability and statistics, with more coverage on regression models. May be used in Stats II so buying now is advisable.
- Morris H. DeGroot and Mark J. Schervish. *Probability and Statistics (Third Edition)*.
  - Somewhat rigorous and fairly comprehensive text.
- Alan Agresti and Barbara Findlay. *Statistical Methods for the Social Sciences (Third Edition)*.
  - Good basic/undergraduate text.
- John A. Rice. *Mathematical Statistics and Data Analysis*.
  - Fairly mathematical and rigorous, but not extremely technical. A good reference for more direct proofs and derivations of basic statistical ideas.

For computing in the course, we will use the freely available statistical package **R**, which can be downloaded free of charge at:

<http://cran.r-project.org/>

It is also recommended that students use an editor for writing commands in **R** rather than simply typing them into the command line. There are several options for this including the built-in script editor, which is fairly good in the newer versions of **R**, as well as programs such as WinEdit, TinnR and Emacs. Whichever you choose, it is very important that you have a separate (clean) copy of your code in its own file for any work in this class.

Installation and basic use of **R** will be covered in discussion section.

## Assignments, Exams and Grading

Evaluation in the course will be based on weekly problem sets as well as two exams. Problem sets, which will be posted to Blackboard each week by Wednesday evening, will be due the following Tuesday at the beginning of class. The problem sets will make up 30% of the course grade. There will also be a midterm examination and a cumulative final exam at the end of the course, which will make up 30% and 40% of the grade, respectively. The date for the midterm exam will be determined based on how quickly we get through the early class material and the exam may be held either in class or during another agreed upon time. The final exam will be held at the regularly scheduled time during finals week.

Students are encouraged to work in groups on homeworks and in studying for exams, but all work should be written up individually. When **R** is used for a problem set, students should include a clean copy of their code in a fixed width format along with the writeup. Assignments will only be accepted as hard copies and should never be emailed to the professor or TA without explicit prior approval. Late assignments will be penalized severely if accepted at all.

## Course Topics

Below is a list of the topics to be covered in this course. Depending on timing, we may not get to some of the later topics. I may also reserve some classes for review and applications of previously presented material. The corresponding reading in the main text (Larsen and Marx) is also listed. I will likely supplement these readings with others from journals or posted on Blackboard. Each topic should take around a week to cover, but this may vary considerably across topics. I will announce during class what topic(s) will be covered the following week and what readings should be done.

Topic	Readings
Probability	2.1-2.7
Random Variables	3.1-3.4
Expectations and Variances	3.5-3.6, 3.9
Specific Distributions	4.1-4.5
Survey Sampling	-
Estimation:MLE and MOM	5.1-5.2
Interval Estimation	5.3
Properties of Estimators	5.4-5.7
Hypothesis Testing	6.1-6.4, 6.6
The Normal Distribution	7.1-7.5
Two-Sample Problems	9.1-9.6
Goodness of Fit Tests	10.1-10.5
Nonparametric Statistics	14.1-14.4
Linear Regression	11.1-11.4