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Political Research With Quantitative Methods
"Discussion" Section – Mathematics for Political Science
PLAD 7100, University of Virginia
Fall 2016

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Instructor: Constanza F. Schibber

Time and Location: Thursday 6:00 PM - 7:50 PM every other week (check course calendar)

Contact: constanza@virginia.edu

Office Hours: Thursday 2:00 PM - 4:00 PM, and by appointment

Overview and Objectives

This course is designed to provide mathematical tools useful for the statistical methods sequence, as well as for other courses in formal theory or mathematical modeling. Throughout the course, the mathematical tools are motivated by applications to the general problem of how politics can be modeled for purposes of statistical analysis, deductive reasoning, or conceptual theorizing. Mathematical topics covered include: linear algebra; differential calculus and optimization; and probability. By learning to solve problems covering these mathematical topics, students will learn to represent political phenomena symbolically, to reason about social inquiry formally, and to test theories and hypotheses quantitatively. These core skills apply to future courses in methodology as well as substantive politics.

Evaluation & Grading

Participation & Attendance (20% of the grade): I expect you to attend all lectures and to arrive to class on time. Students who use laptops in class must do so exclusively for the purpose of note taking. Forms of participation may include asking questions, answering questions from the instructor or from other classmates, participating in in-class group activities and class discussion, among others. Using the course email list to ask and answer questions is strongly encouraged and it will contribute to your participation evaluation.

Assignments (80% of the grade): Most weeks you will have readings and problem sets. Problem sets will be posted as PDFs on the UVa Collab course website shortly after each class. Unless otherwise noted, submission is due at the start of class and you should give me a hard copy of your solution. Late assignments will not be accepted. If for any reason you do not attend class, it is your responsibility to provide me with a copy of assignment before by the due date.

Assignments should be written in an organized and professional fashion. If your work is not clear, you will receive no credit. If you have difficulties in this area, you can use the document preparation system LaTeX(the library offers support and workshops on LaTeX). Moreover, in order to receive credit for a question on a problem set, you must show your

own work. Correct answers with no work will receive no credit.

I strongly encourage you to work together on the problem sets, but each keystroke of your solution set must be your own (cut-and-paste solutions are not acceptable). I also encourage you to use office hours to discuss any specific assignments, difficulties, or questions about the course.

The procedure to have any grade revised is as follows. Please write up a short description of your argument as to why your grade should be changed and hand it in, along with your initial assignment, within one week of receiving your grade. I will respond in writing.

Required Text

Kropko, Jonathan. 2016 *Mathematics for Social Scientists.* Sage. (Referred to as JK in the Reading List)

Additional Resources

I can also recommend additional readings for specific topics or other reference books in additional to the one that is required for the class.

UVa Collab

All assignments, grades, and readings other than the ones in the textbook will be posted on the UVa Collab site for the course, accessible at https://collab.itc.virginia.edu/portal.

Schedule

- Week 1 - September 1

  - <u>The Basics</u>: Notation, Sets, Functions, Logarithm, and Exponents
  - JK, Chapter 1
  - JK Chapter 2.1, 2.2, 2.3, 2.4

- Week 2 - September 15

  - <u>Probability</u>: Counting Theory, Sampling Problems, Bayes' Rule
  - JK, Chapter 3

- Week 3 - September 29

  - <u>Linear Algebra</u>: Vectors, Matrix Operations, Matrix Inverses, Singularity
  - JK, Chapter 8
  - JK Chapter 9

- Week 4 - October 13

  - <u>Linear Algebra</u>: Linear Systems of Equations and Eigenvalues
  - JK, Chapter 10

- Week 5 - October 27

  - <u>Calculus</u>: Limits and Derivatives
  - JK, Chapter 4

- Week 6 - November 10

  - <u>Calculus</u>: Optimization. Partial Derivatives.
  - JK, Chapter 5
  - JK, Chapter 7.1-7.3

- Thanksgiving: class moves to December 1

- Week 7 - December 1

  - <u>Calculus</u>: Integration
  - JK, Chapter 6

Calendar

Monday	Tuesday	Wednesday	Thursday	Friday
Aug 29th	30th	31st	Sep 1st **1** Class: The Basics	2nd
5th	6th	7th	8th	9th
12th	13th	14th	15th **2** PS #1 on Basics Due Class: Probability	16th
19th	20th	21st	22nd	23rd
26th	27th	28th	29th **3** PS #2 on Probability Due Class: Linear Algebra	30th
Oct 3rd	4th	5th	6th	7th
10th	11th	12th	13th **4** PS #3 on Linear Algebra Due Class: Linear Algebra	14th
17th	18th	19th	20th	21st

Monday	Tuesday	Wednesday	Thursday	Friday
24th	25th	26th	27th **5** PS #4 on Linear Algebra Due Class: Calculus	28th
31st	Nov 1st	2nd	3rd	4th
7th	8th	9th	10th **6** PS #5 on Calculus Due Class: Calculus	11th
14th	15th	16th	17th	18th
21st	22nd PS #6 on Calculus Due	23rd	24th **Thanksgiving Day**	25th
28th	29th	30th	Dec 1st **7** Class: Calculus	2nd
5th	6th	7th	8th PS #7 on Calculus Due	9th