

POLITICAL SCIENCE MATH CAMP - 2019

2–6 September
3020, Arts Block

Instructor: Oguzhan Turkoglu

Email: turkoglo@tcd.ie

Office: TRISS, Arts Block

COURSE DESCRIPTION

The main goal of this course is to provide a review of some of the essential math to prepare students for taking their first courses in statistics (Quantitative Methods 1 and 2). It will mainly cover basic linear algebra and calculus and try to give some intuition of how to use mathematical tools and reasoning in political science research. Its coverage is broader and incomplete. Keeping the variation in graduate students' math knowledge in mind, this course might be very basic to some, but, a handy way to review that you have already known.¹

This course is not for credit; however, there will be practice problems to help you solidify your understanding of the concepts covered. Practice problems will be assigned every day. You are encouraged to work together on these problem sets, but also to try them on your own before meeting as a group. They will not be graded, but solutions will be posted, which you should read carefully to ensure you can identify and understand any mistakes made. Additionally, we will work through some of the problems in class.

COURSE TEXTBOOKS

In the lectures we will follow:

- Moore, Will H., & David A. Siegel. *A Mathematics Course for Political and Social Research*. Princeton University Press, 2013.

This book is a great introduction to the math that you will need for *PO7001: Quantitative Methods 1*. It is intuitive and accessible, especially for those who do not have a strong mathematical training. Its examples are mainly from political science research. Video courses by David Siegel (one of the authors of the book) can be found *here*.

Students who looks for more exposure of calculus can follow

- Calculus One by Jim Fowler (Department of Mathematics, Ohio State University) *here*.

For students who look for a more advanced reference text:

- Simon, Carl P., & Lawrence Blume. *Mathematics for Economists*. New York: Norton, 1994.

¹To get a general idea of students' mathematical background, pre-camp exercises will be distributed (not graded). Students are expected to submit their answers by 29th of August.

SCHEDULE

Meetings will take place every day (3-7 September) from 10-12 and 1-3pm in room 3020, Arts Block.

Day 1 – 2 September, 10:00–12:00

- Variables, constants, sets, operators, relations, notation
- Algebra review
- Moore & Siegel, p.3-21, ch. 2
- Recommended: Simon & Blume, 5.1-5.3

Day 1 – 2 September, 13:00–15:00

- Introduction to L^AT_EX

Day 2 – 3 September, 10:00–12:00

- Functions and limits
- Moore & Siegel, p.44-74, ch.4
- Recommended: Simon & Blume, ch.2.1-2.2, 2.5

Day 2 – 3 September, 13:00–15:00

- Definition of the derivative, intuition
- Moore & Siegel, ch.5
- Recommended: Simon & Blume, ch.2.3-2.4

Day 3 – 4 September, 10:00–12:00

- Rules of differentiation
- Finding maxima and minima
- Moore & Siegel, ch.6, ch.8
- Recommended: Simon & Blume, ch.3-4

Day 3 – 4 September, 13:00–15:00

- Introduction to integral
- Moore & Siegel, ch.7
- Recommended: Simon & Blume, appendix A.4

Day 4 – 5 September, 10:00–12:00

- Vectors and Matrix Operations

- Moore & Siegel, p.275-288
- Recommended: Simon & Blume, ch.8.1, 10

Day 4 – 5 September, 13:00–15:00

- Determinant and inverse of a matrix
- Moore & Siegel, p.289-297
- Recommended: Simon & Blume, ch.9

Day 5 – 6 September, 10:00–12:00

- Vector spaces and systems of equations
- Moore & Siegel, ch.13
- Recommended: Simon & Blume, ch.7

Day 5 – 6 September, 13:00–15:00

- Functions of several variables
- Multivariate calculus
- Moore & Siegel, ch.15
- Recommended: Simon & Blume, ch.13-14