University of Michigan Political Science Math Camp

Summer 2019

Instructor: Roya Talibova
Class Time: August 19-23, 26-28 (10:00-12:00 and 2:30-4:00)
Class Location: 7603 Haven Hall
Office: 7750 Haven Hall
Email: talibova@umich.edu

This course is intended to provide a review of the essential math and statistics that you will come across in your formal and quantitative methods graduate courses at the University of Michigan (PolSci 598 and 599), as well as much of social science research. Although not for credit, this introductory course will make use of practice problems and a number of assessment tests. We will learn how to use basic calculus and linear algebra tools to solve mathematical problems. Mathematics is best learned through a combination of instruction and practice, and during this short course my hope is to integrate both.

The class will be divided into two different sections. The first section will cover the material needed for preparing for PolSci 598, while the second half will focus on topics required for a smooth transition to the PolSci 599 course.

Course requirements

Problem Sets: There will be multiple practice problems assigned throughout math camp. These should not take longer than 1-2 hours. Please let me know if you end up spending more time. You are strongly encouraged to attempt to solve them on your own before meeting in groups. You are required to write up your solutions individually. The problems will not be graded, but solutions and feedback will be provided. You are expected to go over these to identify and understand your mistakes.

Assessment Tests: There will be a test at the end of each section (on August 23 and August 28), covering contents from days 1-4 and 5-8 respectively. These will be graded for you to get some feedback, but the grades will not be used for anything beyond providing you with useful information.

Suggested Textbooks:

- Carl P. Simon and Lawrence E. Blume. *Mathematics for Economists.*
- DeGroot and Schervish. *Probability and Statistics.*
- David C. Lay. *Linear Algebra and Its Applications.*

Course Schedule

Day	Content
August 19	**Fundamentals & Precalculus:** • Functions, correspondence, graphing, increasing and decreasing functions, domain and range, polynomials (factoring), power rules, exponentials & logarithms • Simon and Blume (Chapter 2)
August 20	**Differentiation I:** • Change over time, tangent lines, notation, limits & derivatives • Simon and Blume (Chapter 3)
August 21	**Differentiation II:** • Rules of differentiation (product rule and chain rule), derivatives of functions (polynomials and powers, exponentials, logarithms) • Simon and Blume (Chapter 4)
August 22	**Integrals I:** • Definite and indefinite integrals, rules of integration (polynomials and powers) • Simon and Blume (Chapter 5)
August 23	**Integrals II:** • Rules of integration (exponentials and logarithms) & Fundamental theorem of calculus • Simon and Blume (Appendix 1 and 4)
August 26	**Basics of Probability & Mathematical Statistics:** • Sample space, events, factorials, counting rules, and sets • DeGroot and Schervish (Chapter 1)
August 27	**Linear Algebra I:** • Vector operations (vector addition, subtraction, scalar multiplication, unit vectors, linear combinations, orthogonality) • DeGroot and Schervish (Chapter 7), Sinon and Blume (Chapter 10)
August 28	**Linear Algebra II:** • Matrix operations (additions and multiplication, row-echelon form and Gaussian elimination) • Simon and Blume (Chapter 7)