

# Pol 502: Mathematics for Political Science

Fall 2018

## Description

This course introduces fundamental mathematical concepts and techniques that are the foundations of quantitative and formal research in political science. There is no prerequisite for this class. The objective of the course is to familiarize students with reading and writing rigorous mathematical arguments. Topics from real analysis, calculus, and optimization will be covered.

## Course Schedule

**Lecture:** Tuesday and Thursday, 9:00 - 10:20 AM, Fisher 200

**Precept:** Thursday, 6:00 - 7:30PM

## Instructor Information

**Peter Bills**

**Email:** phbils@gmail.com    **Office Hours:** Tuesday 2:00 PM, Fisher 312

**In Young Park (TA)**

**Email:** ipark@princeton.edu    **Office Hours:**

## Textbooks

### Required Texts

- *Understanding Analysis* by Stephen Abbott

### Optional Texts

In order to have a reference for optimization I highly recommend picking up one of the following texts:

- *Mathematics for Economists* by Carl Simon and Lawrence Blume
- *A First Course in Optimization Theory* by Rangarajan K. Sundaram

Some other useful Real Analysis texts:

- *Real Analysis and Foundations* by Steven Krantz

- *Real Analysis* by N.L. Carothers

Carothers covers more material and at a higher level, but I have found it to be user friendly. It may be particularly useful if you want to learn more about metric spaces, function spaces, and measure theory on your own after the course.

## Grading

Problem sets (30% of the grade); A midterm (30% of the grade); A final (40% of the grade)

## Course Topics

1. Sets, functions, logic, and the real numbers (Abbott 1.2-1.4)
2. Sequences, limits, and series (Abbott 2.2-2.6)
3. Basic topology of  $\mathbb{R}$  (Abbott 3.2-3.3)
4. Continuous functions (Abbott 4.2-4.5)
5. Differentiation and a first look at optimization (Abbott 5.2-5.3)
6. Multivariable calculus (Simon & Blume 14, 15.1)
7. Optimization of multivariate functions (Simon & Blume 17-19)
8. Integration (Abbot 7.1-7.5)