Political Mathematics

Political Mathematics is an investigation of both the mathematics of political systems and the politics of mathematics throughout history and today. Students will discover the role mathematics can play in understanding and constructing political systems. They will critically engage with the usage of mathematics as a persuasive tool in modern politics. Finally, they will discuss the impact political decisions have on mathematics education at all stages of development.

Textbook


Attendance and Participation

Due to the discussion-based nature of this course, attendance is mandatory. Students will be graded on their attendance and their engagement in the course. This engagement may be demonstrated by asking or answering questions, by demonstrating or exploring solutions on the board, by actively participating in discussions, and by thoughtfully reflecting on the material and discussing it with the professor during class or office hours.

Homework

Mathematical assignments and reflections on course discussions and readings will be assigned weekly. Students may work in groups, and should turn in only a single assignment if they do so. Everyone is expected to understand the submitted work, and points may be deducted if a student cannot explain their group’s conclusions.

Projects

In lieu of examinations, students will complete two group assignments throughout the quarter (chosen from a possible five). A final group project, also chosen from the possible five, will be due during exam week, with a presentation aspect during the final week of courses.

Grading

Attendance and Participation ................................................................. 20 Points
Homework ............................................................................................. 40 Points
Projects ................................................................................................ 20 Points
Final Project ......................................................................................... 20 Points

Total ........................................................................................................ 100 Points
Course Outline

The course is separated into Modules. Class periods will consist of brief lectures on new topics, followed by group work on challenging problem sheets that encourage students to discover mathematical issues and techniques themselves. Courses following presidential and vice presidential debates will be class discussions on the usage of mathematics and statistics by the debaters and moderators.

Module 1: Mathematical Structures in Political Systems (5 periods)

- One person, one vote: the mathematics of democracy. (2 periods)
- Rigged systems, fairness, and voting methods. (2 periods)
- The geometry of gerrymandering. (1 period)

Module 2: Demographics and Data (4 periods)

- A mathematical edge: the history of data in political campaigns. (1 period)
- Targeted democracy: the data revolution. (1 lecture)
- Any way you slice it: the shifting demographics of America. (2 lectures)

Module 3: Lies and Damned Lies: Statistics in Politics (6 periods)

- A brief history of political polling. (1 period)
- Directed thinking: how (not) to beat statistics into your point of view. (2 periods)
- Will it rain on November 8?: political forecasting through history. (1 period)
- Baseball and ballots: the methodology of Nate Silver. (2 periods)

Module 4: Final Presentations (2 periods)

- Students will present the results from their final projects. (2 periods)