

MATH 710.10: The Mathematics of Social Choice

Instructor: Daniel Ullman, Professor of Mathematics

CRN: 85675 Quantitative and Logical Reasoning GCR

In **FUNG** 210, TR 11:00 to 12:15

Open to all students

There is a fascinating, rich, and not-widely-known theory of social choice that illustrates how mathematical reasoning can be used to address problems of the real world. The problem of apportionment is a familiar example from the political arena where a mathematical treatment is available and where a theorem is known that asserts the impossibility of solving the problem subject to certain axioms about avoiding paradoxes. Another such problem is that of deciding elections when voters submit a complete preference ordering of the candidates. Then there is the theory of voting power in block voting schemes like our electoral college. In addition, we explore a bit of game theory and the prisoner's dilemma.

The year 2000 presidential election debacle and the new census data make these topics especially timely. Students, working in groups, will explore scenarios involving elections, decisions, and power and will learn how mathematicians prove that some things are impossible. Theorems of Arrow, Balinski and Young, and Taylor and Zwicker play a central role.

The course is targeted toward students of the liberal arts and is an ideal choice for a student interested in politics.

Daniel Ullman is Professor of Mathematics and current Chair of the Department of Mathematics.