

The George Washington University
Department of Mathematics
Math 1007-10: Mathematics and Politics
Fall 2011
Tu, Th 9:35a.m.–10:50p.m.
Corcoran Hall (725 21st Street), Room 101

Professor

Valentina Harizanov
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Office Hours: Tu 11:00a.m.–12:00noon
Th 8:30–9:30a.m.

Mathematics Department

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Th 3:00–4:15p.m.

Textbook

A Mathematical Look at Politics by E.A. Robinson and D. Ullman, CRC Press, 2011.

Syllabus

Part on Voting

Chapter 1. *Two Candidates*
Chapter 2. *Social Choice Functions*
Chapter 3. *Criteria for Social Choice*
Chapter 4. *Which Methods are Good?*
Chapter 5. *Arrow's Theorem*

Part on Electoral College

Chapter 19. *Weighted Voting*
Chapter 20. *Whose Advantage?*

Part on Apportionment

Chapter 7. *Hamilton's Method*

Chapter 8. *Divisor Method*

Chapter 9. *Criteria and Impossibility*

Chapter 12. *History of Apportionment in the United States*

Learning Outcomes

As a result of completing this course students should be able to:

1. Summarize various social choice functions, identify the voting criteria they satisfy and explain why;
2. Design and analyze examples illustrating Arrow's Theorem that there is no perfect way to settle elections involving at least three candidates;
3. Summarize various apportionment methods, identify the apportionment criteria they satisfy and explain why;
4. Design and analyze examples illustrating the theorem of Balinski and Young that there is no perfect way of assigning a whole number of representatives to states according to their populations.

Grading

Final Exam (cumulative two-hour exam): 30%

The final exam will be scheduled by the University during the final exam period.

Midterm Exam, Thursday, October 27, 2011: 15%

Three Graded Take-Home Assignments: 15% (5% each)

You will get two weeks to work on each assignment. No late homework will be accepted. The solutions to homework problems are expected to be your own work.

Quiz #1, Thursday, September 15, 2011: 10%

Quiz #2, Thursday, October 6, 2011: 10%

Quiz #3, Thursday, November 10, 2010: 10%

Quiz #4, Thursday, December 1, 2011: 10%

For letter grades: 90% will be at least A-, 80% will be at least B-, 65% will be at least C-, and 50% will be at least D-.

Absence policy

If you must be away from class on a given day on which graded work is due, please contact the professor before class and explain the need for your absence. In such a situation, your absence can be excused, although there will not be any opportunities to make-up missed work. Work missed owing to excused absence will not count against a student's grade. Still, students are responsible for learning the material that is covered, even if they cannot be in class.