Mathematical Reasoning: Mathematics of Voting (Western Perspective)

Prof. Jan Minton
Office: 461 Trexler Hall
Phone: 2488
Email: jminton@roanoke.edu
Office Hours: MW: 2:30-3:45, TTh: 2:00-4:00 Fridays and other times by appointment

Intended Learning Outcomes: By the end of this course students will be able to

Analyze the roles of mathematics in elections throughout American history, contrasting potential outcomes from a variety of voting methods and judging ways in which these methods promote or obstruct the principles of democracy.

Analyze quantitative information about different voting or decision making processes, identifying underlying assumptions and evaluate ramifications of alternative processes.

Articulate the underlying assumptions of different voting methods and construct arguments supporting a position on the benefits and flaws of different voting methods.

Formulate questions about a voting method in the language of mathematics, and indentify and use appropriate mathematical techniques to derive relevant information to evaluate the voting method.

Course Materials:

Primary Mathematics Text:
Excursions in Modern Mathematics with Mini-Excursions, Tannenbaum

Supplementary Reading:
Gaming the Vote, Poundstone

Writing Reference
A Writer's Reference, Diana Hacker RC Custom Edition

Handout from instructor
Calculator (not cell phone) for basic arithmetic

Classroom Policies:

Cell phones must be turned off and put away prior to entering the classroom. In the unlikely event that you need to turn on your cell phone during class, you must have permission of the instructor to do so. Otherwise, anyone using a cell phone for any reason during class is subject to being dropped (DF) from the course.

The only electronic device that may be used in the classroom is a calculator (cell phone calculators not allowed). Use of laptops may be permitted occasionally, but only for specific assignments.
Attendance Policies:

Full attendance is expected. As stated in the Academic Catalog, “Every student is accountable for all work missed because of class absence. Instructors, however, are under no obligation to make special arrangements for students who are absent.” Also, anytime you come in late or leave during class you miss part of the course and you disrupt the educational experience for everyone else. Do this only in the case of emergency.

Quizzes/Tests/Exams:

There will be frequent quizzes on homework and readings. In-class group work and small outside of class research assignments may also count as “quizzes”. There will be no make-up quizzes, but the lowest 2 grades will be dropped.

There will be three tests. Anticipated dates are: Feb. 3, Feb 26, and Mar. 31. Make-up tests will be given only under very extenuating circumstances that prohibit you from physically appearing in the classroom. The comprehensive final exam will be 2:00-5:00 on Friday April 23.

Study Problems:

Practice problems or questions will be assigned each class period. You are expected to attempt the entire assignment before the next class meeting and ask questions in class and in office hours for those you do not understand.

Project/Papers:

Four projects will be assigned during the semester to address various issues related to voting. These will go beyond routine study problems providing an opportunity for deeper exploration through research or original work. All projects will result in a paper.

Projected Course Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Content</th>
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<tbody>
<tr>
<td>Feb 3</td>
<td>Test 1 – Tannenbaum Chapter 1 plus handouts on approval, positional, range, and spatial voting</td>
</tr>
<tr>
<td>Feb. 26</td>
<td>Test 2 – Tannenbaum Chapter 2 plus stable marriage handout</td>
</tr>
<tr>
<td>Mar. 31</td>
<td>Test 3 – Tannenbaum Chapter 4 plus handouts on Electoral College and Gerrymandering</td>
</tr>
<tr>
<td>Apr. 23</td>
<td>Final Exam – all of above plus Chapter 3, census handouts, and possibly others</td>
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Projected due dates for papers: Jan 27, Feb. 17, Mar. 19, and April 16.

Most importantly, daily schedule will be posted and updated on Blackboard website

Academic Integrity The College policy is fully supported. All tests and quizzes are closed book and closed notes. Collaboration is allowed on the study problems and questions. Projects and resulting papers will be done individually unless clearly specified otherwise.
Co-curricular Requirement

The Math, Computer Science and Physics department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our disciplines. Dates and times will be announced later.

Members of this class are encouraged to be involved with all of these meetings; however participation in at least one of these sessions is mandatory. A response form is available in Blackboard as a Course Document. Within one week of attendance, students must submit this completed form to the instructor.

Grading Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz Average</td>
<td>15%</td>
<td>A 93-100</td>
<td>B- 80-82</td>
<td>D+ 67-69</td>
<td></td>
</tr>
<tr>
<td>Tests (15% each)</td>
<td>45%</td>
<td>A- 90-92</td>
<td>C+ 77-79</td>
<td>D 63-66</td>
<td></td>
</tr>
<tr>
<td>Project/papers (5% each)</td>
<td>20%</td>
<td>B+ 87-89</td>
<td>C 73-76</td>
<td>D- 60-62</td>
<td></td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
<td>B 83-86</td>
<td>C- 70-72</td>
<td>F below 60</td>
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</table>

Failure to complete the co-curricular component of the course will result in the lowering final course grade by one level. For example an A becomes an A-, and an A- becomes a B+, and so on.

Note: Material, content, and scheduling are subject to change if deemed appropriate or necessary by the instructor.