
Salisbury University Department of Mathematical Sciences
**MATH 105 : Liberal Arts Mathematics: Introduction to the Mathematics of Voting
Syllabus (Tentative)**

Description: Study of the beauty and structure of mathematics, with emphasis on quantitative and analytical reasoning skills. Various areas of mathematics or its applications will be used as a vehicle for this study. Designed for students whose major area of study does not have specific requirements in mathematics. 4 Hours Credit: Meets 4 hours per week. Meets General Education IVB or IVC.

Prerequisites: Three years of high school mathematics including geometry or college-level intermediate algebra.

Intended Audience: Students whose major areas of study do not have specific requirements in mathematics, who require a mathematics course to satisfy a general education requirement.

Objective: This course will focus on the mathematics of voting systems and investigate the difficulties present in collecting together a set of individual votes (or choices) into a single choice that reflects the will of the group.

Upon completion of this course, students will be able to

1. Examine the different voting systems that are used world- wide.
2. Use established criteria to evaluate and consider the fairness of voting systems for two-candidate elections.
3. Examine the theory of Weighted Voting Systems and its applicability to the systems we use in the United States.
4. Examine apportionment, especially as related to the House of Representatives.

Textbooks: The Mathematics of Voting an Elections: A Hands-On Approach, Volume 30 of Mathematical World, by Jonathan K. Hodge and Richard E. Kilma. Published by the American Mathematical Society, 2018.

Topic	Weeks
Voting Systems	4
An examination of the different voting systems that are used world- wide. Preferential voting systems examined to include Minority, Majority Rule, Dictatorship, Imposed Rule, Borda Count, and Pairwise comparisons, Instant Runoff Voting and the concept of the Condorcet Winner.	
Fairness	4
An examination of established criteria used to evaluate and consider the fairness of preferential voting systems for two-candidate elections. To include Anonymity and Neutrality, the Condorcet criterion, the Majority criterion, and the Independence of Irrelevant Alternatives.	
Weighted Voting Systems	3
Weighted voting systems, Banzhaf Shapley- Shubik Power indices, a look at the electoral college.	
Apportionment Theory	2
Apportionment theory, especially as related to the history of the U.S. House of Representatives.	
Tests	1
Total	14

Evaluation

Participation/Attendance	10%
Nearpod Tasks	20%
Weekly Quizzes & Exams	50%
Comprehensive Final Exam	20%

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.