

MA 391
Math and Politics
Spring 2023, MWF 12-12:50
Whitehall Classroom Building 343-CB

Instructor: Dave Jensen
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Office Hours: TBA
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Official Course Description and Prerequisites: This is an undergraduate topics course in mathematics. The mathematical content of this course will be selected at the discretion of the instructor. This course satisfies the Graduation Composition and Communications Requirement for mathematics majors. The prerequisites are: MA 213; one of MA 261 or MA 214; MA 322; one of MA 321, MA 351, MA 361, or MA 471; and 30 or more credit hours.

Course Description: In this class, we will look at the mathematics behind some important questions in politics. The goal of this class is to illustrate the importance of rigorous reasoning in various political processes while providing an introduction to some fascinating mathematics. Topics covered will include: social choice, yes-no voting systems, apportionment of legislative seats, gerrymandering, fair division, ranking systems, and the impact of algorithms on public policy. This will lead us to explore several mathematical concepts, including equivalence relations, total orderings and ultrafilters, geometric measures of compactness, Sperner's Lemma, the stable marriage algorithm, dynamical systems, and machine learning.

Required Materials: None. Readings and assignments will be posted on the class website:

<http://www.ms.uky.edu/dhje223/MA391Spring2023.html>

Grading: Your course score will be based on the following percentages, described in more detail below:

25% Attendance and Participation
35% Written Homework
40% Essays

Your letter grade will be determined according to the common 100% scale, rounded to the nearest percent:

90 – 100% A
80 – 89% B
70 – 79% C
60 – 69% D
0 – 59% E

Assignments will be due almost every Wednesday throughout the semester. There will be 6 written assignments and 7 essays. Check the course website for details.

Attendance and Participation:

- You must be present and engaged in class every day.
- However, **if you feel sick, you should stay home. I do not need a doctor's note.**
- There are assigned readings for almost every class day. You are expected to complete the daily reading assignment and be prepared to discuss it.

Written Assignments:

- You are strongly encouraged to collaborate with your classmates on the homework. Please do not let cooperation degenerate into one person solving all the problems and the others copying the answers.
- On each homework set, indicate the people you worked with.

- Searching the internet for solutions to problems is not allowed.
- Your solutions should be written in full sentences and be grammatically correct.
- While you may discuss the homework together, you must write up your own solutions in your own words.

Essays:

- There will be 7 assigned essays in this class. You can find the due dates on the course schedule. For most of these, you will have a choice of 2 essay topics.
- Each of the essays asks for your opinion on a topic related to math and politics. You must provide your opinion and support it with evidence. Part of your grade will be based on the persuasiveness of your argument.
- Essays will also be graded on the strength of the writing style, depth, focus, and structure.

Academic Integrity: Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud> . A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of Student Rights and Responsibilities (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations Due to Disability: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Diversity, Equity, and Inclusion: The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community (Governing Regulations XIV). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community (<https://www.uky.edu/regs/gr14>). These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.

We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the college's diversity officer, who is charged with addressing concerns about diversity, equity, and inclusiveness (uky.edu/inclusiveexcellence/college-diversity-inclusion-officers). Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services website (<https://www.uky.edu/biss/report-bias-incident>).

Suggestions and Other Course Issues: Suggestions for improvement are welcome at any time. Any concern about the course should be brought first to my attention. Further recourse is available through the Mathematics Director of Undergraduate Studies and the Department Chair, both accessible from POT 715.