

Instructor: Micah Warren**Office:** 318 Fenton Hall**Email:** micahw@uoregon.edu (preferred)**Phone:** 541-346-5618**Class Meetings:** MW 12pm–1:20pm, 110 FEN**Course Materials:**

- **Text:** “The Mathematics of Voting and Elections: A Hands-On Approach”, Second Edition, by Hodge and Klima. Hardcopies are at the bookstore and digital edition are available through the library with UO credentials. No homework will be directly assigned from the textbook.
- **Instant Response (required):** iClicker 2 remote (purchasable at the bookstore). This will enable interactivity during lecture for course engagement credit (see [page 1](#) for details on this grade category).
- **Calculator (recommended):** A scientific calculator will save you time doing simple computations. The Casio fx-300MS is available from the UO Bookstore for about \$13.

Course Format: Our class will meet twice per week for content introduction, plus one hour of discussion section to begin homework sets, ask questions about recent content, and take brief quizzes. Webwork is due twice a week and the written assignments are designed to be (mostly) completed during discussion sections. Quizzes also occur in discussion period.

Grade Categories and Distribution: We will use a fixed grading scheme for the course, but there may be a small upward shift in scores. This shift is not guaranteed, but if there is a shift, it will be determined after all graded work is scored and be based on class completion of extra credit opportunities.

Category	Portion of Course Grade	Adjusted Course Score, S	Grade Awarded
iClickers	5%	$S \geq 90\%$	A
Quizzes	10%	$80\% \leq S < 90\%$	B
Written Homework	13%	$70\% \leq S < 80\%$	C
WeBWorK	13%	$60\% \leq S < 70\%$	D
Final Exam	20%	$S < 60\%$	F
Midterm Exam 1	20%		
Midterm Exam 2	20%		

I will probably award plus and minus grades, but precisely where is at my discretion based on the distribution at the end of the quarter. Please don't ask to be “bumped up.”

Office Hours: My office hours are drop-in and available to all students. Typically, students come to my office hours to discuss questions from recent assignments (e.g. WeBWorK), exceptions to requirements (e.g. late written work submission), current grade, or concerns about the course. That said, any discussion is welcome! I will make private time available to those who wish to speak about a personal matter, but I will also encourage cooperation with students present if working on common questions from the class.

If you are unable to attend my standard office hours, I also schedule individual appointments (typically in 20-minute blocks to accommodate several appointments each week).

iClickers: Every class meeting you will have opportunities to answer brief questions using iClickers. Each question is worth two points, which can be obtained regardless of the accuracy of your answer. An additional one point is possible (for 150% total credit) for a *correct* response to the question.

Written Homework: Every week in discussion you will begin a written homework packet, focused on processing recent material discussed in primary class time, and worth course credit comprised of

both participation and accuracy. Engaging earnestly with your group in the discussion of the material, regardless of completion, is generally sufficient for full participation credit (your instructor is the arbiter of what constitutes full, partial, or no participation). The homework can be completed during discussion, or turned in at the beginning of the next week's discussion to be graded for accuracy. You will be allowed one "free" packet attendance credit in the event of an emergency situation (subject to your instructor's approval). Otherwise, no make-up participation credit will be given.

Quizzes: Most weeks, a 15-to-20-minute quiz will be given in discussion. Quizzes are focused on the last week of completed WeBWorK homework, so that you and your instructor can gauge your grasp of recent material and, perhaps even more importantly, to showcase an example of a question very similar to one appearing on the next exam. The lowest quiz score will be dropped - this includes the score of zero you would receive from being absent. We cannot discriminate Make-up quizzes will only be given under extreme circumstances as determined by your instructor.

WeBWorK: Homework will be collected through WeBWorK typically twice per week: Monday (the "a" assignment) and Thursday (the "b" assignment). Both assignments will be available by the beginning of each week. Keep in mind that your discussion leader and I may not be checking email over the weekend, so it would be most responsible to finish your assignments by Friday each week).

The easiest way to access WeBWorK is through the Modules menu item in Canvas by clicking on the link for your discussion section. Late WeBWorK assignments can be completed for 60% credit. Each "reduced scoring period" will last until one or two days prior to the next exam¹. More details regarding WeBWorK strategies and access are on the last page of the syllabus.

¹Except in extreme circumstances, as determined by your instructor, WeBWorK deadlines will not be extended.

Exams: The two midterm exams will cover several chapters of material and will be administered during your *discussion section* on the week listed. The final exam will cover all sections, and be administered in our regular classroom during finals week.

- 1) Midterm Exam 1: Discussion, Week 4 (Jan 29/30)
- 2) Midterm Exam 2: Discussion, Week 7 (Feb 19/20)
- 3) Final Exam: In Fenton 110, 8 – 10am on Wednesday of Week 11 (Mar 18)

Extra Credit: I provide regular opportunities for extra credit during the term. Opportunities are provided in a manner that any students who exhibit good effort can achieve them. Sources of extra credit include, but are not necessarily limited to, the following:

- Answering iClicker engagement questions correctly
- Obtaining special “bonus codes” to write on exams – these are found by reading Canvas announcements, using the review material on Canvas, and attending class (you must write these during the exam administration, you won’t be able to add a code after the fact)
- Particularly insightful work on reflective writing assignments

Discussion Sections: Discussion sections are held in one-hour sections per week. You will engage in and turn in written homework, have some homework questions answered, or do some exam review (on exam weeks). The last part of discussion will be reserved to take quizzes (in weeks 4 and 7 the discussion times instead will be used to take your midterm exams). You must attend the section you are registered for.

CRN	Day / Time	Location	Discussion Leader
23016	W 0800-0850	303 DEA	Derek McBride
23017	W 0900-0950	151 STB	Derek McBride
23014	R 0800-0850	303 DEA	Ian McConachie
23015	R 0900-0950	303 DEA	Karl Richter

Discussion Leader	Discussion CRN	Office Hours	Office Time Location	Email Address
Derek McBride	23016	T 2 – 4pm	3rd floor Tykeson	shreyan@uoregon.edu
Derek McBride	23017	T 9 – 11am, R 9 – 10:30am	3rd floor Tykeson	anielsen@uoregon.edu
Ian McConachie	23014	MW 8 – 10am	3rd floor Tykeson	xitlalin@uoregon.edu
Karl Richter	23015	W 2 – 4pm	3rd floor Tykeson	kadalja@uoregon.edu

Accessibility: For those of you who are currently registered with Accessible Education Center for a documented disability, please present your paperwork to me during the first week of the term (or earlier) so that we can design a plan for you. Those of you with a disability (or who might) but are not registered with AEC should contact them as soon as possible. It is much more likely that measures can be taken to provide adequate special accommodation if the organization is done through AEC. I have attempted to provide documents that are accessible. Please let me know if you need additional accommodations.

Student Conduct: I plan to treat every student with respect and, as such, expect my students to show respect for me and for the class as a whole. Violations of the student conduct code results in the incident being included on your student conduct record as well as academic sanctions such as a failing grade on any coursework related to the violation or simply a failing grade in the course. The University of Oregon requires all instances of cheating be reported, no matter how small. Cheating includes, but is not limited to:

- Looking at another student's exam during a test
- Copying the work of another person (student or otherwise) and submitting it as your own
- Using any materials except those explicitly approved during a test-taking situation
- Resubmitting graded work that was altered after being returned
- Cooperating on work for the course (including exams) without being explicitly allowed to do so

For a list of other descriptions of cheating, see the [Student Conduct Code](#).

Suggestions for Successful Study:

- Don't get behind in your reading, homework, etc.
- Participate in class, ask questions, and make use of my office hours.
- Form a study group with others in the class. Work together on homework - but everyone must join in and submit their own work.
- Read ahead in the book. A little bit of preparation will help the material sink in quicker during class and allow you to ask meaningful questions.
- Keep all your old exams and homework. You'll find them useful when you're studying for tests.
- If you think you'll need extra help, establish a tutoring plan right away. Check with the Tutoring and Academic Engagement Center (fourth floor of Knight Library) for free or private tutoring. Tutoring is also available in the Math Reading Room in Fenton every day except Saturdays.

Prohibited Discrimination and Harassment Reporting I am a student-directed employee. For information about my reporting obligations as an employee, please see [Employee Reporting Obligations](#). Students experiencing any form of prohibited discrimination or harassment, including sex or gender based violence, may seek information on [safe.uoregon.edu](#), [respect.uoregon.edu](#), [titleix.uoregon.edu](#), or [aaeo.uoregon.edu](#) or contact the non-confidential Title IX office (541-346-8136), AAEO office (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help. I am also a mandatory reporter of child abuse. Please find more information at [Mandatory Reporting of Child Abuse and Neglect](#).

Some Additional Comments About This Course:

There are a number of difficulties associated with large courses, and as such I require everyone's cooperation to make our classroom experience positive and worthwhile. Here are some guidelines I ask you to follow during the term:

- If you are going to be late to class, make your entry as quietly as possible.
- Please, PLEASE, make sure your cell phone is turned off or silent before every class.
- We have limited time together during the term, so be ready to begin class promptly at 12pm and don't start packing up until I've dismissed class.
- Sit as close to the front of the room as space and personal needs will allow. The closer you are the easier it is for me to interact with you and for you to see the projected material.
- Don't engage in side conversations during class. A pair of students can disrupt everyone nearby. If you have a question, you'll find me very willing to oblige. Otherwise, take it outside.
- Understand how difficult it is for me to organize hundreds of students during the term when everyone wants to submit late work. Reduced credit on late writing and WeBWorK assignments are built-in means of rescuing late work. True emergencies are grounds for exceptions to the late work policy, but not because you slept in, had a project due in another class recently, or another unfortunate, but avoidable, happenstance.

Tentative Weekly Schedule: The following is a non-binding notion of where we will be and what we will do each week. The actual assignment deadlines will be provided in class and usually also on Canvas.

Week	Class Time Agenda	Discussion Activities	Assignments
1	Chapter 1	Written HW 1, Quiz 1	WW 1b due
2	Chapters 1 and 2	Written HW 2, Quiz 2	HW 1 due; WW 2a, 2b due
3	Chapters 3 and 4	Written HW 3, Quiz 3	HW 2 due; WW 3a, 3b due
4	Chapter 4, Review; Chapter 7	Exam 1 (Ch 1 – 4)	HW 3 due; WW 4a due
5	Chapters 7 and 8	Written HW 4, Quiz 4	WW 5a, 5b due; Exam 1 Reflection
6	Chapters 8 and 9	Written HW 5, Quiz 5	HW 4 due; WW 6a, 6b due
7	Chapter 9, Review; Chapter 11	Exam 2 (Ch 7 – 9)	HW 5 due; WW 7a due
8	Chapter 11	Written HW 6, Quiz 6	WW 8a, 8b due; Exam 2 Reflection
9	Chapter 12	Written HW 7, Quiz 7	HW 6 due; WW 9a, 9b due
10	Catch up and Review	Review; Quiz 8	HW 7 due, WW 10a, 10b due; Course evaluations
11	Final Exam (Wed @ 8am)	None	No classes

Important Dates:

Saturday of 1st week (Jan 11)

Last day to drop without a "W"

Monday of 2nd week (Jan 13)

Last day to add a class

Monday of 3rd week (Jan 20)

Martin Luther King Jr. Day (No Classes);

Sunday of 7th week (Feb 23)

Last day to withdraw (drop with a 'W') or change to P/NP

See [the calendar on Registrar's website](#) for other Winter 2020 deadlines

Learning Outcomes: A successful student can...

- Identify the candidates and voters in a voting system
- Use a quota to determine winner(s) in a quota system
- Identify winner(s) in an election using a dictatorship, imposed rule, minority rule, or a majority rule voting system
- Explain why a voting system is (or is not) anonymous, neutral, and/or monotone
- Create a voting system that is (or is not) anonymous, neutral, and/or monotone
- Determine winners using the plurality method
- Determine societal preference orders using the Borda count
- Identify whether or not a voting system violates the majority criterion
- Identify whether or not an election has Condorcet winners and/or losers
- Identify whether or not a voting system violates the Condorcet winner criterion
- Determine a winner using sequential pairwise voting with a particular agenda
- Determine societal preference orders using the instant runoff method
- Identify winners using a two-step method (like Black's method) as provided
- Determine whether or not a given voting system satisfies the Independence of Irrelevant Alternatives criterion
- Use Arrow's Theorem to identify voting systems with an impossible combination of characteristics
- Identify a weighted voting system by weights and quota
- Identify winning, losing, and minimal winning coalitions of a weighted voting system
- Explain why two weighted voting systems are, or are not, isomorphic
- Identify any voters who are dictators, are dummies, or who have veto power in a weighted voting system
- Identify swaps and trades between coalitions within a weighted voting system
- Explain how trade robustness can be used to determine whether or not a voting system is weighted
- Identify critical voters, the Banzhaf power and Banzhaf index of voters in a weighted voting system
- Determine the total Banzhaf power of a weighted voting system
- Identify pivotal voters, the Shapley-Shubik power and Shapley-Shubik index of voters in a weighted voting system
- Determine the number of possible arrangements of voters in a yes/no voting system
- Determine the total Shapley-Shubik power of a weighted voting system
- Discuss the defining characteristics, and some history, of the US Electoral College voting system
- Analyze the Electoral College weighted voting system as measured by voting power indices
- Apply the Electoral College weighted voting system to other sets of voters
- Calculate, and interpret, standard quotas and standard divisors for use in apportionment
- Use Hamilton's method for apportionment

- Use Jefferson's, Webster's, and Hill's methods for apportionment
- Compute the geometric mean of two numbers
- Identify an apportionment method as a quota method or a divisor method
- Identify the Alabama, population, and new-states apportionment paradoxes
- Determine if an apportionment strategy avoids any of the apportionment paradoxes
- Apply Balinski and Young's Theorem to identify possible apportionment methods
- Given a voting region diagram and district boundaries, identify the distribution of voters and partisan winners
- Identify common requirements for redistricting in the United States
- Construct valid boundaries for voting districts within a region, including with a partisan goal in mind
- Calculate the length-width, perimeter, and bounding-circle compactness of a voting district
- Calculate the partisan bias of a region
- Identify the number of wasted votes cast in an election
- Compute the efficiency gap between two parties in a region