

# MATH B398-02

## Senior Conference

### Mathematics & democracy (Fall 2020)



Professor John Bergdall  
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Tu/F 9:30 - 11:00 AM  
Park 338 (if in person)

#### Overview

This is a senior experience in mathematics. Together, we will study the mathematics of social choice and representation within democratic structures. The cornerstones are impossibility theorems: results explaining that systems of choice satisfying fairness conditions (to be discussed) cannot possibly exist.

#### Learning goals

Analyze methods for voting and apportionment

Present mathematical results to your peers

Identify qualities of fairness in democracy

Measure power in political processes

Digest mathematical research articles

# Materials



## Textbook

*Mathematics and politics* (2nd edition) by Taylor, Alan D. and Pacelli, Allison M.  
(Used: \$42\*)



## Articles and course documents

Moodle for PDF's of articles.  
Perusall (through moodle) for annotations.  
(Free)



## Conferencing and recording

Zoom: [brynmawr-edu.zoom.us](https://brynmawr-edu.zoom.us)  
Meeting ID and password posted to moodle page  
(Free)

\*If costs cause hardship or would limit your course access, see Tina Fasbinder ([tfasbinder@brynmawr.edu](mailto:tfasbinder@brynmawr.edu)) for help from the Math Dept.

# Course components

Each component is worth 1/3 of your grade. Details for presentations and the project can be found on the pages 5 and 6.



## Participation

- Discussion of book & articles.
- Feedback for presenters.

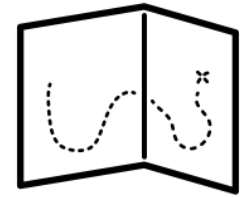
Participation is important for you and your peers. Prior to class discussions, read the textbook and research articles. Post questions and annotations to moodle and Perusall. Give feedback on presentations. Engage in problem solving during class.



## Presentations

- 2-3 total, 10-30 minutes long
- Material from text & articles.

Your first presentation (20-30 min) will asynchronously cover a chapter of the text. Your second (15 min) will synchronously cover a research or survey article. You may have a third article to present, depending on enrollment. Meet with me prior to presenting!



## Project

- Scaffolded steps.
- Paper & presentation.

Your term project will explore a theme from chapters of the textbook, research articles, and resources you find on your own. A paper will present and digest a clear theme from the course. A presentation (10 min) will summarize your project for your peers.

# Late work

You're expected to do your work and attend class, but there are no penalties for late work or absence. Presentations are a challenge to schedule, so be sure before you to re-schedule one. If you encounter debilitating circumstances, or have overwhelming concerns of wellness, contact your dean and me for help.

# Resources to reach me



## Email

Your questions are important. Email me to ask questions you don't find time for in person. It can take at least 24 hours to respond, but send a reminder if I don't reply.

## Office hours

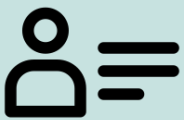
You can ask anything you like in office hours. Being seniors today is extra stressful — if you want to discuss your plans and future outlook, I will lend an empathetic ear. I will start with 2 office hours (plus presenter conferences). We can add more if needs arise.



## Appointments

I'm happy to hold appointments. To set one, email me and remain patient while we find a time to meet. In your initial message, please explain (i) what you want to talk about, (ii) *your* availability and (iii) if meeting in person is important (which is possible).

# Class formation



## Names and pronouns

You deserve to be called how you want. Let me know your preferred pronouns and name at any point, in person or over email. When meeting each other, take a moment to re-introduce yourself *every time*, so everyone's name is known and properly used.

## Academic integrity

You are responsible for following the Bryn Mawr College honor code. If you have any questions, you should presume to ask me rather than assume you know the answer.



## Access

I want you to pass this class, with success. Deb Alder ([dalder@brynmawr.edu](mailto:dalder@brynmawr.edu)) handles academic accommodations. Wellness service information can be found on the Dean's Office webpage (<https://www.brynmawr.edu/deans/>). If there is a resource not being provided, email or see me and I will work to help you.

## Diversity

I welcome all forms of participation. I pledge attention and appreciation for your identity and experience, regardless of your age, background, beliefs, ethnicity, gender identity and expression, national origin, racial identity, religious beliefs, sexual orientation, and any other visible or non-visible categories. Please acknowledge the same for your peers.



# Tips for success



**Read!**

Before class.



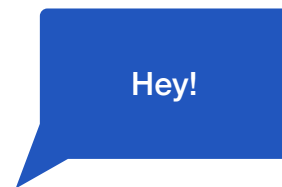
**Post!**

To moodle.



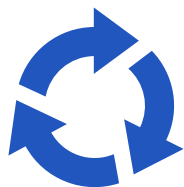
**Collaborate!**

With your peers.



**Conference!**

With me.



**Practice!**

Repetition is key.



**Budget!**

Leave yourself time.

**More tips:** We all get stuck and frustrated.

- Take a break.
- Explain to someone why you are stuck.
- Check hypotheses or assumptions.
- Work out a single example.
- Keep going!

## Schedule overview

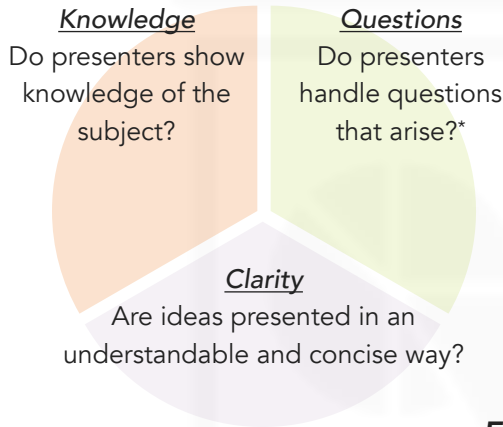
Phase 1 (Sep 8-Oct 9) 6 weeks	Ch. 1-5 of Taylor—Pacelli Collaborative paper reading Project pre-discussion: Sep 14-18. Project start-up: Oct 2.
Phase 2 (Oct 13-23) 2 weeks	<u>At least one day off</u> (to catch up) Ch. 7 of Taylor—Pacelli Project proposal: Oct 16.
Phase 3 (Oct 27-Nov 20) 4 weeks	Presentations of research articles. At least one per student (15 min). Two per day. Choose based on project interests! Outline draft: Nov 6. Section draft: Nov 20.
Phase 3.5	Bryn Mawr official break (Nov 21 - Nov 30)
Phase 4 (Dec 1-18) 2+ weeks	Focus on term projects. Presentations: Dec 4 & 8. Paper: Dec 18.



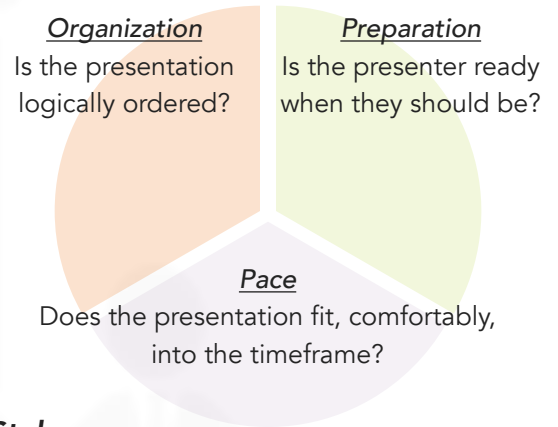
# Presenting

Good presentations are challenging to create. Feedback (peer evaluations) will be given, based on nine key characteristics, to help you develop your skills.

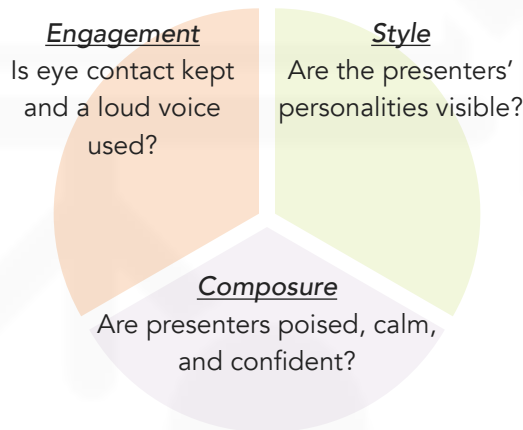
## Knowledge, Clarity, and Questions



## Organization, Pace, and Preparation



## Engagement, Composure and Style



### Peer Evaluation (electronic)

Characteristics evaluated as:

- Not at expectations ("no")
- Meeting expectations ("yes")
- Above expectations ("yes!")

Peers have opportunity to add affirmations and suggestions.

### Assessment

4.0: Mostly yes!

2.0: Mostly yes.

In between: a mixture.

You'll receive a narrative summary and grade per presentation. Improvement is highly valued!

\* This may not apply to pre-recorded presentations.

## Participant responsibilities

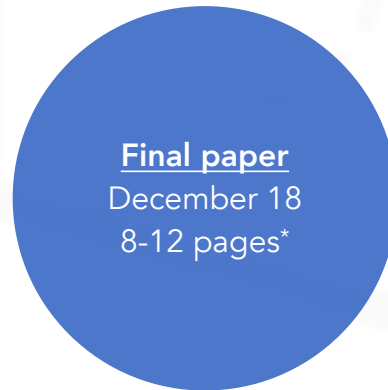
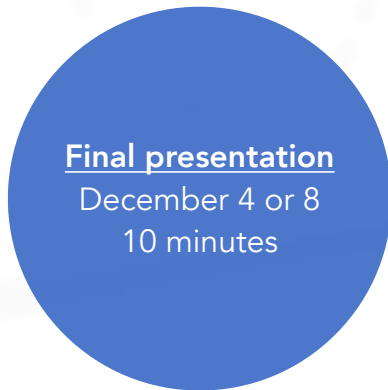
<u>Presenters</u>	<u>Audience</u>
Read the material. Work the math. Fill out the preparation form (electronic). Conference with me, at least 48 hours in advance.	Read the material. Formulate your questions. Annotate the text.
Build your presentation. Practice and re-practice your plan. Present! You got this!	Cheer on the presentation. Fill out an evaluation. Ask questions.
Answer audience questions. Choose fun exercises and then lead their discussion.	Join the discussion. Solve some exercises.

Note: everyone is responsible for reading the material!

# Term project

The term project allows you to trace a theme through the course. The topic is open, but it should have significant *mathematical* quality. The final products are a presentation and a paper. Scaffolding is provided (dates also on page 4).

<b>Project pre-discussion.</b> (Schedule by Sept. 11)	Meet with me and another student.
<b>Project start-up.</b> (Turn in near Oct 2.)	Look for resources. Write a paragraph describing a direction you're thinking in.
<b>Project proposal.</b> (Turn in near Oct. 16)	Write a 1-2 page* proposal. Identify a topic. Include why you're interested and why the topic is important. Note at least 3 sources.
<b>Outline draft.</b> (Turn in near Nov. 6)	Construct an outline dividing your paper into sections. Think hard about what will fit and what won't; the paper will be 8-12 pages long.
<b>Section draft.</b> (Optional, Nov. 20)	Draft a single section, ideally 2-5 pages. The writing should be self-contained. For instance, a section stating and then proving a theorem.



## Grading

Your project grade is determined from the final products and scaffolded steps. The presentation is graded by the same method as in-term presentations. Rubrics (below) are provided for the proposal and paper; evaluation and assessment follow presentation model. Everything else is for credit and feedback.

### *Project proposal*

- Is the proposal properly long and formatted?\*
- Is there a topic/thesis being proposed?
- How clear is the proposed statement?
- Is there sufficient interest in the proposal?
- How clear is the importance of the proposal?
- Are sources identified by the proposer?

### *Term paper*

- Is the paper properly long and formatted?\*
- Is there an introduction with a clear thesis?
- Does the body support the thesis statement?
- Is the conclusion clearly justifying the thesis/?
- Is there significant mathematical quality?
- Are history and examples used?
- Are positions defended against counter-points?
- Are references provided to support arguments?

\*Documents should be double-spaced, with 1 inch margins, and in 12-point font.