PHIL 408Q/PHPE 308D - Fairness

Instructor:	Eric Pacuit (pacuit.org)
Semester:	Spring 2024
Email:	epacuit@umd.edu
Course Website:	`https://umd.instructure.com/courses/1362256`
Class Times:	TuTh 12:30pm - 1:45pm
Location:	PLS 1117
Office Hours:	TBA
Office:	Skinner 1103A

Course Description

Discussions about fairness have long been prevalent in fields such as game theory, social choice theory, political philosophy, and ethics. More recently, there is a growing focus in AI (especially machine learning) on creating algorithms that are fair. This course is divided into three parts, each focused on different ways that fairness considerations influence individual and group decision-making:

1. Fairness in game theory;
2. Fair division algorithms; and
3. Algorithmic fairness.

This course aims to equip students with a nuanced understanding of fairness across various domains, blending theoretical insights with practical applications.

Course Structure

This course will have weekly lectures on Tuesdays and Thursdays 12:30pm - 1:45pm. During the lectures, we will introduce the material for the week, discuss the readings, and work together on participation questions.

Required Resources

- Course Website: `https://umd.instructure.com/courses/1362256`
- There is no textbook to purchase for this course. The course will be based on readings from various textbooks are journal articles. The relevant material will be made available on the course website.
- We will PollEverywhere this semester. This will be used for short 1-question quizzes given during the lectures. You can sign-up for PollEverywhere for free by following this link `https://PollEv.com/epacuit/register?group_key=0rSZtu9dRNx0wH2TBXXTxEPkF`.

Grading Policy

The course requirements are:

- **Participation**: There will be a number of short quizzes given during each lecture. Typically, these short quizzes will consist of 1 question that is given during class using PollEverywhere, but some lectures may have more than 1 question. **Make-up quizzes will not be offered.** I will drop the lowest 5-10% of the quizzes (so you can miss some of the questions without losing any points).
- **Discussion**: Students must submit a weekly discussion post and a response on ELMS. Each week, you will be asked to provide a question or reaction to some aspect of the reading for this week. If you have a question, then you should give some motivation from the reading that prompted the question. Your question or reaction should be approximately 200 words. After submitting your question or reaction, you should make at least 1 comment on another student's question or reaction. Each discussion post is **due Wednesdays at 11:59pm**. You will. have until the following **Monday at 11:59pm** to respond to another post. I will drop the two lowest scores, so you can skip posting at most twice.
- **Problem Sets**: There will be 3 problem sets (after each part). Problem sets will be submitted through Gradescope (accessible through the course website). You can use your notes, the readings, and the online textbook, but you should not discuss your answers with your classmates or use any AI tools, such as ChatGPT, to answer these questions.
- **Final exam**: There will be an in-person final exam given during finals week. Consult `https://app.testudo.umd.edu/soc/exam/` for more information about the time and location of the final exam.

Grades will be assigned according to the following weights:

Participation	20%
Discussion	35%
Problem Sets	35%
Final Exam	10%

Your final grade may be curved, but the final grade cutoffs are typically as follows:

A+	$> 100\%$	B+	88%	C+	78%	D+	68%		
A	93%	B	83%	C	73%	D	63%	F	$< 60\%$
A-	90%	B-	80%	C-	70%	D-	60%		

See undergraduate catalogue for description of grades, e.g., A+, A, A-, etc.: `https://registrar.umd.edu/current/Policies/acadregs.html#plusminus`.

Tentative Syllabus

Below is a tentative syllabus for this semester. This is subject to change. Please consult the course website for an up-to-date overview of the material discussed in the course.

Week 1 (1/25): Course Overview

No reading

Part 1: Fairness in Game Theory

Week 2 (1/30, 2/1): Ultimatum games, Social preferences

Reading

Colin Camerer and Richard H. Thaler (1995). Anomalies: Ultimatums, Dictators and Manners, *Journal of Economic Perspectives*, 9(2), pp. 209 - 219.

Armin Falk, Ernst Fehr and Urs Fischbacher (2003). On the Nature of Fair Behavior, *Economic Inquiry*, 41, pp. 20-26.

Cristina Bicchieri and Jiji Zhang (2012). An Embarrassment of Riches: Modeling Social Preferences in Ultimatum Games, in *Philosophy of Economics: A Handbook of the Philosophy of Science* pp. 577 - 595. Sections 1 & 2

Additional Reading

Martin A. Nowak, Karen M. Page, Karl Sigmund (2000). Fairness Versus Reason in the Ultimatum Game, *Science*, 289, pp. 1773-1775.

Week 3 (2/6, 2/8): Nash bargaining games

Reading

Brian Skyrms (2014). Chapter 1: Sex and Justice (pp. 1-22) and Chapter 2: Fairness and Commitment (pp. 23-42), in *Evolution of the Social Contract: Second Edition*, Cambridge University Press.

Additional Reading

Kevin Zollman (2008). Explaining fairness in complex environments, *Philosophy, Politics, and Economics*, 7(1), pp. 81 - 98.

Week 4 (2/13, 2/15): Bargaining on networks

Tuesday, 2/13 - No Class: Away at a Conference

Reading

J. McKenzie Alexander and B. Skyrms (1999). Bargaining with Neighbors: Is Justice Contagious? *Journal of Philosophy*, 96(11), pp. 588-598.

Week 5 (2/20, 2/22): Unfairness

Reading

Cailin O'Connor (2022). Why Natural Social Contracts are Not Fair, forthcoming in *New Social Contract Theory*.

Additional Reading

Cailin O'Connor (2019). Chapter 5: Power and the Evolution of Unfairness (pp. 105 - 132, in *Origins of Unfairness*, Oxford University Press.

Part 2: Fair Division

Week 6 (2/27, 2/29): Fair division of indivisible goods I

Reading

H. Peyton Young (1994). Chapter 1: Overview (pp. 3 - 19) and Chapter 2: Equity and Priority (pp. 20 - 41) in *Equity in Theory and Practice*, Princeton University Press

Steven Brams, Paul Edelman, Peter Fishburn (2001). Paradoxes of Fair Division, *The Journal of Philosophy*, 98(6), pp. 300-314.

Week 7 (3/5, 3/7): Fair division of indivisible goods II

Reading

R. Sugden (1984). Is Fairness Good? A Critique of Varian's Theory of Fairness, *Noûs*, 18(3), pp. 505 - 511.

Steven J. Brams, D. Marc Kilgour, Christian Klamler, and Fan Wei (2023). Two-Person Fair Division of Indivisible Items - Bentham vs. Rawls on Envy, *Journal of Philosophy*, 120 (8), pp. 441-456 (2023)

Additional Reading

Hal R. Varian (1975). Distributive Justice, Welfare Economics, and the Theory of Fairness, *Philosophy & Public Affairs*, 4(3), pp. 223 - 247.

Week 8 (3/12, 3/14): Fair division with divisible goods

Reading

Steven J. Brams and Alan D. Taylor (1996). Chapter 1: Proportionality for $n = 2$ (pp. 6-29) and Chapter 4: Envy-freeness and equitability for $n = 2$ (pp. 65 - 94) in *Fair Division: From Cake-Cutting to Dispute Resolution*, Cambridge University Press.

Additional Reading

Gerdus Benadé, Ariel D. Procaccia, and Jamie Tucker-Foltz (2023). You Can Have Your Cake and Redistrict It Too, in *Proc. 24th ACM Conference on Economics and Computation.*

Ariel D. Procaccia (2016). Cake Cutting Algorithms, in *Handbook of Computational Social Choice* (Brandt, Conitzer, Endriss, Lang, and Procaccia, eds.), chapter 13.

Week 9 (3/19, 3/21): Spring Break

No Class on Tuesday 3/19 and Thursday 3/21

Week 10 (3/26, 3/28): Fairness through lotteries

Reading

John Broome (1990). Fairness, *Proceedings of the Aristotelian Society*, 91, 87- 101.

Kfir Eliaz and Ariel Rubinstein (2014). On the fairness of random procedures, *Economics Letters*, 123, pp. 168 - 170

Additional Reading

Benjamin L. Curtis (2014). To be fair, *Analysis*, 74(1), pp. 47-57.

Part 3: Algorithmic Fairness

Week 11(4/2, 4/4): Fairness in group decision-making I

Reading

P. Faliszewski, P. Skowron, A. Slinko, and N. Talmon (2017). Multiwinner Voting: A New Challenge for Social Choice Theory. In U. Endriss (ed.), *Trends in Computational Social Choice*. AI Access.

Participatory Budgeting: Data, Tools, and Analysis. Piotr Faliszewski, Jarosław Flis, Dominik Peters, Grzegorz Pierczyński, Piotr Skowron, Dariusz Stolicki, Stanisław Szufa, and Nimrod Talmon. In IJCAI '23.

Additional Reading

Stéphane Airiau, Haris Aziz, Ioannis Caragiannis, Justin Kruger, Jérôme Lang, and Dominik Peters (2023). Portioning using Ordinal Preferences: Fairness and Efficiency. *Artificial Intelligence*, 103809.

Week 12 (4/9, 4/11): Fairness in group decision-making II

Reading

Bailey Flanigan, Paul Gölz, Anupam Gupta, Brett Hennig, and Ariel D. Procaccia (2021). Fair algorithms for selecting citizens' assemblies, *Nature*, 596, pp. 548–552.

Additional Reading

Ariel Procaccia (2022). Citizens' Assemblies Are Upgrading Democracy: Fair Algorithms Are Part of the Program Math, *Scientific American*.

Week 13 (4/16, 4/18): Algorithmic fairness and statistical discrimination

Reading

Michael Kearns and Aaron Roth (2020). Chapter 2: Algorithmic Fairness from Parity to Pareto in *The Ethical Algorithm*, Oxford University Press.

John W. Patty and Elizabeth Maggie Penn (2022). Algorithmic Fairness and Statistical Discrimination, *Philosophy Compass*, 18(1), e12891.

Additional Reading

Will Fleisher (2021). What's Fair about Individual Fairness? In Proceedings of the 2021 AAAI/ACM Conference on AI, Ethics, and Society (AIES '21).

Week 14 (4/23, 4/25): Fairness in machine learning

Reading

Zeyu Tang, Jiji Zhang, and Kun Zhang (2023). What-is and How-to for Fairness in Machine Learning: A Survey, Reflection, and Perspective, *ACM Computing Surveys*, 55(13), pp. 1 - 37.

Additional Reading

Sam Corbett-Davies, Johann D. Gaebler, Hamed Nilforoshan, and Ravi Shroff (2023). The Measure and Mismeasure of Fairness, *Journal of Machine Learning Research*, 24, pp. 1-117, Sections 1 & 2.

Week 15 (4/30, 5/2): More on algorithmic fairness I

Reading

Benjamin Eva (2022). Algorithmic Fairness and Base Rate Tracking, *Philosophy and Public Affairs*, 50(2), pp. 239-266.

Rush T. Stewart (2022). Identity and the Limits of Fair Assessment, *Journal of Theoretical Politics*, 34(3), pp. 415-442.

Week 16 (5/7, 5/9): More on algorithmic fairness II

Reading

Elizabeth Maggie Penn and John Patty (2023). Algorithms, Incentives, and Democracy, manuscript.

Course Policies

A full list of course-related policies and relevant links to resources may be found at:

`http://www.ugst.umd.edu/courserelatedpolicies.html`.

Communication about this Course I will use ELMS announcements to convey important information, and students are responsible for keeping their email address up to date, and must ensure that forwarding to another email address functions properly. Failure to check email, errors in forwarding, and returned email are the responsibility of the student, and do not constitute an excuse for missing announcements or deadlines.

Names/Pronouns and Self-Identifications The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Accessibility and Disability Services The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The Accessibility & Disability Service (ADS) (https://www.counseling.umd.edu/ads/) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu.

Student Resources and Services

- Note taking assistance (https://counseling.umd.edu/ads/notetakers)
- Counseling Center (https://www.counseling.umd.edu/)
- UMD's Student Academic Support Services website (http://tutoring.umd.edu/)
- UMD's Writing Center (http://www.english.umd.edu/academics/writingcenter/schedule)
- UMD's Student Resources and Services website (https://sph.umd.edu/content/student-resources-and-services)
- Basic Needs Security (https://studentaffairs.umd.edu/basic-needs-security)

Class Cancelations The University may be closed in the event of an emergency, in which case class will be cancelled. To find out if the University is closed you can check its main site (`http://www.umd.edu`), its emergency preparedness site (`http://www.umd.edu/emergencypreparedness/`), or call the "snow phone line" at 301-405-7669 (which covers more than just snow caused closings). If class is cancelled while the University remains open, then there will be an announcement posted on the course ELMS page.

Emergency Protocol: In the case of an extended closure to the University (e.g., because of inclement weather), consult the ELMS course page for announcements and changes to any due dates.

Attendance and Absences Students are expected to attend classes regularly. Consistent attendance offers students the most effective opportunity to gain command of course concepts and materials. Events that justify an excused absence include: religious observances; mandatory military obligation; illness of the student or illness of an immediate family member; participation in university activities at the request of university authorities; and compelling circumstances beyond the student's control (e.g., death in the family, required court appearance). Absences stemming from work duties other than military obligation (e.g., unexpected changes in shift assignments) and traffic/transit problems do not typically qualify for excused absence. Students claiming an excused absence must notify the course instructor in a timely manner and provide appropriate documentation. The notification should be provided either prior to the absence or as soon afterwards as possible. In the case of religious observances, athletic events, and planned absences known at the beginning of the semester, the student must inform the instructor during the schedule adjustment period. All other absences must be reported as soon as is practical. The student must provide appropriate documentation of the absence. The documentation must be provided in writing to the instructor by the means specified in this syllabus. The full university attendance/absence policy can be found here: `http://www.ugst.umd.edu/courserelatedpolicies.html`.

Academic Integrity The UMD Honor Code prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents and forging signatures. On every examination, paper or other academic exercise not exempted by the instructor, students must write by hand and sign the following pledge:

> *I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment).*

Allegations of academic dishonesty will be reported directly to the Student Honor Council: `https://studentconduct.umd.edu/`

Copyright Notice Class lectures and other materials are copyrighted. They are the property of the instructor - do not sell them, do not post them on a website. They may not be reproduced for anything other than personal use without written permission from the instructor. Copyright infringements may be referred to the Office of Student Conduct.

Academic Accommodations for Students who Experience Sexual Misconduct The University of Maryland is committed to providing support and resources, including academic accommodations, for students who experience sexual or relationship violence as defined by the University's Sexual Misconduct Policy. To report an incident and/or obtain an academic accommodation, contact the Office of Civil Rights and Sexual Misconduct at 301-405-1142. If you wish to speak confidentially, contact Campus Advocates Respond and Educate (CARE) to Stop Violence at 301-741-3555. As 'responsible university employees' faculty are required to report any disclosure of sexual misconduct, i.e., they may not hold such disclosures in confidence. For more information: `http://www.umd.edu/ocrsm/`

Diversity The University of Maryland values the diversity of its student body. Along with the University, I am committed to providing a classroom atmosphere that encourages the equitable participation of all students regardless of age, disability, ethnicity, gender, national origin, race, religion, or sexual orientation. Potential devaluation of students in the classroom that can occur by reference to demeaning stereotypes of any group and/or overlooking the contributions of a particular group to the topic under discussion is inappropriate.

For information on elms, counseling, health, learning workshops, tutoring, writing help, student rights in undergrad courses, questions about graduation or add/drop/withdraw, please see `http://www.ugst.umd.edu/courserelatedpolicies.html`.