Spring 2020 - 11.S01 Urban Science for Public Good: Gender and Racial Equity in Artificial Intelligence

First-year Discovery class
Mondays 2 - 3:30pm. 9-217. Spring 2020. 3 Credits.

Catherine D'Ignazio
Office Hours:
Wednesdays 1-3pm in 10-485M - Reserve a time
And by appointment.
Get in touch: dignazio@mit.edu

Course Information

Course Description

Gender and racial equity are often central goals of urban planning. But what are gender and race? What happens when we start to measure and model these dimensions of identity? Conversely, what happens when we ignore gender and race in urban computation? This course introduces students to some of the leading scientists, theorists and practitioners who are working to challenge bias in AI and to use data and computation to work towards gender and racial equity in cities. Along the way, we will reflect on our own identities and learn critical concepts to navigate gender and race from fields such as Urban Planning, Women’s & Gender Studies, Critical Race Studies, and Computer Science.

Course Learning Objectives

- Students will discuss fundamentals of oppression based on race and gender, as well as how those manifest in data science and AI
- Students will reflect on their own identities in relation to structural forces
- Students will apply feminist conceptions of race and gender to examples of data science and AI from a variety of domains, such as health & human services, mobility, hiring, pay equity, and criminal justice
- Students will be exposed to researchers, journalists and policymakers using quantitative methods to create more equitable, just cities
Students will be exposed to MIT faculty, staff, labs, programs, and resources they can make use of in order to chart a path towards a career at the intersection of science, technology and justice.

Indigenous Land Acknowledgement

We begin by acknowledging the history of colonization of the land on which we gather today and all days, through violence and genocide against the Indigenous peoples connected to it. I wish to acknowledge, too, that my own presence, and my words here, are shaped by my perspective as a white settler.

This land is the unceded, traditional territory of the Massachusett, Nipmuc, Pequot, and Wampanoag, and we recognize that the state of Massachusetts is still home to many Native American peoples. As we continue today and all days, I invite us to consider the ways in which these foundations may shape our structures, and to reflect on how to carry this awareness into our work together.

(Credit to Hannah Winkler of MIT Libraries and the Indigenous Peoples Advocacy Committee for this acknowledgement, which has been modified slightly for the class.)

Assignments

Since this is a 3-credit class, the work is mainly showing up, participating and doing the readings each week. We will work towards a collaborative Dictionary of Social Justice and Urban Science, in which each student writes one entry.

<table>
<thead>
<tr>
<th>Participation &amp; preparation</th>
<th>50%</th>
<th>Individual</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dictionary entry - 1st draft &amp; final draft</td>
<td>25%</td>
<td>Individual</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>Peer review of three (3) dictionary entries</td>
<td>25%</td>
<td>Individual</td>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>

Special Accommodations for Students with Disabilities

If you need disability-related accommodations, I encourage you to meet with me early in the semester. If you have not yet been approved for accommodations, please contact Student Disability Services at sds-all@mit.edu.

I look forward to working with you to assist you with your approved accommodations.

Student Mental Health
As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may impact your ability to attend class, concentrate, complete work, take an exam, or participate in daily activities.

I am happy to help you navigate these challenges in relation to your classwork. For more resources:

Undergraduates: Please discuss this with Student Support Services (S³). You may consult with Student Support Services in 5-104 or at 617-253-4861.

Graduate Students: Please reach out to the deans for personal support in the Office of Graduate Education.

**Equity & Inclusion**

MIT values an inclusive environment. I hope to foster a sense of community in this classroom and consider this classroom to be a place where you will be treated with respect. I welcome individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. If this standard is not being upheld, please come speak with me.

**Help with Writing**

The MIT Writing and Communication Center offers free one-on-one professional advice from communication experts. The WCC is staffed completely by MIT lecturers. All have advanced degrees. All are experienced college classroom teachers of communication. All are published scholars and writers. WCC lecturers have a combined 130 years’ worth of teaching here at MIT (ranging from 1 to 26 years).

We work with undergraduates, graduate students, post-docs, faculty, and staff. The WCC helps everyone strategize about all types of academic and professional writing as well as oral presentations and slide design.

No matter what department or discipline you are in, the WCC helps you think your way more deeply into your topic, and helps you see new implications in your data, research, and ideas. The WCC also helps with non-native speaker issues, from writing and grammar to pronunciation and conversation practice. To make an appointment, go to https://mit.mywconline.com and register with our online scheduler. The WCC is at E18-233, 50 Ames Street.

**Technology Policy**

Students may use laptops and tablets to review readings during class discussions and do our workshops. If you are Facebooking or engaging in other distractions I will ask you to close your
computer. I will ask you to put it away your cell phone if you are texting or talking on it in class. If there is an urgent matter that needs to be addressed using your phone (e.g. medical or family issue) please step outside of the room to address it.

Calendar

Building our race and gender literacy

Mon 2/3 - Hello!
Introductions & class overview. What is Race? What is Gender? Intersectional Feminism 101 and why we need to understand it for doing justice-oriented data science.

Mon 2/10 - Data Feminism
How oppression manifests in datasets, algorithms, and AI. Joy Buolamwini’s "Gender Shades" Power Flower Activity.
Read:
- Data Feminism Introduction
- Data Feminism Chapter 1
Watch: Gender Shades By Joy Buolamwini

Mon 2/17 - No Class - Presidents' Day

Tues 2/18 - Workshop: Tech in the Press
Work in groups to do a feminist analysis of power on one of the technology/data products described in these reports.
Read: Data Feminism Chapter 2, plus

Read/watch at least 2 of these case studies:
- Race – Machine Bias by Julia Angwin et al for ProPublica
- Gender – Companies are on the hook if their hiring algorithms are biased by Dave Gershgorn for Quartz
- Class – A Child Abuse Prediction Model Fails Poor Families by Virginia Eubanks
- Gender – How Self-Tracking Apps Exclude Women by Rose Eveleth
- Gender – Design Justice, A.I., and Escape from the Matrix of Domination by Sasha
Costanza-Chock

- Race – Video - Biased algorithmic advertising by Latanya Sweeney (MIT alum!)

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What is fair? What is just?
Perspectives from advocacy, organizing, law, and journalism.

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Mon 2/24 - Interrupting injustice. Allies and accomplices. Guest workshop: Active Bystander Training with Pleasure

Read:
- Allyship (& Accomplice): The What, Why, and How by Michelle Kim on Medium.com
- Rec from PLEASURE?

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Mon 3/2 - Guest lecture: Mutale Nkonde on AI for the People

Reading:
- Excerpt from Safiya Noble’s Algorithms of Oppression
- Advancing Racial Literacy in Tech, a report by Nkonde with Jessie Daniels and Darakhshan Mir

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Mon 3/9 - Guest lecture: Tiffany C. Li on Algorithmic Bias and the Law

Reading:
- TBD

Brainstorm additional dictionary terms & assign dictionary terms to individual students.

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Mon 3/16 - Workshop: Equity vs Equality

Activity: Hands-on data analysis workshop. Modeling equity and equality with MIT admissions data.

Read/Watch:
- Design Justice, A.I., and Escape from the Matrix of Domination by Sasha Costanza-Chock
- Video - Kiddada Green, Executive Director of Black Mothers Breastfeeding Association, explaining equity vs equality – This is about breastfeeding (not tech) but provides a
great explanation of why equity and equality are different things entirely.

**Mon 3/23 - No Class - Spring Break**

**Equity in the City: Using Data & AI for Justice**

**Mon 3/30 - Data journalism & accountability in the "Smart City". Guest lecture from The Markup?**

Due: Your first draft entry for the Social Justice & Technology Dictionary

3:15pm: Info session with Dean Alison Hynd from the PKG Center and ways to get involved.

TBD -- Possibly read/Check out:
- Algorithmic Fairness: Tackling Bias in City Algorithms
- The Algorithms Beat, by Nicholas Diakopoulous for the Data Journalism Handbook
- Check out [http://algorithmtips.org/](http://algorithmtips.org/) and The Markup

**Mon 4/6 - Workshop: Refuse, Reform, Reimagine, Revolt?**

Interactive session & discussion where groups decide whether to refuse, reform, reimagine or revolt against the technology.

Bring: Students bring in a popular press article about gender and/or race bias in data.

Read/Watch:
- Excerpt from Cathy O'Neil's Weapons of Math Destruction
- Abolish Big Data panel from Data for Black Lives

**Mon 4/13 - Guest lecture: Sarah Williams on Million Dollar Blocks**

Due: Peer feedback on dictionary entries
We'll hear from Prof Williams on Million Dollar Blocks.

3:15pm: Info session about the 11-6 Urban Science Major.
Read/review:
- Architecture and Justice – Case study of Million Dollar Blocks
- Review the Urban Science major website

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**Mon 4/20 - No Class - Patriot's Day**

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**Mon 4/27 - Guest lecture: Jinhua Zhao on Gender & Mobility Patterns**

Due: Revised dictionary entry

Read/Watch:
- Hongmou Zhang and Jinhua Zhao, Gender, Social Interaction, and Mobility Sharing, Transportation Research Part A, 1st revision (pdf)
- Prof. Ines Sanchez de Madariaga’s short video talk about gender, mobility & urban planning

3:15pm: Guest info session with Sophia Hasenfus about the Women’s & Gender Studies program

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**Mon 5/4 - Guest lecture: Mayank Varia (BU). Assessing gender pay equity in Boston using multi-party computation**

In class activity: I will, we should, don't forget

Read/Browse:
- Press release about the pay equity project
- What is secure multi-party computation? - short video
- The web form where different corporations uploaded their data for secure processing
- Boston Women’s Workforce Council’s 2017 report on the gender wage gap (esp. see pp. 7-11 where they discuss the data analysis)

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**Mon 5/11 - No group class, but Catherine is available in 10-485M for 1-1 meetings/advising during the class time. Happy to talk about any questions related to your academic trajectory at MIT. Make an appointment here.**
Assignments

Participation & preparation – 50%

Participation in this class is essential. Preparation consists of doing the readings assigned for each class. Participation & preparation will be assessed by attendance and participation in class discussions and workshops. If you are not a person who likes speaking up in large groups, don’t worry – There will be plenty of opportunities for smaller, peer-to-peer discussions where you can participate.

Dictionary entry - 1st draft & final draft – 25%

Our collaborative class project is to create a Social Justice & Urban Science Dictionary. Imagine that the audience for this dictionary consists of MIT undergraduates who are new to some of the concepts of power that we have discussed in this class. Each student is responsible for drafting a dictionary entry for one term. You will turn in a first draft, then three other students (and the professor) will provide feedback on the draft, then you will revise the draft based on their feedback.

Your dictionary entry should contain:

- **Origin of this term** – who coined it and/or developed it recently? How long have people been talking about this term?
- **Description of the term**, in your own words. You can use others' words as supporting quotes, but make sure you provide a definition in your words.
- **Example** of this concept in relation to urban science/Al/technology. For example, if you were writing an entry for sex, gender and sexism, you could describe the example of Amazon’s failed hiring algorithm.
- **3-5 references** where readers can learn more about this term. These might be scholarly works, popular press articles, videos, zines, podcasts, and more. Basically, any sources that you think would resonate with an MIT undergraduate.
- **500-750 words**.

<table>
<thead>
<tr>
<th>Term</th>
<th>Student assigned</th>
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<tbody>
<tr>
<td>Matrix of domination</td>
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<tr>
<td>Intersectional feminism</td>
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<tr>
<td>Privilege / Oppression</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Students assigned to peer review</td>
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<td>-------------------------------------</td>
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<tr>
<td>Equity vs Equality</td>
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<tr>
<td>Race and racism</td>
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<td>Sex, gender and sexism</td>
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<tr>
<td>Settler colonialism</td>
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<tr>
<td>Bias, in training data sets</td>
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<td>Bias, in data collection</td>
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<tr>
<td>Bias, in prediction</td>
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<tr>
<td>Biologic essentialism</td>
<td>See <a href="#">here</a> for a short article on this regarding gender essentialism</td>
</tr>
</tbody>
</table>

**Peer review of three (3) dictionary entries – 25%**

Each student will review three (3) dictionary entries. Reviewing consists of giving three types of comments in another’s document:

1) **Big picture comments**: Is the tone appropriate for MIT undergraduates? Is the writing accessible? Are there sources we have reviewed in class that they missed? Make sure to point out ways that you appreciate their work as well as ways that they could strengthen it.

2) **Section comments**: Is the example they use clear? Do they connect it to the definition of the term? Are the references they suggest appropriate/engaging for undergrads? Make sure to point out things you like as well as things that could use more work.

3) **Line edits**: Edits to individual sentences for clarity and/or content. Make sure you note when you really like how they said something in addition to correcting errors.