**Course Title:** APSTA-GE 2062: Ethics of Data Science

**Number of Credits:** 3

**Meeting Pattern:** twice a week, 1.25 hours for each class, Spring offering

**Office Hours:** TBD

**Course Instructor:** Laura Norén, [laura.noren@nyu.edu](mailto:laura.noren@nyu.edu)

**Course Description:**
Course is designed to build students’ ethical imaginations and skills for collecting, storing, sharing and analyzing data derived from human subjects including data used in algorithms. The course provides historical background to understand the tenets of informed consent, discrimination, and privacy. Using case study design, students will explore current applications of quantitative reasoning in organizations, algorithmic transparency, and unintended automation of discrimination via data that contains biases rooted in race, gender, class, and other characteristics.

**Course Overview**
The power of data analytics to help us understand our world increases daily due to technological advances in strategies for collecting data (passively), implementing studies (randomized experiments), analyzing data (algorithms divorced from theory, history, or a fully contextualized understanding of the consequences of data-driven decisions), and disseminating findings both to broad public audiences and to narrow groups who are disproportionately impacted. Algorithmic decision-making has not been accompanied by a commensurate increase in our understanding of the consequences of choices made by human and machine actors and assemblages of human-in-the-loop sociotechnical systems. Legal rules lag ethical frameworks. In data science, data capture, storage, and model deployment are fragmented across national and cultural boundaries. This course focuses on understanding the ethical implications of empirical research including ethical considerations specific to data collection, study design, data analysis, and the dissemination and application of findings. It provides practical guidance about how to uncover ethical weaknesses in existing protocols and undertake constructive, effective, fair data scientific research and application of automated processes.

**Course Pre-requisites/Co-requisite:**
Pre-requisite: One semester of Statistics or Data Science (for instance APSTA-GE 2003 or DS-GA 1001 or equivalent as approved by the instructor) to be taken before enrolling in this course.

Co-requisite: A second semester of Statistics or Data Science (for instance APSTA-GE 2004 or DS-GA 1002 or equivalent as approved by the instructor) to be taken either before this course or concurrent with it.

**Learning Objectives:**
After satisfactorily completing this course students will:
1) Students will identify and assess the ethical impacts of a given course of action in data-driven organizations
2) Students will describe techniques for protecting privacy, sharing data ethically, and minimizing both collective and individual harm associated with data-driven
organizational processes.
3) Perform an ethical audit of data-driven processes in a given organizational context.

Course Format:
The course will meet twice weekly for 1.25 hours each. The course will include a mix of lectures, group discussion, guest lectures, and small group in-class activities. The professor will begin each class by reinforcing key tenets of the readings as well as historical background absent from the readings via lecture. Then, along with a student assigned on a rotating basis, the professor will lead a discussion about the required readings. Students will all be expected to provide discussion questions, but only the rotating student lead will be expected to guide the discussion. There will be two or three guest lectures from legal and philosophical experts from NYU Law and the Data & Society Institute (located in New York). Students will be expected to be active, respectful, and intellectually additive classroom participants.

Course Requirements
The grade for this course will be determined as follows:
10% assigned discussion leadership
15% class participation, including attendance
20% weekly responses
25% first ethical audit
30% second ethical audit

Students will be required to participate in class activities by asking questions or making comments a minimum of 20 times during the course of the semester. Participation and attendance will be documented by the students in a log they will be asked to maintain and share with the professor (who has the discretion to amend, as applicable).

First ethical audit of the Northpointe case:
The Northpointe case will be assessed by the instructor using a standardized rubric designed specifically for this assignment on a 100 point scale. The rubric will contain sections for writing techniques and communication skill; understanding of the Northpointe case and criminology; proper application of theoretical constructs and precedents; and the identification and presentation of techno-ethical findings of the audit. Students will also be provided unique written feedback addressing their strengths and possible shortcomings.

Second ethics audit:
The second ethics audit will use a rubric, written feedback strategy, and 100 point scale similar to the first ethics audit. In this case, pairs of students will be asked to provide a three-way assessment of the overall project, their contribution, and their partners’ contribution. The professor will also provide an assessment of the overall project.
Reading responses and discussion questions:
Weekly reading responses will be assessed on a 5 point scale.
1 = submission received
2 = student demonstrates understanding of at least one reading
3 = student demonstrates understanding of at least one reading or part of a reading, provides a thoughtful discussion question for at least one reading or part of a reading
4 = student demonstrates understanding of the full reading assignment
5 = student demonstrates understanding of the full reading assignment, provides meaningful analysis, insight, and examples during discussion

Class Participation:
This course is highly interactive, both in terms of working and learning in teams and as a classroom. Interaction takes a variety of forms, ranging from small group discussions, seminar participation, and leading discussions of particular readings. Different skills are emphasized at different times. The evaluation of class participation uses a flexible scale so that everyone can achieve the highest measure. For each class meeting students will provide a self-assessment and receive an assessment from a randomly selected peer: 1=present, 2=responsive, 3=active. During sessions in which the student is co-leading the discussion, they will receive three assessments: a self-assessment, a peer assessment, and an instructor assessment for preparedness, grasp of the material, and capacity to spark discussion.

The overall participation grade is obtained by averaging over the class sessions.

Letter grades will be assigned using the following criteria:
A= Excellent [90-100% of points available in a given assignment category]
This work is comprehensive and detailed, integrating themes and concepts from discussions, lectures and readings and offering valuable original insight. Writing is clear, analytical and organized. Arguments offer specific examples, incorporate relevant literature, and concisely evaluate evidence. Students who earn this grade are prepared for class, synthesize course materials, contribute insightfully, and craft salient techno-ethical scholarly contributions.

B=Good [80-89% of points available in a given assignment category]
This work is complete and accurate, offering insights and competent understanding. Writing is clear, uses examples properly and tends toward broad analysis. Classroom participation is thoughtful and frequent.

C=Average [70-79% of points available in a given assignment category]
This work is correct but is largely regurgitates readings, lacking synthetic analysis. Writing is vague and fails to completely address the key questions. Arguments are unorganized, without specific analysis. Classroom participation is lacking or inarticulate.

D= Unsatisfactory [60-69% of points available in a given assignment category]
This work is incomplete, and evidences little understanding of the readings or discussions. Arguments demonstrate inattention to detail, misunderstand course material and overlook significant themes. Classroom participation is spotty, unprepared and off topic.

F=Failed [<60% of points available in a given assignment category]
This grade indicates a failure to attend class, participate in class, and/or complete assignments.

Assignments

1) Weekly responses: This is a reading heavy course. In order to make sure it is also a thinking heavy course, students will be asked to engage with the texts through written responses to be submitted via email as well as in-class discussions. Ethics is a practice. Regular, ongoing, deep engagement with the ideas in the texts is a key strategy for developing an ethical imagination. Each week students will prepare 400-500 word responses to the readings, due before class via email. Responses will crystallize the authors’ key points and offer a question or set of questions based on the text and any relevant previous readings suitable for in-class discussion.

2) Co-leading class discussion: Depending on enrollment, each student will be expected to co-lead the discussion portion of the course at least twice with a student partner. They will ideally co-lead discussions with a single partner, though with high enrollment there may be groups of three. Discussions will be assessed based on ability to identify key questions, present a balanced overview (include all the readings and the viewpoints within them), and tie in key ideas from previous weeks.

3) Perform an ethical audit of the COMPAS/Northpointe bail setting case: Jails and prisons are overcrowded; judges' schedules are overbooked, threatening the constitutional right to a speedy trial and putting municipal budgets under pressure. Cities and counties are challenged to maintain public safety without expanding their physical capacity to house convicted criminals. One of the ways they hope to minimize costs and social harms is to release as many accused people out on bail to await trial in the community as they can without reducing safety levels in the community. This allows those who are released to keep their jobs, maintain childcare responsibilities (if any), and otherwise continue to support themselves, their families, and their communities. These benefits must be balanced against the potential harms that occur if accused criminals are released into situations where they commit additional crimes. Judges already make these kinds of bail decisions every day. In many situations, their dockets are so full they have very little time to adjudicate any particular case. Now data-analytics companies are offering to use predictive models to give each arrestee a recidivism score that time-strapped judges can use in their rapid-fire decision making context.
We look at the company Northpointe which offers a recidivism prediction score in roughly a dozen states. Investigative journalists at ProPublica have denounced the company for producing racial bias as measured by the differential rate of false positives between whites and blacks. Northpointe has countered this accusation, arguing that their algorithm is fair, focusing attention on community protection true positives and true negatives.

Students are asked to perform an audit of this case using ethical theory from weeks 2 and 3 as well as a socio-statistical assessment. How do we balance harms to society, rights to fair trials, budgets, and communities? Is any predictive analytics platform likely to lead to ethical lapses? Is a data-driven decision making strategy ethically acceptable if it outperforms the humans and organizational processes previously in place or can we develop a new ethical template for assessing the impact of data-driven decision making tools?

Essays will provide historical background related to predictive policing, American attitudes towards punitive not rehabilitative policing, and carceral budgeting. They will then present an original ethical audit of the Northpointe/COMPAS algorithm ad its application.

Essay length will range from 12-15 pages.

4) Perform an ethical audit of your own research partnership (or a research project from outside of class): In teams of two, students will perform an ethical audit of a project they are working on in an internship or for another course. If neither partner has worked on a suitable project, they may select from a submitted list of faculty research projects. In pairs, students will gather relevant case material, examine research protocols, data capture and storage, and investigate the impact of ongoing or future applications (if any). Students will provide an analysis of ethical adherence, lapses, discuss likely impacts on the organization, the subjects, the data, and key stakeholder groups throughout the community.

Essay length will range from 12-15 pages.

Required Readings and/or Text
The readings are all articles that are referenced in the course outline. They are either freely available through the library or will be posted on Classes.

Course Outline (list of topics by week)
Week 1: Overview of ethical issues in data-driven organizations

Overview of data science as an ethical practice


Introduction to the unique ethical challenges of ‘big data’


Week 2: Ethical Theory - Philosophical frameworks for assessing fairness

Early theories of fairness

Rousseau, Jean-Jacques. (1754) Discourse on the origin and basis of inequality among men. [Many print versions of this text have been published. Available in full here: https://www.aub.edu.lb/fas/cvsp/Documents/DiscourseonInequality.pdf]

Mill, John Stuart. (1861) Utilitarianism. [There are multiple published versions of this treatise

- it is also available in full here: https://www.utilitarianism.com/mill1.htm]

Moving towards contemporary theories of fairness

[excerpts including the Veil of Ignorance]


Week 3: Research ethics for data science

Ethical side effects of the publish or perish system: p-hacking and small sample size


In-class: the Belmont Report, history of research ethics guidelines and protocols.

The misapplication of informed consent in dataveillance practices


Optional


**Week 4: Techniques of data ethics 101**


doi:10.1023/A:1010016102284


**Getting from data to individuals: Internet traces and Geofingerprints.**


**Week 5: All data are human data: On the discriminatory trouble with training data**

http://scholarship.law.berkeley.edu/californialawreview/vol104/iss3/2

http://www.theverge.com/2015/7/1/8880363/google-apologizes-photos-app-tags-two-black-people-gorillas


**Week 6: Discrimination and algorithms**

In some cases, algorithms obscure unintentional bias. In other cases, algorithmic bias is, if not intended then at least condoned obscured by company's refusal to share data with would-be third party auditors.

The ethics of price discrimination  

Angwin, Julia; Larson, Jeff; Kirchner, Lauren; and Mattu, Surya. (2017, 5 April) Minority neighborhoods pay higher car insurance than white neighborhoods with the same risk.  
ProPublica, co-published with Consumer Reports. Accessed online  
https://www.propublica.org/article/minority-neighborhoods-higher-car-insurance-premums-white-areas-same-risk

Criminal justice by algorithm  
Angwin, Julia; Larson, Jeff; Mattu, Surya; and Kirchner, Lauren. (2016, May 23) Machine bias. ProPublica. Accessed online:  


**Week 7: The philosophical challenge of thinking in categories**
How humans explain their social worlds through perceptions and statistics

Social processes and the impact of categorical life

**Week 8: Data ethics for researchers**
Health Research


**NPR: Fresh Air.** Accessed online: http://www.npr.org/2010/02/02/123232331/henrietta-lacks-a-donors-immortal-legacy

**Educational Research**


**Week 9: The ethics of data scraping and storage**


**Week 10: Mosaic data, found data, and designed data**


**Week 11: Privacy and Surveillance**

**Week 12: Special topics in surveillance: Adtech**
http://cacm.acm.org/magazines/2013/5/163753-discrimination-in-online-ad-delivery/fulltext

**Week 13: Special topics in surveillance: Employment**


**Week 14: Differential privacy**


**Guidance for acting ethically with data**


**Academic Integrity:**

All students are responsible for understanding and complying with the New York University Steinhardt School Statement on Academic Integrity. A copy of this statement is available at: http://steinhardt.nyu.edu/policies/academic_integrity.
Students with Disabilities:

Students with physical or learning disabilities are required to register with the Moses Center for Students with Disabilities, 726 Broadway, 2nd Floor, (212-998-4980 and online at http://www.nyu.edu/csd) and are required to present a letter from the Center to the instructor at the start of the semester in order to be considered for appropriate accommodation.