Part I. Course Basics

Course Overview and Prerequisites

This class will teach you to recognize where ethical issues can arise when applying data science to real world problems. It will bring more analytic precision to ethical debates about the role that data science, machine learning, and artificial intelligence play in consequential decision-making in commerce, employment, finance, healthcare, education, policing, and other areas. Largely through discussion of case studies, we will focus on ways to conceptualize, measure, and mitigate harm in data-driven decision-making. You will learn to think critically about how to plan and evaluate a data science project with ethical concerns in mind, and how to cope with novel challenges for which there are often no easy answers or established solutions.

To do so, you will learn key technical, ethical, policy, and legal terms and concepts that are relevant to ethical assessment in data science; learn about some of the common approaches and emerging tools for mitigating or managing these ethical concerns; and gain exposure to readings that will help you understand the current ethical and regulatory environment and to anticipate future developments. Ultimately, the class will teach you how to reason through these problems in a systematic manner and how to justify and defend your approach to dealing with them.

The prerequisites for this course are admission into the M.S. program in Applied Data Science and successful completion of SIADS 501, “Being a Data Scientist.”

Instructional Team

For this course, we have a primary instructor, three supporting instructors (who also teach other courses in MADS and elsewhere at UMSI), and a group of graders. As a student in SIADS 503, you will primarily interact with the primary and supporting instructors; the graders work behind the scenes to assess and provide feedback on your weekly assignments.

- Primary Instructor: Dr. Melissa Chalmers
- Instructional Staff: Dr. Anthea Josias, Dr. Nick Sheltrown, Merve Hickok
Communications Expectations

- **Contact the instructional team:** Slack is the primary communication mechanism between the instructional team and students for this course. Course channel in Slack = siads503_wi21_001

- **Slack response time:** within 24 hours.

- **Email response time:** N/A; please use Slack

- **Office Hours:** Fridays 12 pm - 1 pm; Mondays 5 pm - 6 pm. Both are Eastern Time and held on Zoom. Please refer to the [Live Events](#) section in Coursera for links.

How to Get Help

This is a large class, but it’s still easy to get help if you need it:

- **Questions likely to be of general interest to other students in the class:** please post to the course Slack channel. Note that there will be pinned posts for each of the four weekly assignments.

- **To request additional individualized feedback or support on weekly assignments:** If you got feedback that you are having trouble understanding, or perhaps you disagree with it and would like some substantive advice on how to improve in future weeks, please follow these steps:
  - Write up as specific a question as you can, including enough context for the instructor team to understand it. Be sure to include your best interpretation of what the feedback is telling you.
  - Send a slack DM to the whole instructional team (@Melissa Chalmers, @Anthea Josias, @Merve Hickok, @Nick Sheltrown) with your question or concern (written up as an attachment or inline within slack). One of us will get back to you in the slack thread, usually within 24 hours.

- **If you have questions concerning the degree program or encounter issues using Slack,** please email umsimadshelp@umich.edu.

- If you have an issue specific to the Coursera environment, you can begin a live chat session with Coursera Technical Support (24/7) or view Coursera troubleshooting guides. (you may be asked to log in to your Coursera account).
Required Textbook

You will be given a list of required and recommended readings within the course. Online access to these readings are provided through the University of Michigan Library or through approved online sources. For resources provided through the library, you will be asked to sign in with your UMich uniqname and password to access these materials. There is no required textbook for this course that needs to be purchased separately from a bookstore.

Learning Outcomes

1. Achieve literacy on the potential harms of data collection, aggregation, and analysis typically found in applied data science contexts.

2. Achieve literacy in the most important terminology of ethics that applies to data science.

3. Achieve literacy in writing ethical assessments (e.g., a memorandum) of a data science analysis or an automated system incorporating data science.

4. Achieve competency in articulating the reasoning behind the most important ethical challenges of data science as applied to course domains of privacy, bias/classification, provenance/aggregation and accountability/consequences.

Please note that you will also see "Learning Objectives" listed at the start of each week. Think of these as "Goals for This Week."

Course Structure

Each week, this course consists of recorded lectures and two offices hours produced by the teaching team. Lectures consist of overview material about concepts as well as the discussion of case studies. In addition, a guest speaker will visit or we will take a field trip. This will provide one or more additional recorded lectures, interviews, or conversations. Each week there will be both required readings and recommended readings.

A low-stakes, open-book weekly quiz will provide an incentive to keep up with the readings/viewing. The primary work of the course is one writing assignment each week.

Lectures supplement but do not always review or duplicate the readings; readings supplement but do not always duplicate the lectures. That means some of the course content is available only from a lecture or a reading. For instance a concept may not be mentioned in lecture, but it may be the key point of a reading. Students are still responsible for that material.

Course Deadlines

This course begins on Wednesday March 3, 2021 and ends on Tuesday, March 30, 2021.

updated 2/26/21, mkc
Weekly Quizzes and Writing Assignments will be due on Tuesdays at 11:59 pm (time zone is Ann Arbor, Michigan; Eastern Time).

The Extra Credit assignment will be due on Tuesday, March 30 at 11:59 pm (time zone is Ann Arbor, Michigan; Eastern Time).

Grading

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% of Final Grade</th>
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</thead>
<tbody>
<tr>
<td>Weekly Quizzes (4 quizzes; lowest score dropped)</td>
<td>10%</td>
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<tr>
<td>Weekly Writing Assignments</td>
<td></td>
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<tr>
<td>Week 1: Memo about a privacy concern</td>
<td>(15%)</td>
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<tr>
<td>Week 2: Evaluation of the What-If Tool</td>
<td>(25%)</td>
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<tr>
<td>Week 3: Perform an algorithmic impact assessment</td>
<td>(25%)</td>
</tr>
<tr>
<td>Week 4: Design an ethics oath, pledge, or checklist</td>
<td>(25%)</td>
</tr>
<tr>
<td>Extra Credit – Write Your Own Quiz Questions</td>
<td>0% (up to 2.5% EC)</td>
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</tbody>
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Note: All assignments (except for EC) are required to earn credit for this course.

Letter Grades, Course Grades, and Late Submission Policy

Refer to the MADS Assignment Submission and Grading Policies section of the UMSI Student Handbook (access to Student Orientation course required)

Final letter grades for the course will be calculated using the following scale: A 93%+; A- 90-92%; B+ 87-89%; B 83-86%; B- 80-82%; C+ 77-79%; C 73-76%; C- 70-72%; D+ 67-69%; D 63-66%; D- 60-62%; E 59% or below.

Late submissions receive 10% penalty per day. Note: Gradescope does not accept late submissions, so you must submit late assignments to Anthea Josias via Slack DM (@Anthea Josias).

Regrade Requests Policy

Graders may make mistakes. Gradescope has a system for regrade requests; please use it to request review of an assignment. Regrade requests will be handled by a different grader. The entire assignment will be regraded, applying all elements of the grading rubric. Your grade could go up or down.
II. Additional Course Policies

Accommodations

Refer to the Accommodations for Students with Disabilities section of the UMSI Student Handbook (access to the Student Orientation course required).

Use the Student Intake Form to begin the process of working with the University’s Office of Services for Students with Disabilities.

Library Access

Refer to the U-M Library’s information sheet on accessing library resources from off-campus. For more information regarding library support services, please refer to the U-M Library Resources section of the UMSI Student Handbook (access to the Student Orientation course required).

Student Mental Health

Refer to the University’s Resources for Stress and Mental Health website for a listing of resources for students.

Student Services

Refer to the Introduction to UMSI Student Life section of the UMSI Student Handbook (access to the Student Orientation course required).

III. Course Schedule

Week 1: Introduction and Data Privacy

Framing Questions:

- What is Data Science Ethics?
- Does Data Science Hate Privacy?
- Is Privacy-Respecting Data Science Even Possible?

Major Class Topics This Week:

- The 15 Top Misconceptions About Data Science Ethics
- What is a “patient” or “stakeholder”?
- Special Guest: Amanda Stanhaus, School of Public Health, University of Michigan and Fellow, US National Institutes of Health

updated 2/26/21, mkc
Additional Key Concepts:

Ethics vs. law/compliance/public relations; cultural relativism; “professional” ethics in data science; individuals vs. collectives; the “nothing to hide” argument; the “Fair Information Practice Principles” and their problems; The Belmont Report principles; informed consent; privacy dependencies

Required Readings:


Assessments Due:

- Week #1 Quiz
- Whistleblower Memo About a Privacy Concern

Week 2: Bias and Classification

Framing Questions:

- Is Data Science Backward-Looking?
- Is it Inherently Discriminatory?

Major Class Topics This Week:

- Classification
- Cumulative Disadvantage and Protected Classes
What is a “harm”?
Field Trip: **Project Green Light**: University of Michigan Detroit Center; Detroit’s Corktown Green Light District
Special Guest: **Tawanna Petty**, Director of Data Justice Programming for the Detroit Community Technology Project.

**Additional Key Concepts:**
- harm without intent;
- objectivity/neutrality;
- bias toward the majority;
- error analysis;
- team diversity

**Required Readings:**

1. American Civil Liberties Union. (2004). "Scary Pizza." (video.) 01:42. Available online: [https://www.youtube.com/watch?v=33ClJVyYyEh](https://www.youtube.com/watch?v=33ClJVyYyEh)

**Practice materials for this week’s assignment:**

- **The What-If tool.**
  - See also the What-If Tool documentation, e.g., the walkthrough [https://pair-code.github.io/what-if-tool/walkthrough.html](https://pair-code.github.io/what-if-tool/walkthrough.html) (optional), or introductory videos about the tool on YouTube [https://www.youtube.com/results?search_query=%23whatiftool](https://www.youtube.com/results?search_query=%23whatiftool) (optional).

**Assessments Due:**

- Week #2 Quiz
- Memo Evaluating the What-If Tool

**Week 3: Accountability and Governance**

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Framing Questions:

- Can large, automated systems be effectively controlled?
- When are YOU responsible?

Major Class Topics This Week:

- How Transparency Works and Doesn't Work
- Algorithm Auditing, External Auditing, and Reverse Engineering
- How should we consider “power” and regressing/progressive acts in data science ethics?
- Special Guest: J. M. Porup, a freelance cybersecurity reporter whose work has appeared in The Economist, Vice, Ars Technica, Motherboard, and elsewhere.
- Special Guest: Sol Bermann, Former Director of International Privacy, Walmart Corporation; current Chief Information Security Officer, University of Michigan.

Additional Key Concepts:

- governance; accountability workflows; consequences predictable by experts vs. discoverable by users; approaches to auditing; algorithmic accountability reporting; reverse engineering.

Required Readings:

5. Drew Harwell. Colleges are turning students' phones into surveillance machines, tracking the locations of hundreds of thousands. The Washington Post.

Assessments Due:

- Week #3 Quiz
- Memo Evaluating the What-If Tool

**Week 4: Data Provenance and Aggregation; Course Conclusion**

Framing Questions:

- Does data science always leave something out?
- Are data ever truly portable?
Major Class Topics This Week:

- Challenges of “public” data
- Sampling as an ethical problem
- What is a “norm”? What are grounds by which we make ethical claims?
- **Special Guest: Kathy Pham**, founder, Ethical Tech Collective; former founding member, Product and Engineering Team, United States Digital Service, The White House.

Additional Key Concepts:

- provenance (a.k.a. origination); sampling bias; aggregation; retention; disposition; forgetting / erasure; building ethics into a data science culture

Required Readings:


Assessments Due:

- Week #4 Quiz
- Design and Ethics Oath, Pledge, or Checklist

IV: Bibliography of Additional Readings

These are additional *recommended* readings that may be of interest to you. (Listed by week and topic.)

**Overall**

- Cornell Tech - Good Code Podcast. *Episode 8: Solon Barocas on Teaching Ethics in Data Science*.

updated 2/26/21, mkc
Privacy


updated 2/26/21, mkc
Bias and Classification

- 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.

Accountability and Governance

Professional Pledges, Oaths, and Checklists


V. Acknowledgements
Thank you to Casey Fiesler, Natalie Garrett, and Nathan Beard’s work on ethics and their ethics syllabi research project. This syllabus is in debt to the syllabi of Paul Conway. Thanks for specific suggestions from Solon Barocas and Karrie Karahalios. Thank you to our generous beta-testers and guest speakers, as well as to James Wexler, Fernanda Viegas, and Google PAIR (People + AI Research). Finally, general thanks to the Ethical Tech Collective and the FAT* community.