

Computer Science CS 5970: AI, Ethics, and Geoethics

Instructor: Dr. McGovern

Spring 2021

Course Overview

This course will focus on topics in ethics of Artificial Intelligence (AI) and environmental sciences (ES)/geosciences as well as the intersection of the two. The course will also include responsible conduct of research, including ethical scientific conduct and the ownership of ideas, algorithms and data but will focus on these themes as specifically related to AI and ES. The course will include discussions about intellectual property (IP) and how IP varies across entities.

This course will also foster critical skills for interdisciplinary research. We will integrate a series of lectures to foster interdisciplinary thinking with focus on developing interdisciplinary habits of the mind (Luckie et al., 2018, Pedagogy for interdisciplinary habits of mind), such as: setting aside personal convictions, striving for a feel of each discipline's perspective, not falling in love with a solution until you understand the complexity of the problem, and, most importantly, valuing intellectual flexibility and playfulness. We will also teach a range of other relevant topics from the fields of Interdisciplinary Studies (covering seminal work by Repko, Stein and Newell) and from the Science of Team Science (work by Fiore, Pennington and others).

The AI and ethics content will include the following, especially as they relate to ES:

- Bias: Do the population biases in our data create forecasting biases in the AI algorithms? Could this bias affect specific populations unfairly? How can we account for this bias in our data collection and in our learning algorithms?
- Transparency: As we develop trustworthy AI, are the algorithms transparent to all populations? Our focus group is expert scientists, but does this create a lack of trust with the general public? What can we do to enhance the overall transparency of the algorithms for everyone?
- Liability: Who is responsible if an AI algorithm produces an incorrect forecast and people are killed or property is lost? Are there policies that can help reduce liability? Who is responsible if a self-driving car makes a mistake?
- Humanity: How do machines affect our behavior and interaction? How do forecasters and the general population react to AI-generated forecasts? How do we properly study trustworthy AI with human subjects? Does the difference between experts and the general public matter for the overall trustworthiness of AI?

- Security: How do we protect the critical algorithms from deliberate errors in data? How can we protect the AI from security breaches?
- Employment: As AI algorithms become integrated into the forecasting and scientific workflow, how does that affect the employment of current and future forecasters and scientists? Do jobs disappear or do they just change and require new training? How does this affect employment across all jobs? How does this potentially restructure society?
- Policy: What policies exist to govern the use and development of AI? Are there any policies guiding the ethical use of AI?
- Data sharing: When you share data used to train an AI algorithm, are there ethical issues you need to consider? How well can you anonymize the data that you release? Is there harm from sharing the data?

Learning Objectives

The general/overall learning objectives are:

- Identify the potential ethical implications of data collection
- Identify sources of bias for AI algorithms, particularly as it relates to ES/geoscience applications
- Identify ways to reduce bias in AI algorithm development
- Communicate effectively across disciplines, in public discourse, and politically

General Information

- **Class time:** Online, Asynchronous
- **Class location:** Online
- **Prerequisites:** A basic background in AI or ML is assumed.
- **Required materials:**
 - Race After Technology by Ruha Benjamin
 - Weapons of Math Destruction by Cathy O'Neil
 - Automating Inequality by Virginia Eubanks
 - On Being a Scientist published by the National Academies Press
 - Scientific Integrity and Ethics in the Geosciences by Linda Gundersen.
- **Instructor details:** Dr. McGovern
 - Office: Devon Hall 251 (online for now)
 - Class URLs:
 - The official page is here: <http://canvas.ou.edu>
 - Resources will also be available on www.ai2es.org
 - Email: amcgovern@ou.edu
 - Office hours: Via slack or by appointment

Evaluation

What you get out of a course will depend on what you put into it! Following that philosophy, your grade will be determined by you. You will accumulate points through completion based questions in canvas and you will have a mid-semester and end-of-semester conference with Dr McGovern to self-evaluate your progress. The course will involve class participation and a class project (determined by the class itself) and you will learn the most if you actively contribute to all aspects of class.

Online Grade Summary: Canvas has a grade book that will store all of your points. It is your responsibility to verify that the grades on Canvas are correct. If an error is found, bring the document to me and I will correct Canvas.

Due dates: Life in a pandemic has been hard on everyone. As such, the class aims to be as flexible as possible while accommodating the need for active participation to involve regular engagement with the materials in a similar time frame as everyone else. Assignments have deadlines in canvas but will be accepted through the end of each module with no penalty.

Projects: Your final project will be due the last week of classes. Per university policy, you may turn this project in prior to pre-finals week if you have completed the project.

Course Policies

The following set of rules will help keep us all on the same page all semester and help to ensure fair treatment for all students.

The outside-world allows collaboration and so do we, but there are rules to follow to ensure that you learn the material.

- **Academic Misconduct:** Academic misconduct hurts everyone but particularly the student who does not learn the material. **All work submitted for an individual grade must be the work of that single individual.**
 - Your project code and writeups must be written exclusively by you or your group. **Unless approved in advance with Dr. McGovern, the use of any downloaded code or code taken from a book (whether documented or undocumented) is considered academic misconduct.**
 - Helping each other cannot consist of copying code or solutions. If someone offers to help you this way, they are not helping you to learn the material!
 - For the projects, students working in group projects are expected to share code within the project group but you should not share beyond your group.

- Upon the first documented occurrence of academic misconduct, I will report it to the Office of Academic Integrity. [The Students Guide to Academic Integrity](#) describes this process.
- **(Virtual) Classroom Conduct:** Conduct matters in the classroom, whether virtual or in person. ALL classroom conduct is expected to follow one rule: **Respect**.
 - Each student will agree to the following code of conduct for class:
 - All members of class will create and uphold a safe, open, welcoming, inclusive, and professional environment for learning, conducting, and communicating science with integrity, respect, fairness, trustworthiness, and transparency. This includes learning and using good practices for intercultural and diverse collaborations, maintaining the dignity of all individuals, and valuing diversity in all forms.
 - All members of class will refrain from all forms of discrimination, harassment, and bullying.
 - In addition to their own conduct, any class members who either witness or are made aware of discrimination, harassment, or bullying by others should actively seek to prevent, report, and/or otherwise mitigate the offensive behavior.
 - Students who violate the class code of conduct can be charged with a violation of the [Student Code of Responsibilities and Conduct](#). If you have repeated disruptive issues, you will be withdrawn from the class.
- **Religious Holidays:** It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays.
- **Incompletes:** The grade of I is intended for the rare circumstance when a student who has been successful in a class has an unexpected event occur shortly before the end of the class. During the pandemic, receiving an incomplete requires that you are currently passing the class and that you have finished at least 50% of the work of the class.
- **Accommodation of Disabilities:** The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students requiring academic accommodation should contact the Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please see the [Disability Resource Center](#). Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.
- **Adjustments for Pregnancy/Childbirth Related Issues:** Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Disability Resource Center at 405/325-3852 as soon as possible. Also, see the [Institutional Equity Office FAQ](#) for answers to commonly asked questions.

- **Title IX Resources:** For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or smo@ou.edu. Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies may be directed to the [OU Equity Office](#).
- **Final Exam Preparation Period:** Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to [OU's Final Exam Preparation Period policy](#).