Considerations

before

Code

Implementation

RIGHT

GLOBAL IMPACT

WRONG

```
def AI_algo:
    while True:
        have_bias()
        create_addiction()
        gather_data()
        exploit_privacy()
```
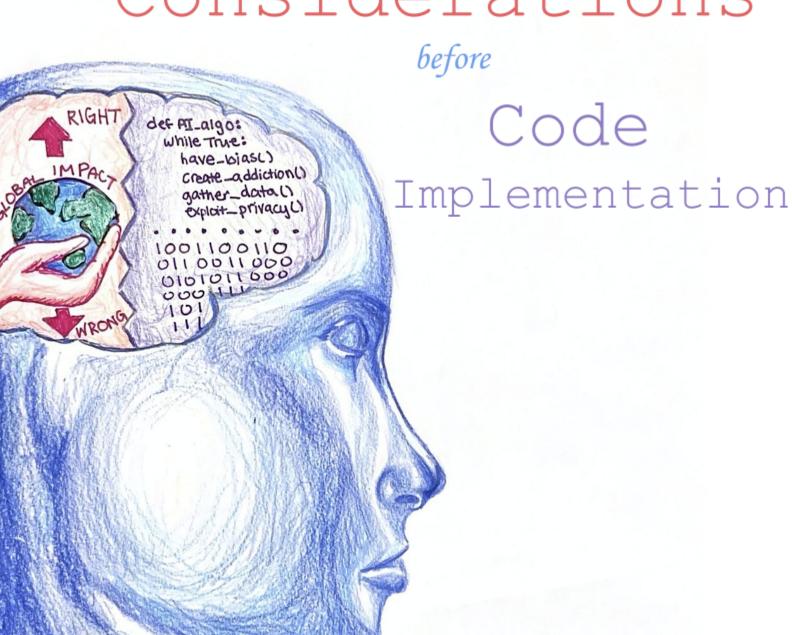
```
100110 0110
011 0011 000
0101011 000
000 111
101
111
```

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Course Description:

As computer scientists, we work towards future careers that have the power to influence the technology we find in our pockets, in our homes, and in our cars. For everyone around the world and for all age ranges, decision-making algorithms are ubiquitous. Whether we use this influence to improve or diminish peoples' quality of living is up to us. What approach to decision making should we take when designing and implementing new technologies? What are the current ethical concerns in the industry and how are industry leaders addressing these issues, if at all? Each unit in this course will discuss the current ethical concerns in the industry and teach students the tools they need to navigate ethical conundrums. As students explore the large, spanning issues of today, they will confront problems and learn to consider a different side to everyday technologies.

Rationale/Course Principles:

Technology affects how we think, live, and interact with each other. It changes how we define what it means to be a person living in the 21st century. To the average consumer, technology is a black box so as the only people capable of recognizing its technical flaws, we must be the ones to identify and prevent those flaws.

That being said, this course aims to achieve three major principles. First, to understand the current and future ethical implications of technology. Second, to build your toolkit in analyzing and critically assessing specific algorithms presented in real-world case studies. Lastly, to form your own unique ethical understanding of programming and design practices.

Assignments/Breakdown:

There are four major topics encountered in this course: Privacy, Addiction in Tech, Big Data, and Artificial Intelligence. Each topic will consist of two weeks of material. Privacy is a baseline for understanding how people interact with technology and the human experience. The next topic of addiction leads to privacy concerns and enables the collection of big data. Big Data, in turn, drives Artificial Intelligence. Artificial Intelligence is the course capstone because it encompasses the future of the computer science industry due to its game-changing capabilities.

A group case study project accompanies each major topic. Your group will apply the principle teachings of that topic's lecture material

to a real example of ethical dilemmas in the technology industry. For each topic, the first week focuses on reading materials, while in the second week, groups prepare a case study for a final presentation at the end of the second week. With this case study, your group will also submit discussion questions to discuss in groups during class. For each topic, students will discuss questions they have for each sub-section and compile the group's answer to each question, as well as comment with their own reflections for submission.

Group case studies force students to seek out and discover more real-world examples of the major topics outside of class. Students can then find how these real-world examples impact them and further contemplate how their future careers affect the world. Furthermore, the discussions allow students to explain and verbalize their thoughts. In addition, they promote collaboration with classmates and foster an environment for critical thinking.

Additionally, the first week introduces the course and the final week focuses on final remarks. During this first week of introduction, each student will write a 200-word journal entry on "what does ethical technology mean to you?" In the final week of the course, the student will repeat this journal entry to see how their views changed throughout the course.

Lastly, for the final, each student will use all of their acquired knowledge of the course material to code an algorithm for a trolley problem. A written explanation discussing a student's reasoning behind their decisions in context of the skills learned throughout the course will help determine their grade.

Grade Breakdown:

Assignment	Weight
Intro Post on *"what does ethical technology mean to you?"*	2.5%
Conclusion Post on *"what does ethical technology mean to you?"*	2.5%
Final Trolley Problem	15%
Each Case Study (x4)	18%
Each Group Discussion (x4)	2%

Reading/Assignment Schedule:

Week One, Meeting One
Intro ethics reflection essay in 200 words

Week One, Meeting Two

94 min watch   The Social Dilemma (Movie) available on Netflix

Week Two, Meeting One

24 min listen   The Business of Selling Your Location (Podcast)
Michael Barbaro

10-15 min read   Your Apps Know Where You Were Last Night, and They're Not Keeping It Secret (Published 2018) (Article)
Jennifer Valentino-DeVries

Week Two, Meeting Two

5-10 min read   "Who cares, I have nothing to hide" — Why the popular response to online privacy is so flawed (Article)
Xavier Harding

12 min watch   Mass Surveillance With Edward Snowden and Jared Leto (YouTube video)
RYOT YouTube channel

Week Three, Meeting One

15 min read   Apps and traps: dating apps must do more to protect LGBTQ communities in Middle East and North Africa (Article)
Article 19

4 min listen/read   Can Computer Programs Be Racist And Sexist? : All Tech Considered (Article/Audio)
Laura Sydell

Week Three, Meeting Two

15-20 min read   [Apple vs. Samsung: Everything you need to know](#) (Article) Geoff Duncan

Week Four, Meeting One

~5.5 hour read   The Attention Merchants (Book) Tim Wu

Week Four, Meeting Two

5 min skim   Deep Neural Networks for YouTube Recommendations (Study) Paul Covington, Jay Adams, Emre Sargin, pdf provided. Use as reference.

10 min read   Problematic and Extensive YouTube use: first hand reports (Study) Results section only, pdf provided. Jane Klobas, Tanya McGill, Sedigheh Moghavvemi, Tanuosha Paramanathan

Week Five, Meeting One

20 min read   [Have Smartphones Destroyed a Generation?](#) (Article) Jean M. Twenge

30 min listen   [Everything in Moderation](#)(Podcast) Manoush Zomorodi

Week Five, Meeting Two

17 min watch   [Tristan Harris TED Talk](#) (Video) Tristan Harris

30 min read   [Network Propaganda](#) (Book) Only "Propaganda Pipeline" chapter (25 pages) Yochai Benkler, Robert Faris, Hal Roberts

Week Six, Meeting One

5 min read   http://www.socialcooling.com/ (Website)

~4.5 hour read   Weapons of Math Destruction (Book)
                          Cathy O'Neil

Week Six, Meeting Two

25 min   The Age of the Algorithm (Podcast)
listen/read   Delaney Hall

20 min read   Big Data Revolution (Podcast)
                          NPR - TED Radio Hour

Week Seven, Meeting One

15 min read   Facebook profiles harvested for Cambridge
                          Analytica (Article)
                          The Guardian

2 hour watch   "The Great Hack" (Netflix Documentary)
                          Karim Amer, Jehane Noujam

Week Seven, Meeting Two

25 min read   Do Algorithms Have a Place in Policing? (Article)
                          Eva Ruth Moravec

Week Eight, Meeting One

20 min read   Can A.I. Be Taught to Explain Itself? (Article)
                          Cliff Kuang

20 min read   Here Come the Fake Videos, Too (Article)
                          Kevin Roose

Week Eight, Meeting Two

20 min read   One Month, 500,000 Face Scans: How China Is Using
                          A.I. to Profile a Minority (Article)

Paul Mozur

3 min listen/read	[Facial Recognition May Boost Airport Security But Raises Privacy Worries](#) (Article) Asma Khalid

Week Nine, Meeting One

30 min read	[Understanding perception of algorithmic decisions: Fairness, trust, and emotion in response to algorithmic management](#) (Study) Min Kyung Lee

Week Nine, Meeting Two

12 min watch	[Can we protect AI from our biases?](#) (TED Talk) Robin Hauser
5 min read	[A.I. Experts Question Amazon's Facial-Recognition Technology](#) (Article) Cade Metz and Natasha Singer

Week 10
Students rewrite the week 1 introductory essay to demonstrate how their ideas have changed throughout the course.

Week One: Introductory
Learning goal: This week we will be going over the syllabus and discussing the importance of ethical implications. Additionally, we will go over what ethical skills and toolsets are necessary to approach a humanities class that also encompasses elements of technology.
   - Discussion:
      - What do you know or believe about tech ethics?
      - Who do you think is responsible for considering ethical issues?
      - How to take a Humanities course? Close reading, ethical analysis tools, discussion skills

Week Two-Three: Privacy
Learning goal: As technology and its applications become more ubiquitous in our everyday lives it is becoming harder to keep our data private. Have you ever stopped to read the terms and conditions that you sign when you sign up for a Facebook account (or any other social media account)? Many times you are agreeing to allow the app

to collect your data in exchange for the ability to use the platform on a free account. In this unit, we will introduce the issues regarding the loss or compromise of privacy. We will discuss what is ethical to keep private and when it is okay to compromise privacy. Lastly, we will learn why it is becoming harder to maintain privacy. We will be examining real-life examples of the loss of privacy through the course materials.

- Week 2, Meeting 1 & 2 Discussion:
  Selling Our Data/Tracking: What many people don't understand is they are not using internet services for free like they think they are. To make a Gmail, Instagram, or Facebook account looks free, but it comes with a price. The price is we are allowing these corporations to collect our data (that they get from you while you are using their service) and sell it to advertisers. What kind of data are they collecting? A shortlist includes our location, the types of things we like and share, and our search patterns. Algorithms interpret our data so that products that we are likely to purchase show up on our social media feeds in the form of advertisements.
- Week 3, Meeting 1 Dicussion:
  How Tech Affects Diversity: As one of the articles for week 3 demonstrates, once our data is in the hands of the company, we have no control over how it is used. Companies can sell our data to anyone they want. As a result, the people and/or organizations that purchase our data can use it however they want, even for malicious intent. For example, the data dating app, Grinder, collects has "outted" it users without their permission. Companies don't care about the accuracy of the data or where it will end up, they simply want to monetize the data. If companies collect inaccurate data to feed to algorithms or their wallets this could "harden societal biases."
- Week 3, Meeting 2 Discussion:
  Intellectual-property & Patents: Lastly, for this unit, we will discuss whether patents are being ethically used to protect the products and designs of tech companies. Is it ethical for big companies like Apple to patent certain features for the protection and privacy of their company or are they only utilizing the law to keep other smaller competing companies at a disadvantage?

Week Four-Five: Addiction in Tech
Learning goal: Advertising funds the internet. Each developer fights to hold our gaze as tight as possible. From the massive Facebook, Twitter, and YouTube to the smallest websites, every product profits off your attention, incentivizing them to produce addictive content

that is impossible to turn away from. These two weeks will explore
why these addictive design practices have become so ubiquitous and we
will discuss the ethics of the internet's attempt to monopolize our
time.
- Week 4, Meeting 1 Discussion:
  Facebook and the Like button: As you read in Tim Wu's *The
  Attention Merchants*, the addition of the "Like button" on
  Facebook changed the social media game. It created a new
  metric for engagement that encouraged both posters and
  browsers to spend more time on Facebook and see more
  advertisements. How can we design an advertisement based
  system that does not rely on manipulating our users like
  this? Is it even possible?
- Week 4, Meeting 2 Discussion:
  The YouTube Rabbit Hole: YouTube's recommendation
  algorithm has changed massively over the years. YouTube
  uses your past search history and your previous engagement
  to determine which videos to recommend. However, one of
  the most important factors is watch time. This has created
  a phenomenon known as the YouTube Rabbit Hole, a use
  pattern where a chain of recommended videos can lead a
  user far off topic for hours. What are the ethical
  ramifications of a system designed to take as long as
  possible from a user?
- Week 5 Meeting 1 Discussion:
  The Great Electronic Echo Chamber: YouTube, Facebook,
  Twitter and every other social platform demonstrate to
  each of us regularly that they do not challenge their
  users' notions. Every search engine that tailors content
  to its users recommends content similar to that which the
  user has already shown interest in, stunting any chance to
  be exposed to opposing viewpoints. Has this echo chamber
  stunted the conversation about politics between us? Should
  social websites be expected to offer diverse viewpoints on
  a topic even when we avoid the uncomfortable?
- Week 5, Meeting 2 follow-up Discussion:
  Should platforms be expected to police the truth? What
  about the notable counterexample of the so-called "radical
  alt-right pipeline"?

Week Six-Seven: Big Data
Learning goal: Big Data drives companies' decisions and strategic
moves. As seen in the Privacy Unit, using modern-day applications and
social media results in users relinquishing sensitive information
about themselves. This information ranges from personal identifying

information to your behavior metrics that modern-day algorithms calculate. With your data, companies advertise new products to you, suggest the next show for you to watch, or fuel addiction through content. Algorithms use data to make determinations that affect your everyday life, from evaluating your financial choices to increasing policing in particular neighborhoods based on crime rates and race. Understanding the development choices behind algorithms and how algorithms use big data is fundamental to teaching programmers how to make algorithmic design decisions when creating new applications and technologies. In these weeks, we will explore different algorithms used in making decisions for companies and also how companies use big data to do things such as influence elections.

- Week 6 Discussion 1:
    - Big Data: Big data are large data sets that, when analyzed, show patterns and associations. Much of these data sets' outcomes correlate to human behavior. As we learned in the previous sections, companies and even governments collect your data and use that data to market new products to you, or products you may be interested in. Alongside that, companies use their products and your data to keep you on their applications and take up your time. But, beyond that, companies and governments use big data to make decisions that may affect your life. How do you think different companies or entities use your data? In what ways do you think big data can affect your life? What predictions can you make regarding how big data will affect lives in the future? How would you define the Big Data Revolution?
- Week 6 Discussion 2:
    - Algorithms turn people into quantifiable data. Algorithms then use that data to predict human behavior which companies use to market products to you or determine the value of consumers. Do you think algorithms fairly make decisions? What factors affect these algorithms? Can algorithms make unbiased decisions, or can they make better objective decisions compared to a human? Do you think a human or an algorithm can make better decisions, for instance how to choose a customer to give up their seat on an overfilled plane?
- Week 7 Discussion 1:
    - Cambridge Analytica: Cambridge Analytica gathered vast amounts of data to then target voters across the world. Do you think political parties should be able to use algorithms and 3rd party companies to target voters and advertise? How does the use of algorithms and Big Data

affect elections? What would you expect to advertise to you if Cambridge Analytica used your data and targeted you?
- Week 7 Discussion 2:
    - Algorithms and Big Data: With big data, companies make decisions using algorithms. Since the data sets are too massive for humans to go through, algorithms efficiently make decisions for them. These algorithms range from predictive policing to determining how valuable a customer is. Are algorithms a fair way to judge someone? How can algorithms used in predictive policing impact an area? What aspects of the human should algorithms consider when making important decisions like predictive policing? Should counties and cities use algorithms in such a manner like predictive policing?

Week Eight-Nine: Artificial Intelligence
Learning goal: Artificial Intelligence is an ever-changing field that brings up questions of how we define intelligence and if this concept is different between computers and humans. With things like facial recognition, suggested Spotify playlists, and voice recognition software, AI has taken over much of our daily lives. We are only at the very beginning of what we can do with artificial intelligence, so it is more important than ever to start understanding the ethical impact of AI before it's too late. Artificial intelligence is often not even understood by its creators, which exposes the possibility of an enormous number of unintended consequences. These two weeks will be dedicated to learning the skill sets to approach AI critically and to understand the built-in biases and the built-in inequalities, which stems greatly from AI's reliance on Big Data.
- Week 8 Discussion 1 & 2
    - Current unethical implementations: Facial recognition and fake videos are two ways that AI is currently being implemented in a manner that can infringe on human ethics. They both seem flashy and innovative, but really there are much more deep-rooted issues with their implementation. This is a cautionary tale that shiny things aren't always the answer.
- Week 9 Discussion 1
    - The human element: AI can be so convoluted that even the machine doesn't understand how it came to its decisions. Can't this be said for humans as well? How many subconscious decisions do we make a day? Ultimately how do we define intelligence and are computers or humans better at achieving this definition of intelligence? It is

important to realize that AI actually teaches us a lot about what it means to be human and what it means to make decisions, and ultimately how we trust these decisions.
- Week 9, Discussion 2
    - The bias: This is the ultimate connection between big data and AI. We feel as though AI erases biases but in reality, we program them into the system with the data that we feed the machine. These biases can be detrimental when AI is used in the court of law or autonomous vehicles. These biases will not be understood by the machine. Only we as humans have the power to recognize and prevent these biases from further perpetuating systemic inequalities.

Week Ten: Conclusion

Learning goal: How have you changed through your experiences in this class? This week is a reflection of the quarter, looking back at our previous notions from a slightly different perspective.
- Final Meeting Discussion:
    - Did you learn anything that you did not already know during this course?
    - Did anything you learned during the course change any of your opinions on important topics?
    - Did you learn anything that did not change your opinion, but helped you to understand an opposing viewpoint?

Final:

For the final, you will be given starter code that reflects the classic trolley problem in a self-driving car scenario. You will have to provide an algorithm that assigns weights to certain outcomes that you believe would be the best path for a self-driving vehicle to take when making hard ethical decisions. For example, if your self-driving car had to swerve and the two options were to hit a young girl versus a pregnant mother-to-be what route would your algorithm take? That being said, this is ultimately a very hard decision, and you will not be graded on how your algorithm assigns weights or how it makes decisions. Rather, the grade will come from a written paper that explains your reasoning behind your implementation and how you used the knowledge and skills from this course to come up with your reasoning.