



ENGR 380: Modern Ethical Technology

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Course Overview

The umbrella of “technology” defines ideas, devices, and innovations which have revolutionized the world for thousands of years. In an age where technological advancement is happening at historically unparalleled speeds, it is more important than ever to closely examine the consequences of emerging tech. This course will examine some literary motifs about technology and technologists with particular attention to the results that our attitudes about technological development have on products and their impacts for users and society. These observations will be paired with real-life parallels in podcasts, articles, essays, and research papers to promote genuine reflection regarding the responsibilities of technologists and ethical issues surrounding technological applications in biomedicine, computer games, and machine learning.

Why should I take this class?

This course is exceedingly pertinent to developing technologists and those students who intend to go on to work in technological industries, but it also holds important considerations for those who will go on to work in agriculture, the public sector, and any developing field which intends to serve “the good” of humanity. By examining issues associated with the development of technology, you will learn to consider unforeseen costs of their actions and of technological development in the modern era.

Why reading and writing?

This quarter will primarily focus on writing and reading based learning. As engineers, you are expected to be proficient readers, writers, and critical thinkers. This class will give you the opportunity to expand upon your skills to critically analyze the assigned readings, listenings, and viewings. During our weekly “roundtable” discussions, we will be able to have honest and productive discussions regarding your ethical findings from each piece. This will prove to be a critical skill in the field given our rapidly evolving technologies and the increasing importance of critical analysis. In fact, critical reading, writing, discussion, and thinking skills are often valued more than your engineering abilities you learn in hands-on courses. Rest assured, you will leave this class with the tools to engage with ethical principles and discussions when developing new technologies.

Why journaling?

Given that your journals will account for 30% of your grade, it is imperative that you complete them every week. The journals are a space for you to reflect on your learnings and share thoughts or questions with your classmates. The online discussion board will give you an opportunity to delve deeper into the week’s content and converse with your peers. Discussion is critical in all disciplines - technical or not. Discussion trains us to think about the material we have learned and apply it in a way that creates a well crafted opinion. Throughout this course, you will find that productive discussions are at the heart of all good decisions.

Objectives

- Examine the impact of moral relativism and determinism on modern technology, and discuss the effects of these ideas on a developing technology (content moderation).
- Learn how biases can be introduced in artificial intelligence and machine learning and how they affect the system's accuracy and ability to make the correct decisions.
- Understand the human rights and legal implications of creating artificial beings and manipulating genetics through eugenics.
- Consider the risks involved with human testing of vaccines and with giving parents the right to choose for their child to be vaccinated.
- Examine how computer games reflect a simulation of human reality. Discuss how the players' actions in that world reflect aspects of their behavior in the real world.
- Explore how ethical and moral problems are presented in computer games. Show how the problems need to be presented so that the player has clear options but doesn't know the exact ramifications.

Course Schedule

Topic 1: An Introduction to Ethical Technology

Week 1:

Nathaniel Hawthorne -- "The Birthmark"

Session 1) Reading comprehension quiz. Discuss parallels with the "Sermon on the Mount."

Discussion Questions: What role does technology play in driving perfectionism? Can technology be perfect? Can humans?

Radiolab Podcast -- "Post No Evil"

Session 2) Discuss personal experiences with social media content moderation, either first person or from an acquaintance's experience. Consider over-moderation and under-moderation and how it affected the user.

Discussion questions: Should speech be limited on certain platforms? Why or why not? To what extent can photos be considered speech?

Week 2:

Kurt Vonnegut -- *Slaughter-House Five*

Session 1) Reading comprehension quiz. Compare and contrast the Tralfamadorians' perspective with regular humans.

Discussion questions: If the Tralfamadorians know what they are going to do ahead of time, can they stop themselves from performing immoral actions? Can they prevent other atrocities from occurring? Is it immoral for them to not even try?

Session 2) Discussion on time travel and on “seeing the future.”

Discussion questions: Do humans possess free will? Are all events in time pre-determined? Does seeing the future or possessing knowledge from other times affect free will?

Topic 2: Biomedical technology and medical humanities

Week 3:

Michael J. Sandel -- “The Ethical Implications of human cloning”

Session 1) Distinguish between cloning for reproductive purposes as well as for biomedical research purposes.

Discussion Questions: Does a child lose its autonomy and individuality when their life trajectory is decided at birth? Is it ethical to create an artificial human for research purposes?

John Harris -- ““Goodbye Dolly?” The ethics of human cloning”

Session 2) Discuss the current methodology of cloning as well as modern policies and responses to cloning.

Discussion Questions: Is cloning through cell mass division any different than having identical twins naturally? What are the moral implications of destroying a cell for biopsy versus destroying a cloned embryo, despite both being created in the same manner? Does the same apply when destroying one egg cell for the clone organism through nuclear substitution?

Week 4:

GATTACA - 1997 Film

Session 1) Comprehension quiz on the film, GATTACA. Consider the ethical implications of eugenics as well as the implications of its widespread adoption.

Discussion Questions: Is Vincent actually at a disadvantage in any field he attempts to go into because he was naturally born and is competing with people who have cherry-picked genetics for the job? Is one truly “destined” for something because their genetics dictate that they would do well at it?

Lori B. Andrews, Jane E. Fullarton, Neil A. Holtzman, and Arno G. Motulsky -- “Assessing Genetic Risks: Implications for Health and Social Policy” Chapter 8. “Social, Legal, and Ethical Implications of Genetic Testing”.

Session 2) Focus on the social and legal constraints of genetic testing and records.

Discussion Questions: Should genetic testing be required? Why or why not? Should the results be left confidential or open to certain individuals; ie, family, employers, health care, government?

Week 5:

Kristin S. Hendrix, Lynne A. Sturm, Gregory D. Zimet, Eric M. Meslin – “Ethics and Childhood Vaccination Policy in the United States”

Session 1) Study the efficacy of vaccinations in relation to the number of active cases over time.

Discussion Questions: Should parents be allowed to maintain autonomy over their child’s vaccination when a disease is a national health concern? What are some of the shortcomings of relying upon herd immunity?

Jeffrey P. Kahn, Leslie Meltzer Henry, Anna C. Mastroianni, Wilbur H. Chen, Ruth Macklin – “Opinion: For now, it’s unethical to use human challenge studies for SARS-CoV-2 vaccine development”

Session 2) Take a close look at the Coronavirus, its effects, and the efforts going into vaccine development.

Discussion Questions: Is it ethical to conduct challenge trials for a vaccine in the midst of a pandemic? What should be considered “acceptable levels of risk?” What are the ethical concerns with accelerating the vaccine approval process?

Topic 3: Bias in machine learning

Week 6:

Shepperd, Bowes, Hall -- “Researcher Bias: The Use of Machine Learning in Software Defect Prediction”

Session 1) Reading comprehension quiz. Learn how datasets in convolutional neural networks affect its results.

Discussion Questions: How can we gather complete datasets? How do we know when a dataset is “good enough”? What are dataset collection techniques? Are some better than others? Why and how?

Session 2) Dig deeper into biased datasets.

Discussion Questions: What are some examples outside of this paper that show incomplete datasets? What are reasons for incomplete or biased datasets? Is bias in a system ever good? Can we quantify bias? When and how can we detect bias? How can we avoid bias?

Week 7:

Hubert Etienne -- “When AI Ethics Goes Astray: A Case Study of Autonomous Vehicles”

Session 1) Realize the real-world effects of bias in AI.

Discussion Questions: What is the Moral Machine experiment? What are some examples of immoral AI? What realms of our lives does AI control? Should we limit the bounds of AI?

Wilson, Hoffman, Morgenstern -- "Predictive Inequity in Object Detection"

Session 2) Understand why it's important to detect bias in critical systems.

Discussion Questions: What was the most shocking part of the research findings? Why was this shocking? What other systems should we consider in racial bias? Are there any other non-race related biases that you can think of in autonomous vehicles?

Topic 4: Gaming

Week 8:

Miguel Sicart -- "The Ethics of Computer Games"

Session 1) Define what is a game in general terms. Short history on the evolution of games.

Discussion questions: How does one interact with a video game? In what ways may your actions be shown to other players? In what way does this affect users' action in game? How does this differ from a board game with all players in one room?

Session 2) Consider incentivization and monetization in games. Bring good and bad examples to the discussion.

Discussion questions: How can a developer incentivize a player to play their game or to do something specific in the game? How can they get players to pay for more content? Where is the line between gaming and gambling? Is it fair to charge for electronic goods and services that hold no resale value?

Week 9:

Miguel Sicart -- "Moral Dilemmas in Computer Games"

Session 1) Reading comprehension quiz. Discuss games that present moral choices or morality "alignments."

Discussion questions: How well do games adapt to players' choices? Should the player be rewarded for playing as "good" or "evil"? What does it say about morality in the instances where a player is given more power for being "bad" and is left handicapped for being "good"?

Session 2) Consider games with the simplest of rules and how much freedom the player is afforded within those confines.

Discussion questions: Does a game need to have clearly defined rules? What effects can changing the rules mid-game have on player engagement?

Week 10:

K.K. Kimpa and A.K. Bissett -- "The Ethical Significance of Cheating in Online Computer Games"

Session 1) Discuss cheating in games and how that affects other players' experiences.

Discussion questions: Is cheating wrong if it is in a game being played just for fun? Is it any different if there are stakes involved; ie, money?

Session 2) **Final Presentations**

Journals

Each student will write short (250-350 words) journals every week and post them to the discussion board on canvas by Wednesday night. Journals are about the reading and discussion questions for the week and how they relate to modern technologies. Students should reply to two of their peer's journal entries per week by Thursday night.

Final Project

Each student will create a 3-5 minute presentation in the format of their choosing (video, powerpoint, etc.) focusing on a controversial case study where technological ethics may have been compromised. The presentation will break down the timeline of events that led to the product's negative consequences for the consumer or society. In the presentation, students will apply their knowledge learned in the course to suggest what steps could be added or corrected in order to prevent this from happening in the future, or which steps could have been added before the incident occurred.

Course Grading

Journals - 30%

Participation in weekly ethical roundtable discussion - 40%

Final project - 20%

Reading quizzes - 10%

Kevin's Sources

Etienne, Hubert. "When AI Ethics Goes Astray: A Case Study of Autonomous Vehicles." *Social Science Computer Review* (2020): 89443932090650. Web.

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Anthony's Sources

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Kahn, Jeffrey P., et al. "Opinion: For now, it's unethical to use human challenge studies for SARS-CoV-2 vaccine development." *Proceedings of the National Academy of Sciences* 117.46 (2020): 28538-28542.

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"Post No Evil." Radiolab. 19 June 2020. Web.

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Sicart, Miguel. "Moral Dilemmas in Computer Games." *Design Issues*, vol. 29, no. 3, 2013, pp. 28-37., doi:10.1162/desi_a_00219.

Vonnegut, Kurt. *Slaughterhouse-five, Or, the Children's Crusade: A Duty-Dance with Death*. New York: Dial Press, 2005. Print.