

Course: 15-110 Principles of Computing

- Purpose of the course is to give students an intro to CS while building a foundation that allows them to **collaborate, converse, and evaluate CS-related work.**
- Overall Course Objectives
 - An intro to reading and writing programs efficiently
 - Computer concept representation and data structures
 - Use computer science and computational thinking as tools in other domains
 - **Identify how computer science affects the world in the past, present, and future**

Module Learning Objectives

- **Critically reflect** on their individual ethical concerns in CS
- **Highlight examples** of ethics-related instances in the real world of CS
- Understand the **significance** of ethics from the perspective of their own academic discipline and desired careers
- Engage in **discussions** of ethical questions with peers

We believe this aptly compliments the course goals and student capabilities.

Course Constraints

- Large lecture (100-200 Students)
 - 50 minutes
- Gen Ed Course (not aimed at SCS students)
 - Dietrich, MCS, Engineering/CIT, Tepper, CFA
- Limited time available for breakout groups and slide additions
- Active learning opportunities limited by lecture-heavy structure
- Encouraged to redevelop the ethics lecture and offer new assessment measures

Implementation Design

- Ethics Reflections in 4 Unit Reviews
 - Each reflection relates to unit topics
 - Discussion questions
 - Supplemental links for curious students
- Ethics Lecture (week 15, last week before final exam)
 - 1 class session (50 minutes total)
 - Lecture (40 minutes)
 - Class Activity (small group, 10 minutes)
- Retrospective work
 - Supplemental readings (links in lecture slides and folder of readings)
 - Final Exam Assessments
 - Short answer questions (2)
 - Multiple choice questions (5)

Module Development

- Needed to **reduce content** of ethics lecture while also providing an **intro to ethics** in computer science and an activity to facilitate **active learning**
- Incorporated **feedback** from professor interviews and class module pitch
 - Include larger group interaction to capture diverse student backgrounds (Unit Reviews)
 - Embed readings in slides: “look here if you are interested in learning more”
 - Modify activity from “engineer” to “client” perspective
 - Include more details about module in presentation

Topics in Unit Reviews

Unit Topics	Ethics Reflection
Unit 1: Intro to Programming & Algorithms	AI Explainability
Unit 2: Data Structures	Facebook-Cambridge Analytica Scandal
Unit 3: Internet, Encryption	Encryption and Impact of Anonymity
Unit 4: Concepts in AI & ML	MIT Study on Misinformation & Social Media

Topics in Ethics Lecture

- Data
 - What is collected
 - How it is collected
 - Data economy on the Internet
- Bias in Machine Learning
 - Data bias
 - Real world examples (facial recognition, criminal justice system, job hiring software)
 - Differentiate between algorithms based on **biased datasets** and **systemic bias**

Bringing it all together

- Relevance to Course
 - Prepare students broadly for conversing/collaborating/evaluating work in computing
 - Help students understand the ethical impacts in computing concepts and data structures
- Relevance to Module Learning Objectives
 - Unit Reviews
 - Provide opportunities to **critically reflect** on individual ethical concerns
 - Ethics Lecture Activity
 - Exemplifies the **significance** of ethics across a diverse set of desired careers
 - Ethics Lecture & Unit Reviews
 - **Highlight examples** of ethics in the real world
 - Provide opportunities to engage in **discussions** with peers

Supplemental Slides

AI Algorithm Design Activity

Suppose that you are part of a team that is deciding whether to adopt an AI hiring algorithm for your company to choose potential job candidates.

- What questions might you have for the designers?
- What concerns might you have about the data used by the algorithm?
- How will you ensure the adoption of the technology is not causing harm or reinforcing existing structural inequalities?

