



UNIVERSITAT<sub>DE</sub>  
BARCELONA



MSc in Fundamental Principles of Data Science

# Ethical Data Science

## Introduction

Jordi Vitrià & Itziar de Lecuona

2020-2021

# Instructors



- Jordi **Vitrià**, Departament de Matemàtiques i Informàtica at the University of Barcelona.



- Itziar **de Lecuona**, Departament de Medicina & Bioethics and Law Observatory at the University of Barcelona.

# Prerequisites

- Proficiency in Python (3.8).
- Calculus, Linear Algebra.
- Basic Probability and Statistics.
- Jupyter Notebooks (Anaconda/Colab).
- **Critical Thinking.** Critical thinking is the ability to think clearly and rationally, understanding the logical connection between ideas.

# Grading

- **50%:** 500-1500 word essays due during the course on assigned topics. Writing assignments evaluation will emphasize **correctness** in your writing and a good understanding of the course material (as well as **rigor**, **precision**, and **clarity**).
  - Writing assignments must be formatted in the Tufte Essay format and submitted in pdf.
- **50%:** Practical programming exercises (IPython Notebook)

# Syllabus

Data science has the potential to be both beneficial and detrimental to individuals and/or the wider public. To help minimize any adverse effects, we must seek to understand the potential impact of our work and consider any opportunities that may deliver benefits for the public.

In this course, we will explore the social and ethical ramifications of the choices we make at the different stages of the data analysis pipeline, from data collection and storage to understand feedback loops in the analysis. Through case studies, and exercises, students will learn the basics of ethical thinking, understand some tools to check or mitigate undesired effects, and study the distinct challenges associated with ethics in modern data science.

- Ethics and Data?
- Ethics Foundations
- Bias and Fairness
- Privacy and Surveillance
- Transparency and Explainability
- Equity & Disinformation
- Data governance
- Data protection

# Outcome

The main expected outcome from this course is to increase your critical thinking ability to solve, specific, highly contextual issues such as the ones in this example:

“A data scientist in the *Department d'Educació de la Generalitat de Catalunya* is trying to decide whether or not to let **a computer predict children who might be at risk of falling behind at school.** **Is this a good idea?**”

The answer seems to be, probably, yes: the more children that we can identify as being at risk, the more children we can help.

One potential problem is that there might be a few children who are falsely identified as being ‘at risk’ due to patchy data fed into the automated program...”

You cannot expect from this course any tool such as a “Guide on how to deal with ethical data issues”.

# Approach

While there is no single definition of data science, it can be broadly thought of as scientific, computational and analytical methods used to process and extract **information**, **knowledge**, and **insights** from data.

As data science methods become more common within different fields, there are both **opportunities** and **challenges** for individuals working in data science.

For example, managing **privacy**, **fairness**, and **bias** can be difficult and complex when using algorithmic methods.

Additionally, public perceptions are still developing around many aspects of data science, including the use of artificial intelligence (AI) in systems and decision making, and 'big data' sources about people, such as social media and mobile phone data.

This course is focused on both, giving a **theoretical basis** and providing the necessary **thinking tools** (sometimes informed by numbers) to keep up with these challenging ethical issues.

# Approach

Learning outcomes:

- Understand the impacts of data misuse.
- Develop your ability to investigate how data and data-powered algorithms shape, constrain, and manipulate our commercial, civic, and personal experiences.
- Develop your ability to identify and mitigate potential risks.
- Have a toolkit to be used in your workplaces.

Ultimately, to redirect your thinking from what is merely advantageous to what is genuinely good — and be prepared to help you navigate the ethical aspects of DS development and deployment.





**Rachel Thomas**  
@math\_rachel

En resposta a @math\_rachel

As @cfiesler showed w spreadsheet of >250 tech ethics syllabi & her accompanying meta-analysis, tech ethics is a sprawling subject. No single course can cover everything. And there are so many great courses out there!

[medium.com/cuinfo science/...](https://medium.com/cuinfo science/)

[cmci.colorado.edu/~cafi5706/SIGC...](https://cmci.colorado.edu/~cafi5706/SIGC...)

Tradueix el tuit

This is  
a hot  
topic!

### What Do We Teach When We Teach Tech Ethics? A Syllabi Analysis

Casey Fiesler  
casey.fiesler@colorado.edu  
University of Colorado Boulder  
Boulder, CO

Natalie Garrett  
natalie.garrett@colorado.edu  
University of Colorado Boulder  
Boulder, CO

Nathan Beard  
nbeard@umd.edu  
University of Maryland  
College Park, MD

- Ethics in a stand-alone course vs. worked in to every course?
- Who should teach: computer scientist, philosopher, sociologist, ...?
- What topics to cover?
- What learning outcomes?

Outcome	Courses
Critique	71
Spot issues	36
Make arguments	26
Improve communication	26
See multiple perspectives	23
Create solutions	21
Consider consequences	18
Apply rules	10

Discipline	Course Home	Instructor Home
Computer Science	67	61
Info Science	62	49
Philosophy	26	21
Communication	23	18
Other Non Tech	18	18
Sci & Tech Studies	13	6
Engineering	12	10
Law	11	13
Other		
Math		
Business		

Topic	Courses
Law & policy	66
Privacy & surveillance	61
Philosophy	61
Inequality, justice & human rights	59
AI & algorithms	55
Social & environmental impact	50
Civic responsibility & misinformation	32
AI & robots	27
Business & economics	27
Professional ethics	25
Work & labor	23
Design	20
Cybersecurity	19
Research ethics	16
Medical/health	12

4:39 p. m. · 19 d'ag. de 2020 · Twitter Web App