

**Algorithms, Public Policy, and Ethics**  
**POLI 170 – Fall 2021**

Tuesday, Thursday 3:30pm – 4:50pm

Location: Peterson Hall, Room 103

**Professor:** Kirk Bansak

Contact: [kbansak@ucsd.edu](mailto:kbansak@ucsd.edu)

Office Hours: Wednesday, 9:00am – 11:00am

Sign-Up: <https://calendly.com/kbansak/officehours>

**TA:** Bertrand Wilden

Contact: [bwilden@ucsd.edu](mailto:bwilden@ucsd.edu)

Office Hours: Friday, 10:00am – 12:00pm

Sign-Up: <https://calendly.com/bwilden/bertrand-office-hours>

## 1 Overview

With machine learning becoming more pervasive and data availability improving over time, decision-makers in various realms of public policy are increasingly utilizing predictive algorithms to help inform or optimize their decisions. For instance, in the area of criminal justice, algorithms are often used to make predictions like a criminal defendant’s likelihood of failing to appear at court or reoffending in the future. These predictions are then used as risk assessments to inform various decisions, such as whether to grant a defendant pre-trial release. The goal of incorporating these types of tools and data into public policy has been to address shortcomings in existing decision-making processes. However, the ability of algorithms to produce fair decisions and improve policy has been the subject of intense debate in recent years. Policymakers, academic researchers, and the popular media alike have scrutinized the increasing deployment of such tools.

As members of society—and potentially future policymakers, data scientists, lawyers, etc.—we have a stake in how public policy is being shaped and executed. What are the benefits, limitations, dangers, and ethics of the use of algorithms in public policy? How can we formulate balanced perspectives on these issues so that we can carefully evaluate different use cases? How can the deployment of such tools be improved in the future?

### 1.1 Objectives

This course will cover a broad range of topics on the use of predictive and related algorithms in public policy. This will include specific case studies, background material on how data are used in these tools, their possible benefits relative to status quo procedures as well as their limitations, and the potential harms and ethics surrounding their use (e.g. issues of algorithmic bias). As the goals of this course, students will:

- 1) Be introduced to a broad range of topics related to the use of algorithms in public policy.
- 2) Learn about specific case studies in which algorithms have been deployed in real-world public policy processes.
- 3) Develop key conceptual perspectives to think critically about, and weigh the pros and cons of, algorithms in specific public policy use cases. For example, perspectives on:
  - Prediction and predictive efficacy
  - Algorithmic bias
  - Applied notions of fairness
  - Human-algorithm interaction
- 4) Be introduced to various concepts and understandings that are useful for thinking about data, prediction, analytics, and ethics in society more generally.
- 5) Develop programming abilities in R.

## 1.2 Prerequisites

There are two prerequisites for the course. The first is upper-division standing. The second prerequisite is POLI5/POLI5D/ECON5 (Data Analytics for the Social Sciences), in particular as that course introduced the statistical software R. We will make use of R during class and in homework. See section regarding the use of R on the syllabus below.

In order to motivate and illustrate key concepts and themes throughout the course, there will also be some mathematical content, and many of the readings contain quantitative analyses and results. However, the course does not require a mathematical background other than basic arithmetic and algebra, as well as an elementary understanding of probability.

## 1.3 Evaluation

Students will be evaluated across the following areas.

- **Data Analysis Assignments: 50% of your grade.**

Data Analysis Assignment 1: 10%

Data Analysis Assignment 2: 20%

Data Analysis Assignment 3: 20%

There will be three data analysis assignments that you will complete using R and R Markdown (see section regarding the use of R on the syllabus below). The first assignment will serve mainly as a refresher on using R and an introduction to R Markdown for anyone who has not used it before. The second and third assignments will be longer and more substantial.

You are allowed to work on data analysis assignments together in small groups of no more than three if desired, **but you must write up your code and answers on your own!** Submitting any code or answers that are copied from another student is unacceptable and in violation of academic integrity. If you work together, you must indicate on your assignments who your co-workers were.

- **Policy Memo: 30% of your grade.**

Group Component: 20%

Individual Component: 10%

In groups of 3-4, you will write a policy memo in which you propose, discuss, and evaluate the hypothetical deployment of an algorithmic tool to improve some process or function at UCSD. It will be up to your group to identify an area of campus life, university decision-making, or any other official UCSD business that could theoretically be improved via the assistance of a data-driven algorithm. Using the various themes and concepts learned throughout the course, you will explain how such a tool could be integrated into (or replace) an existing process, and you will evaluate the possible benefits, risks, and viability of its deployment. Based on this evaluation, you will make a final recommendation as to whether deployment would ultimately be desirable. In addition to the group memo that your group will write together, there will also be an individual written component that each student will complete separately and independently. More information on the precise format and guidelines for this assignment will be provided later.

- **Group Formation:** Each group must e-mail the instructors ([kbansak@ucsd.edu](mailto:kbansak@ucsd.edu) and [bwilden@ucsd.edu](mailto:bwilden@ucsd.edu)) a list of group members or request to be assigned to a group by **Tuesday, November 2nd**.
- **Proposal Approval:** Prior to writing the policy memo, each group must get the instructors' approval of the proposed UCSD algorithm use case that will be highlighted in the memo. Groups are encouraged to get approval as early as possible, and the deadline for doing so is **Tuesday, November 16th**.
- **Assignment Due Date:** The group memo and individual component are both due on **Tuesday, November 30th**.

- **Final Exam: 20% of your grade.**

You will complete a cumulative final exam, administered on the date delineated under UCSD's Fall Quarter exam schedule.

The course is not curved. Your grade will be based on your total percentage (unrounded), and the following conventional scale:

A+ :  $\geq 100$

A : [93, 100)

A- : [90, 93)

B+ : [87, 90)

B : [83, 87)

B- : [80, 83)

C+ : [77, 80)

C : [73, 77)

C- : [70, 73)

D : [60, 70)

F :  $< 60$

Note that there is no rounding. For example, a final grade of 89.99 is a B+, not an A-.

## 2 Logistics

### 2.1 Class Meetings and Modality

All class meetings will be conducted at our scheduled class time (Tuesday, Thursday 3:30pm – 4:50pm Pacific Time). This class is designated as an “in-person” class, and accordingly, we will be meeting predominantly in person (in Peterson Hall, Room 103). However, a subset of meetings will be held remotely. In total, there are 19 class meetings. 13 of these will be held in person, and 6 will be held remotely. The Course Schedule below (Section 3 in the syllabus) indicates which meetings are in-person vs. remote. The remote meetings will be held at the following Zoom link:

**[REDACTED]**

In addition, to accommodate the needs of different students, all class meetings (whether held in person or remotely) will be hosted synchronously on Zoom at the link above, recorded, and posted on our [canvas.ucsd.edu](https://canvas.ucsd.edu) page. Students are highly encouraged to attend class at the scheduled meeting time—in person if possible, or otherwise synchronously via Zoom—in order to have the opportunity to participate and ask questions in real time. Note that in-class participation is not required and will not factor into grading.

Individuals who join via Zoom and do not want to have their surroundings visible are encouraged to use Zoom's virtual background feature, if feasible, or to participate without video. Please also be mindful of others who may not wish to be visible or recorded in the background. Finally, note that only authenticated users will be able to join our Zoom meeting room, which means you will need to ensure you have signed into your UC San Diego Zoom account.

## 2.2 Office Hours

I will hold office hours from 9:00am to 11:00am on Wednesdays. Office hours will be held remotely via Zoom. I can also be available for in-person meetings if requested.

Please note that the Zoom room for my office hours is different from the room used for lecture! My office hours will be held here:



Please make sure to sign up for my office hours in advance using the following link:

<https://calendly.com/kbansak/officehours>

If you would like to meet but have class or another important commitment during my office hours, or if you would like to meet in person, I am happy to make accommodations. Please e-mail me to make arrangements.

## 2.3 Teaching Assistant

Bertrand Wilden ([bwilden@ucsd.edu](mailto:bwilden@ucsd.edu)) will be the teaching assistant for this course. Bertrand will be holding office hours remotely on Fridays from 10:00am to 12:00pm here:

<https://ucsd.zoom.us/my/bwilden>

Please make sure to sign up for Bertrand's office hours in advance using the following link:

<https://calendly.com/bwilden/bertrand-office-hours>

Bertrand can also be available for in-person meetings if requested.

## 2.4 Course Website

We will use our [canvas.ucsd.edu](https://canvas.ucsd.edu) page to distribute readings, submit assignments, access Zoom recordings, and post grades.

## 2.5 Readings

There is no textbook for this course. All readings will be uploaded to the Canvas page or will be available online via the links listed on the syllabus. Pay attention to page numbers when noted on the syllabus, which indicate the portions of a reading that are required. If

there are no page numbers listed, then the document should be read in its entirety. However, anything *highlighted in yellow* in the readings uploaded onto the Canvas page is *not required!*

## 2.6 Software

We will be using the statistical software **R** in class and to complete Data Analysis assignments. Any homework requiring the use of **R** should be completed and submitted using **R Markdown**, a markup language for producing well-formatted HTML documents with embedded **R** code and outputs. **R Markdown** requires installation of the **rmarkdown** and **knitr** packages. We strongly recommend using **RStudio**, an IDE for **R**, which is set up well for the creation of **R Markdown** documents.

To download/install **R**:

<https://cran.r-project.org/>

To download/install and learn more about **RStudio**:

<http://www.rstudio.com>

For more on **R Markdown**:

<http://rmarkdown.rstudio.com>

## 2.7 Assignment Schedule Summary

Due Date	Assignment
Before Each Class Meeting	Assigned Readings
Tuesday, October 12	Data Analysis Assignment 1
Tuesday, October 26	Data Analysis Assignment 2
Tuesday, November 2	Group Formation for Policy Memo
Tuesday, November 9	Data Analysis Assignment 3
Tuesday, November 16	Approval of Policy Memo Proposal
Tuesday, November 30	Policy Memo (Group & Individual Components)
Monday, December 6	Final Exam

## 2.8 Expectations

	What you can expect of me	What I expect of you
<b>Punctuality</b>	I take your time seriously. I like to show up before class starts and begin on time.	Please show up to class a few minutes before we begin. We have a lot of material to get through, and I want to make sure we use our time effectively.
<b>Emails</b>	I try to respond to emails as soon as I can, and at least within 24 hours. Don't hesitate to send me a reminder if I haven't responded within that window.	Before writing to me with a question, check the syllabus to see if it's addressed there first. Please don't leave questions until the last minute.
<b>Availability</b>	I'll always be available during the office hours stated above.	Please use my office hours if you would like to discuss something. If you have class during my office hours, please e-mail me to arrange an alternative time.
<b>Reading</b>	The content in some of the readings I have assigned can be challenging or dense, so it's OK if you don't immediately understand everything. We will use class and office hours to clarify.	Please do all the readings. With academic articles, read outside-in: the introduction and conclusion first, then the middle.
<b>Late Submission</b>	I am willing to make reasonable accommodations and understand that difficult situations can arise. However, I will not make exceptions for one person that are not available to everyone else.	Complete all assignments on time, and reach out to me if you are encountering troubles.





## 4 Course Outline with Readings

### 4.1 Introduction

- Thursday, September 23, 2021

Modality: **In Person**

Topic: **Course Introduction**

*Nothing to read before class.*

- Tuesday, September 28, 2021

Modality: **In Person**

Topic: **Algorithms and Public Policy: The Big Picture**

**Read before class:**

- Jacob Brogran, “What’s the Deal With Algorithms?” *Slate Magazine*, February 2, 2016. Available at:  
<https://slate.com/technology/2016/02/whats-the-deal-with-algorithms.html>
- Ben Buchanan and Taylor Miller, “Machine Learning for Policymakers: What It Is and Why It Matters,” Belfer Center for Science and International Affairs, 2017.

### Case Study 1

- Thursday, September 30, 2021

Modality: **In Person**

Topic: **Allocation of Health Care Services**

**Read before class:**

- David W. Bates, Suchi Saria, Lucila Ohno-Machado, Anand Shah, and Gabriel Escobar, “Big Data in Health Care: Using Analytics to Identify and Manage High-Risk and High-Cost Patients,” *Health Affairs* Vol. 33, No. 7 (2014).
- Natalia Rodriguez, “Infographic: How to Read a Scientific Paper,” *Elsevier Connect*, August 5, 2015. Available at:  
<https://www.elsevier.com/connect/infographic-how-to-read-a-scientific-paper>
- Ziad Obermeyer, Brian Powers, Christine Vogeli, and Sendhil Mullainathan, “Dissecting Racial Bias in an Algorithm Used to Manage the Health of Populations,” *Science* Vol. 366, No. 6464 (2019).



- Thursday, October 14, 2021

Modality: **In Person**

Topic: **Demystifying Prediction**

**Read before class:**

- Ajay Agrawal, Joshua Gans, and Avi Goldfarb, “Prediction Machine Magic,” in *Prediction Machines*, Harvard Business Review Press, 2018.
- Gareth James, Daniela Witten et al., *An Introduction to Statistical Learning*, Springer, 2013. Read pp. 15-26, 61-63, 71-74 (Recommended but optional: pp. 63-71, 75-82).

- Tuesday, October 19, 2021

Modality: **Remote** (<https://ucsd.zoom.us/j/92875551701>)

Topic: **Implementing Prediction**

**Read before class:**

- Gareth James, Daniela Witten et al., *An Introduction to Statistical Learning*, Springer, 2013. Read pp. 82-92, 109-119.
- Dan Kopf, “This is How Computers ‘Predict the Future,’” *Quartz*, September 5, 2018. Available at: <https://qz.com/1261817/predictive-algorithms-are-not-all-that-complicated/>

- Thursday, October 21, 2021

Modality: **Remote** (████████████████████)

Topic: **Evaluating Predictive Performance and Uncertainty**

**Read before class:**

- Gareth James, Daniela Witten et al., *An Introduction to Statistical Learning*, Springer, 2013. Read pp. 29-33, 176-183.
- Alvira Swalin, “Choosing the Right Metric for Evaluating Machine Learning Models — Part 1,” Towards Data Science, *Medium*, April 6, 2018. Available at: <https://medium.com/usf-msds/choosing-the-right-metric-for-machine-learning-models-part-1-a99d7d7414e4>
- Alvira Swalin, “Choosing the Right Metric for Evaluating Machine Learning Models — Part 2,” Towards Data Science, *Medium*, May 2, 2018. Available at: <https://medium.com/usf-msds/choosing-the-right-metric-for-evaluating-machine-learning-models-part-2-86d5649a5428>

## Case Study 2

- Tuesday, October 26, 2021

### *Data Analysis Assignment 2 Due*

Modality: **In Person**

Topic: **Algorithms in Criminal Justice**

**Read before class:**

- The Sentencing Project, “Report of the Sentencing Project to the United Nations Special Rapporteur on Contemporary Forms of Racism, Racial Discrimination, Xenophobia, and Related Intolerance: Regarding Racial Disparities in the United States Criminal Justice System,” 2018.
- Nathan James, “Risk and Needs Assessment in the Federal Prison System,” *Congressional Research Service*, July 10, 2018.
- Julia Angwin, Jeff Larson, Surya Mattu, and Lauren Kirchner, “Machine Bias,” *ProPublica*, May 23, 2016. Available at: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>
- Sam Corbett-Davies, Sharad Goel, and Sandra González-Bailón, “Even Imperfect Algorithms Can Improve the Criminal Justice System,” *New York Times*, December 20, 2017. Available at: <https://www.nytimes.com/2017/12/20/upshot/algorithms-bail-criminal-justice-system.html>

## 4.3 Algorithmic Bias and Ethics

- Thursday, October 28, 2021

Modality: **In Person**

Topic: **Ethics, Algorithms, and the Law**

**Read before class:**

- Brent Daniel Mittelstadt, Patrick Allo, Mariarosaria Taddeo, Sandra Wachter, Luciano Floridi, “The Ethics of Algorithms: Mapping the Debate,” *Big Data & Society*, Vol. 3, No. 2 (2016). Read only pp. 1–12.
- Jon Kleinberg, Jens Ludwig, Sendhil Mullainathan, and Cass R. Sunstein, “Discrimination in the Age of Algorithms,” *Journal of Legal Analysis* Vol. 10 (2018). Read only pp. 113-132.

- Tuesday, November 2, 2021





- Angèle Christin, “Algorithms in Practice: Comparing Web Journalism and Criminal Justice,” *Big Data & Society* Vol. 4, No. 2 (2017).
- Ryan Kennedy, Philip D. Waggoner, and Matthew M. Ward, “Trust in Public Policy Algorithms,” *Journal of Politics*, Forthcoming (2021).
- Ben Green and Yiling Chen, “Disparate Interactions: An Algorithm-in-the-Loop Analysis of Fairness in Risk Assessments,” *Proceedings of the Conference on Fairness, Accountability, and Transparency* (2019). Read only pp. 1-10.

- Thursday, November 25, 2021

**Thanksgiving Holiday - No Class**

- Tuesday, November 30, 2021

***Policy Memo (Group and Individual Components) Due***

Modality: **In Person**

Topic: **Limits of Prediction-Based Action**

**Read before class:**

- Michael Luca et al., “Algorithms Need Managers, Too,” *Harvard Business Review*, January–February, 2016. Available at: <https://hbr.org/2016/01/algorithms-need-managers-too>
- Susan Athey, “Beyond Prediction: Using Big Data for Policy Problems,” *Science* Vol. 355, No. 6324 (2017).

- Thursday, December 2, 2021

Modality: **In Person**

Topic: **Rethinking Fairness from Perspective of Decisions and Impact**

**Read before class:**

- Jon Kleinberg, Jens Ludwig, Sendhil Mullainathan, “A Guide to Solving Social Problems with Machine Learning,” *Harvard Business Review*, December 8, 2016. Available at: <https://hbr.org/2016/12/a-guide-to-solving-social-problems-with-machine-learning>
- Kirk Bansak and Linna Martén, “Algorithmic Decision-Making, Fairness, and the Distribution of Impact: Application to Refugee Matching in Sweden,” Working Paper (2021).

## 4.5 Final Exam

- Monday, December 6, 2021

***Final Exam***

## 5 Policies

### 5.1 Academic Integrity

Students agree that by taking this course, all required assignments may be subject to submission to Turnitin.com for textual similarity review and the detection of plagiarism. All submitted assignments may be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

### 5.2 Student Accessibility

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (<https://osd.ucsd.edu/>). Students are required to discuss accommodation arrangements with instructors and OSD liaisons in the department well in advance of any exams or assignments. The OSD Liaison for the Department of Political Science is Joanna Peralta; please connect with her as soon as possible via the Virtual Advising Center:

<https://stark.ucsd.edu/students/vac/>

### 5.3 Academic Advising

Students who have questions pertaining to Political Science academic advising are asked to reach out the Department's Undergraduate Advisor, Natalie Ikker, who can be reached via the Virtual Advising Center (<https://stark.ucsd.edu/students/vac/>). Academic advising questions often include (but are not limited to): add/drop deadlines, course enrollment policies, planning major and minor requirements, quarter-by-quarter plans, department petitions and paperwork, and referrals to campus and student support services.

### 5.4 UC San Diego Principles of Community

The University of California, San Diego is dedicated to learning, teaching, and serving society through education, research, and public service. Our international reputation for excellence is due in large part to the cooperative and entrepreneurial nature of the UC San Diego community. UC San Diego faculty, staff, and students are encouraged to be creative and are rewarded for individual as well as collaborative achievements.

To foster the best possible working and learning environment, UC San Diego strives to maintain a climate of fairness, cooperation, and professionalism. These principles of community are vital to the success of the University and the well being of its constituents. UC San Diego faculty, staff, and students are expected to practice these basic principles as individuals and in groups.

For the complete UC San Diego Principles of Community, see:

<https://ucsd.edu/about/principles.html>

## 5.5 Sexual Misconduct/Title IX Statement

UC San Diego prohibits sexual violence and sexual harassment and will respond promptly to reports of misconduct. If you wish to speak confidentially about an incident of sexual misconduct, please contact CARE at the Sexual Assault Resources Center at (858) 534-HELP. Students should be aware that faculty members are considered responsible employees and are not a confidential resource; as such, if you disclose an incident of sexual misconduct to a faculty member, they have an obligation to report it to UC San Diego's Title IX office, the Office for the Prevention of Harassment & Discrimination (OPHD). To learn more about sexual misconduct, visit: <https://students.ucsd.edu/sponsor/sarc/>. To report an incident to the University, please contact OPHD at [ophd@ucsd.edu](mailto:ophd@ucsd.edu)

## 6 Resources

- Library Help and Research Tools: <https://library.ucsd.edu/ask-us/triton-ed.html>
- Writing Hub: <https://commons.ucsd.edu/students/writing/index.html>
- Transfer Students: The Triton Transfer Hub is available to meet transfer students' academic, social, and personal needs, including group & individual study space, events, workshops and coaching. Take time to meet with a peer coach and learn a little more about the UCSD culture. <https://transferstudents.ucsd.edu>
- Supplemental Instruction: <https://commons.ucsd.edu/academic-support/supplemental-instruction/si-students.html>
- Tutoring: <https://commons.ucsd.edu/academic-support/content-tutoring/index.html>
- Mental Health Services: <https://caps.ucsd.edu>
- Community Centers: Learn about the different ways UC San Diego explores, supports, and celebrates the many cultures in our diverse community. <https://students.ucsd.edu/student-life/diversity/index.html>
- Accessibility: <https://disabilities.ucsd.edu>
- Basic Needs: Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in this course, is encouraged to contact: [foodpantry@ucsd.edu](mailto:foodpantry@ucsd.edu) and [basicneeds@ucsd.edu](mailto:basicneeds@ucsd.edu). For more information, see <https://basicneeds.ucsd.edu/>