



## Course Information

**Course Title:** Foundations of Data Science for Criminology

**Course Number:** CCJS 418E

**Term:** *Spring / 2022*

**Course Times:** Tue/Thu 11am to 12:15pm

**Instructor:** Zubin Jelveh ([zjelveh@umd.edu](mailto:zjelveh@umd.edu))

**Zubin's Office Hours:** TBD

**TA:** Toryn Sperry ([tsperry@umd.edu](mailto:tsperry@umd.edu))

**Toryn's Office Hours:** TBD

## Course Description

This course will explore the use of data science in the criminal justice system through the lens of risk assessment instruments (or risk assessment algorithms). These instruments have been in use for at least a century, but have come under greater use and scrutiny with the advent of big data and machine learning. The course will cover the fundamental mathematical and statistical concepts behind the modern versions of these assessments. In particular, we will spend a significant amount of time on probability basics and developing an understanding of conditional probability. We will then show the connection between conditional probability and four important components of the study risk assessments: building them, evaluating their predictive accuracy, assessing their impact on fairness, and estimating the causal impact on the policy priority the tool was intended to address.

Each week will contain a lecture and a lab. Labs will be performed in Python and Jupyter Notebooks (though alternatives are acceptable). Most weeks will feature a quiz that will cover material taught the previous week, or cover questions for the reading due in that week's class. There will be homework assignments that will primarily involve coding. There will be a mid-term and either a final project or final exam (which will be determined by students).

## Required Resources

This course does not stick to particular textbooks. Readings and course materials will be provided on the elms course site. No purchases required.

Laptop – We will do live exercises in class in Python.

## Letter Grade Cutoffs

In the table below,  $g_i$  is the grade for i-th student

A+	$97 \leq g_i \leq 100^*$	B+	$87 \leq g_i < 90$	C+	$77 \leq g_i < 80$	D+	$67 \leq g_i < 70$	F	$g_i < 60$
A	$93 \leq g_i < 97$	B	$83 \leq g_i < 87$	C	$73 \leq g_i < 77$	D	$63 \leq g_i < 67$		
A-	$90 \leq g_i < 93$	B-	$80 \leq g_i < 83$	C-	$70 \leq g_i < 73$	D-	$60 \leq g_i < 63$		

\* Note: To receive an A+ you must have demonstrated significant contributions to the class in addition to achieving this numeric grade.

## Communications:

**ELMS** - Official course site for materials, assignments, announcements, gradings, etc. Make sure that your email & announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS so you do not miss any messages.

**Emails** - Administrative requests, quick clarifications, etc. **Please prefix the subject line with [CCJS418E]. If you have not received a reply within 2 days, please email again.**

**Office Hours** - Complex technical questions

## Grading Structure

Assignment	Percentage %
Read + summarize article	5%
In-class participation	5%
3 Homework Assignments (drop lowest)	20%
12 In-class quizzes (2% each, drop 2 lowest)	20%
Midterm	25%
Final Project	25%
Extra Credit	TBD
<b>Total</b>	<b>100%</b>

Course Outline (**Subject to Change**)

Week #	Topic	Deliverable
1- (1/25)	Data Science Background / Probability Basics / Getting Started with Python	
2 - (2/1)	Probability Basics (continued) / Conditional Probability / Python Pandas	<b>UMD Deadline: Last day to drop course (2/4)</b> Quiz #1
3 - (2/8)	Simpson's Paradox / Machine Learning Overview (continued)	Quiz #2
4 - (2/15)	Naive Bayes	Quiz #3
5 - (2/22)	Limitations of Naive Bayes	Quiz #4 / Problem Set #1 Due
6 - (3/1)	Linear Regression / Overfitting	Quiz #5
7 - (3/8)	Decision Trees	Quiz #6
8 - (3/15)	Decision Trees / Random Forest	Quiz #7 / Problem Set #2 Due
9 - (3/22)	No Class	
10 - (3/29)	Midterm	
11 - (4/5)	Random Forest / Performance Metrics / AUC	<b>UMD Deadline: Last day to drop with 'W' (4/8)</b> Quiz #8
12 - (4/12)	Fairness / Sources of Bias Part I	Quiz #9
13 - (4/19)	Sources of Bias Part II	Quiz #10
14 - (4/26)	Choosing a Threshold / Predicting Shooting Victimization	Quiz #11
15 - (5/3)	Causal Inference for Data Science	Quiz #12 / Problem Set #3 Due
16 - (5/10)	Final Review	

Note: **This is a tentative schedule, and subject to change – monitor the course ELMS page for current deadlines.**

## Resources & Accommodations

### Accessibility and Disability Services

Students with disabilities should inform me of their needs at the beginning of the semester. Please also contact UMD's Accessibility and Disability Service (<https://counseling.umd.edu/ads/>). ADS will make arrangements with the student and me to determine and implement appropriate academic accommodations. Inclusion is one of the iSchool's core values, and we have attempted to make all materials and assignments accessible to people with varying abilities. However, if there is something else I can do to make the class more accessible please schedule a time to come talk to me. This will benefit not only yourself but also future students!

### Getting Help

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpening their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

## UMD Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit [www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html) for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.