Reminder: This (and all lectures) in COGS 108 are being recorded.

Welcome to COGS 108!

Data Science in Practice

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Lectures : https://github.com/COGS108/Lectures-Sp21


hello
my name is
Professor Ellis

Why this course?

You are going to be analyzing lots of data because you're studying to be a:

cognitive scientist
data scientist
computer scientist
neuroscientist, biologist, or chemist
social scientist (linguist?)
statistician or biostatistician
CEO/small business owner
political activist
something else really awesome

Survey (link also on canvas)

Due 11:59 PM **Friday**

COGS 108 Student Survey (Spring 2021)

This survey is used to help me get to know you a bit better! Thanks in advance for your participation!

If you complete before Friday of week 1 at 11:59 PM, there is an opportunity for a little bit of extra credit.

If any of these data are used/displayed in class, the data will be anonymized. Please answer as truthfully as possible. How you respond will NOT affect how you do in this class. Also, many questions are NOT required. Please do not answer anything that makes you uncomfortable.

Your email address will be recorded when you submit this form.

Why this course?

DATA

Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

FROM THE OCTOBER 2012 ISSUE

Harvard Business Review

adapted from Brad Voytek

50 Best Jobs in America

Awards

This report ranks jobs according to each job's Glassdoor Job Score, determined by combining three factors:

	Job Title	Median Base Salary	Job Satisfaction	Job Openings
#1	Front End Engineer	$105,240	3.9/5	13,122
#2	Java Developer	$83,589	3.9/5	16,136
#3	Data Scientist	$107,801	4.0/5	6,542

Highest Paying Jobs

Oddball Interview Questions

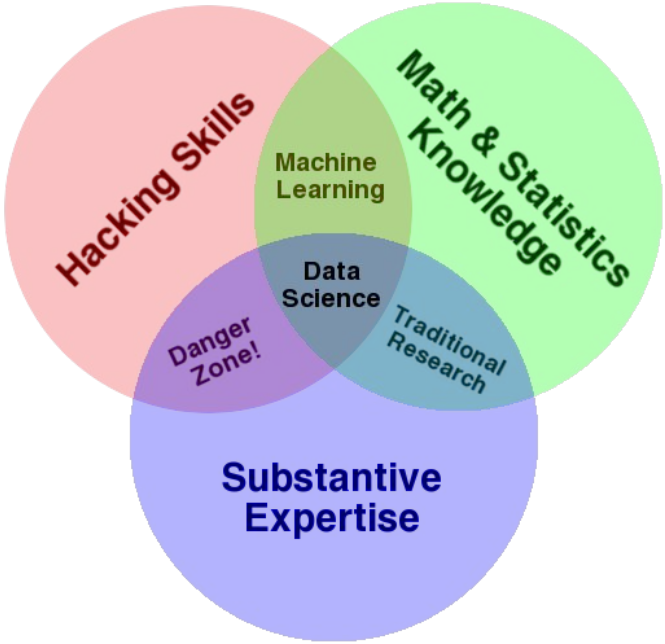
Median Base Salary

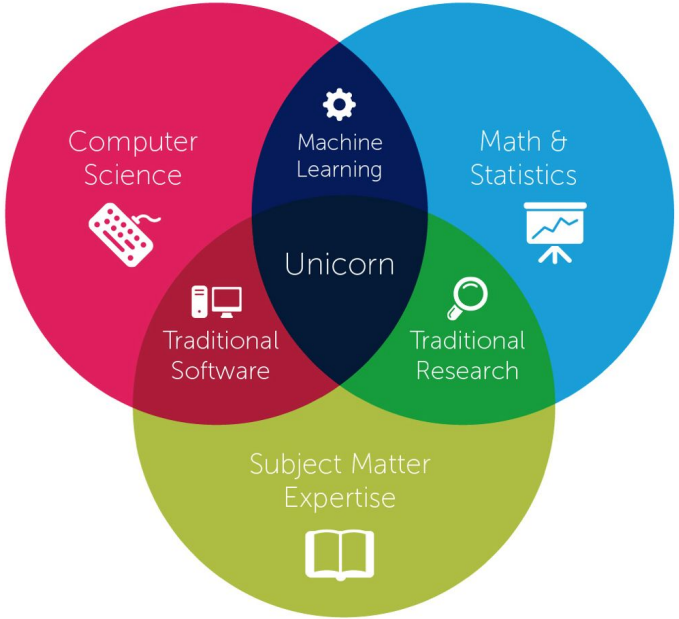
Job Openings

View Jobs

https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KQ0,20.htm

What is data science?





http://drewconway.com/zia/2013/3/26/the-data-science-venn-diagram

Defining Data Science

a "concept to unify statistics, data analysis, machine learning and their related methods" in order to "understand and analyze actual phenomena" with data.[3] *It employs techniques and theories drawn from many fields within the context of* *mathematics*, *statistics*, *information science*, *and* *computer science*. -Wikipedia

"This coupling of scientific discovery and practice involves the collection, management, processing, analysis, visualization, and interpretation of vast amounts of heterogeneous data associated with a diverse array of scientific, translational, and interdisciplinary actions." -David Donoho ("*50 years of Data Science*

"an emerging discipline that draws upon knowledge in statistical methodology and computer science to create impactful predictions and insights for a wide range of traditional scholarly fields" - from a panel Rafael Irizarry moderated, shared on SimplyStatistics ("*The role of academia in data science education"*)

"an umbrella term used by organizations to describe the processes used to extract value from data" -Rafael Irizarry's personal definition in "*The role of academia in data science education"*

"The study of how the quantification of observable phenomena can lead to human understanding of the processes giving rise to those phenomena—or even the ability to predict future outcomes absent human understanding—and why certain phenomena require more or less data to lead to human understanding and/or prediction accuracy". -Brad Voytek's definition

"The scientific process of extracting value from data"

Data scientists ask interesting questions & answer them with data

The goal in COGS 108 is to *do* data science.

Course Objectives

- Formulate a plan for and complete a data science project from start (question) to finish (communication)
- Explain and carry out descriptive, exploratory, inferential, and predictive analyses in Python
- Communicate results concisely and effectively in reports and presentations
- Identify and explain how to approach an unfamiliar data science task

How we'll approach learning about *and doing* data science in COGS 108

Scheduling & Staff

Lecture: MWF 9-9:50
Discussion Sections: M, W, F
Office Hours: Fri 10-12 PM (Prof Ellis, by appt.); all others coming soon!

TAs	IAs
Atman	Enoch
Holly(Yueying)	Anuujin
David	Kevin
Qin	Tiffany

COGS 108: General Plan

Week	Topic(s)
1	Data Science, Python, & Version Control
2	Data Intuition & Wrangling
3	Data Ethics & Questions
4	Data Visualization & Data Analysis
5	Inference
6	Text Analysis
7	Machine Learning
8	Nonparametric Analysis
9	Geospatial Analysis
10	Data Science Communication & Jobs

Programming Prerequisite

- MAE 8 - MATLAB
- CSE 8A or 11 - Python/Java
- COGS 18 - Python
- DSC 10 - Python

Bottom line: **we will assume programming knowledge.**

Python will be used for all labs/projects/assignments.

No programming experience (or you forget it all)?

- *Preferred option*
  - Take a programming course first
  - COGS 18 : Introduction to Python
- *Can't wait?*
  - Use online sites like *codecademy.com* or *LearnPython.org*
  - *Python Data Science Handbook*

Course links

GitHub	https://github.com/COGS108	lecture/section materials & final projects
datahub	https://datahub.ucsd.edu	assignment submission
Campuswire	https://campuswire.com/p/G342FC77A (course code on canvas home page)	questions, discussion, and regrade requests
Canvas	https://canvas.ucsd.edu/courses/25437	grades, lecture videos
Anonymous Feedback	Submit via Google Form	if I ever offend you, use an example you hate, or to provide general feedback

General grading:

	% of Total Grade
(8/9) Weekly Quizzes (lecture content)	8
(8/9) Discussion Labs (technical)	16
(4) Assignments	32
Final Group Project	44
(1) Project Planning Survey*	1
(1) Project Review*	5
(1) Project Proposal*	8
(2) Project Checkpoints*	10
(1) Final Report*	15
(1) Final Video*	3
(1) Project Survey	2

* indicates group submission

Attendance is neither required nor incentivized

- All lectures will be recorded (available by 2PM every MWF; Canvas Media Gallery)
- One Mon technical discussion section each week will be recorded

Weekly Lecture Quizzes:

- (9) weekly quizzes (first one due Friday of Week 2)
- Goal: to help you keep on top of the material covered in lecture
- Why?: experience + student feedback
- How:
  - Taken on Canvas
  - Single Attempt
  - ~10 Questions
  - Timed : 15 minutes
  - Posted by Friday @ 11:59 PM (after each week of lecture); due the following Friday
  - Meant to test concepts from previous week's lecture

Lecture quizzes will be due on Fridays by 11:59 PM.

Lowest quiz score will be dropped.

All deadlines Fri at 11:59 PM

Week	Quiz	Discussion Lab	Lecture Quiz	Assignment
1	Data Science, Python, & Version Control			--
2	Data Intuition & Wrangling	D1	Q1	A1 - python, group proj. survey*
3	Data Ethics & Questions	D2	Q2	Project Review*
4	Data Visualization & Data Analysis	D3	Q3	Project Proposal*
5	Inference	D4	Q4	A2 - pandas/viz
6	Text Analysis	D5	Q5	Checkpoint #1: Data*
7	Machine Learning	D6	Q6	A3 - Inference
8	Nonparametric Analysis	D7	Q7	Checkpoint #2: EDA*
9	Geospatial Analysis	D8	Q8	A4 - NLP/ML
10	Data Science Communication & Jobs	D9	Q9	--

Final Project(Report*, Video*, Survey): due Wed June 9th of finals week by 11:59 PM

*indicates group submission. All other assignments/surveys are completed & submitted individually.

Why polling questions in COGS 108?

- There are a whole lot of you!
- Checks understanding
- Provides me with feedback
- Aids in critical thinking & allows for application of concepts
- Give you all a break from listening to me (we humans need this!)

(4) Assignments

Assignments are completed individually and graded programmatically.

- These are meant to get you practice programming around the topics covered in class.
- The first two are much simpler than the following two and should take less time.
- You will have to look some stuff up on your own. This is by design.
- Instructions must be followed to receive credit.
- You'll have the opportunity to practice in discussion section.

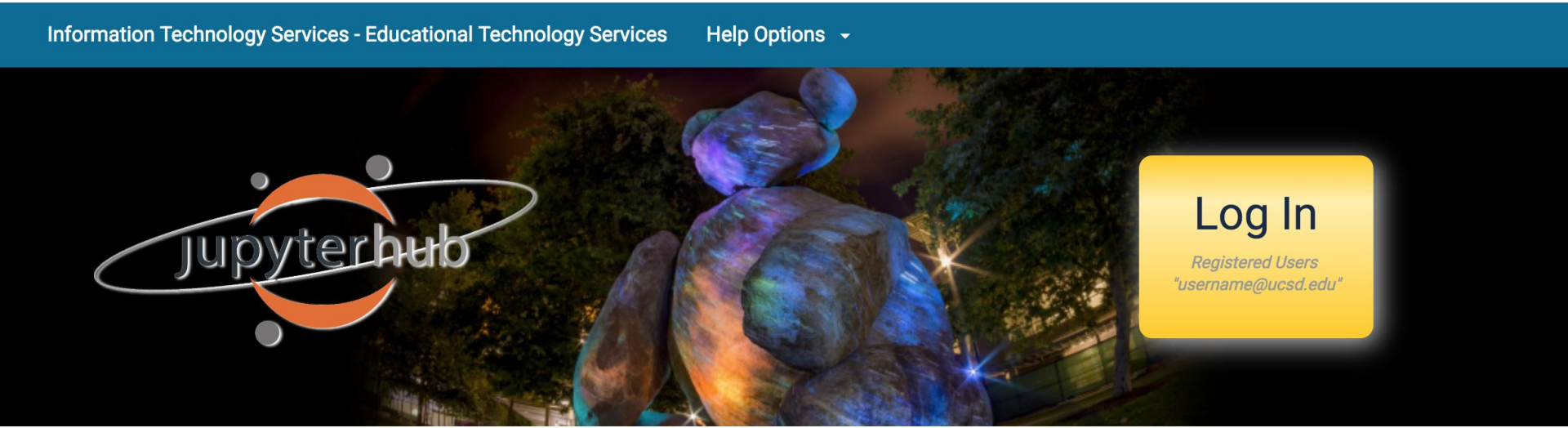
Assignments will be due on Fridays by 11:59 PM.

75% credit if submitted w/n 72h after deadline.

Assignment Submission @ Datahub: https://datahub.ucsd.edu

DATA SCIENCE / MACHINE LEARNING PLATFORM

UC San Diego



UC San Diego Jupyterhub (Data Science) Platform

Before Fri: log onto datahub & have a working installation of Jupyter on your computer

All deadlines Fri at 11:59 PM

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1	Data Science, Python, & Version Control	--	--	--
2	Data Intuition & Wrangling	D1	Q1	A1 - python, group proj. survey*
3	Data Ethics & Questions	D2	Q2	Project Review*
4	Data Visualization & Data Analysis	D3	Q3	Project Proposal*
5	Inference	D4	Q4	A2 - pandas/viz
6	Text Analysis	D5	Q5	Checkpoint #1: Data*
7	Machine Learning	D6	Q6	A3 - Inference
8	Nonparametric Analysis	D7	Q7	Checkpoint #2: EDA*
9	Geospatial Analysis	D8	Q8	A4 - NLP/ML
10	Data Science Communication & Jobs	D9	Q9	--

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Group Projects: the main focus of COGS 108

Groups of 4-5 Individuals

How to find a group:

1. go to discussion section week 1 - Wed or Friday
2. post on group formation campuswire thread
3. Use Zoom chat *at the end of class*

All deadlines Fri at 11:59 PM

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8	Nonparametric Analysis	D7	Q7	Checkpoint #2: EDA*
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Final Project(Report*, Video*, Survey): due Wed June 9th of finals week by 11:59 PM

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Discussion Section

- Goals:
  - help with technical aspects of the course
  - assignment & project help
- Technical Discussion Section
  - Mon at 10AM
  - Labs submitted by Fri @ 11:59 PM (2pt/lab; lowest lab dropped)
- Project-Focused Discussion Sections
  - Mon at 11AM; Wed at 12PM; Wed at 1PM and Fri at 2PM
  - Each Project group will be assigned a staff member as their point of contact/grader

Why is it like this? What about the section I'm assigned to?

- You'll never be required to go to section
- Have labs to help those struggling technically
- Structured project this quarter, so wanted to give structured help during discussion
- Students found discussion more helpful last quarter with this layout

Discussion Sections will start Wed. First week is just for group formation.

All deadlines Fri at 11:59 PM

Week	Quiz	Discussion Lab	Lecture Quiz	Assignment
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Course Confusion

- If something in lecture, a section workbook, or an assignment is unclear:
  - *ask in class*
  - *ask during section*
  - *post on Campuswire*
  - *ask a classmate*
  - *come to office hours*

Please do not use Canvas messages.

(The UI is the worst. I miss messages all the time. I will not look at them first. I look at Campuswire first every day. Then email. I have 500+ students. Please use Campuswire when possible.)

CLASS CONDUCT

In all interactions in this class, you are expected to be respectful. This includes following the UC San Diego principles of community.

This class will be a welcoming, inclusive, and harassment-free experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, ethnicity, religion (or lack thereof), political beliefs/leanings, or technology choices

At all times, you should be considered and respectful. Always refrain from demeaning, discriminatory, or harassing behavior and speech. Last of all, **take care of each other**.

If you have a concern, please speak with Prof. Ellis, your TAs, or IAs. If you are uncomfortable doing so, the OPHD and/or CARE are wonderful resources on campus.

The (dreaded) waitlist

1. I know this matters to you and is a source of stress (and I hate that).
2. I have no control over the waitlist
   a. I know in other departments profs have control of this
   b. I quite literally do not have access to the system
3. A few people in each section typically get off the waitlist, but that number varies each quarter.
   a. I understand why when we're remote you'd expect me to let everyone in.
   b. But, this is project-based. I already have 400 students in this class.
   c. I tried letting everyone Fall quarter. I barely got any sleep.
4. The waitlist settles after week 2.
5. Our staff (cogsadvising@ucsd.edu) take care of this.

What COGS 108 logistics questions do you have?

I’m excited to have you all in COGS 108!