

# ECE 143 FA19 TERM PROJECT

## Analysis of Education & Compensation at UC Schools

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# Dataset Introduction

## CAPE

Course & Professor  
Evaluations



Courses recorded: 31,268  
Professors recorded: 3714



## UCOP Wages

University of California,  
Office of the President



UC San Diego : 35370+  
UC Los Angeles : 38870+  
UC Berkeley : 59668+  
(across years 2014 - 2018)



## Merged

(only for UC San Diego)



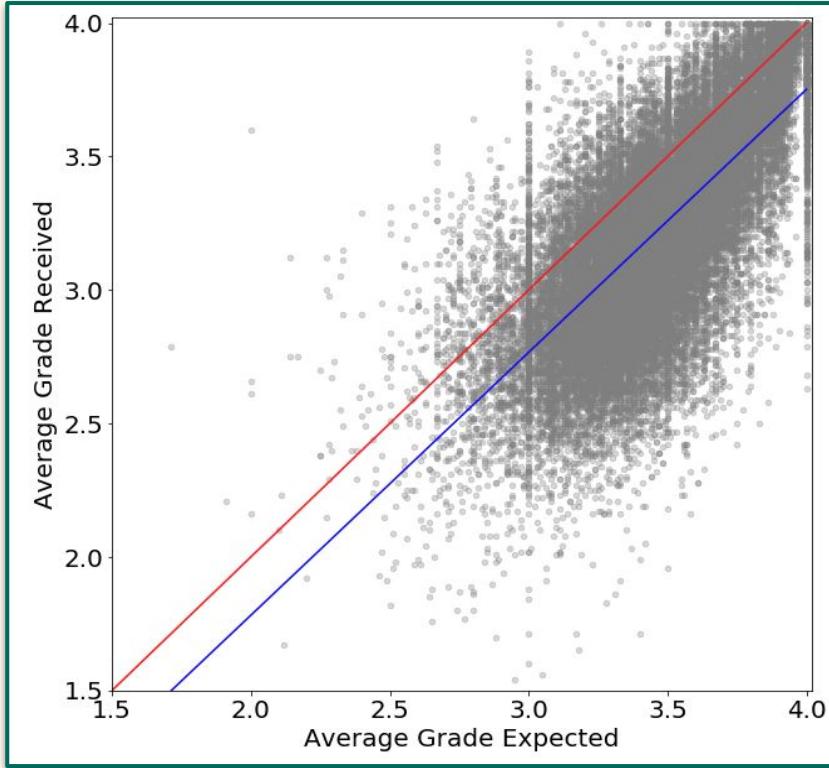
UC San Diego : 31487  
Intersection: 89%

# CAPE Dataset Biases

- Surveys provide an approximation to the truth
- **Response rate:**  $51.4\% \pm 20.4\%$
- **Noisy:** Professors incentivise responses for extra credit -> “garbage” responses.
- **Negativity Bias:** Negative things tend to affect us more than positive things
- **Self-serving Bias:** e.g. misattributing a poor grade to a teacher’s poor teaching ability



# Expectation vs Reality - Course Grades



**Red Line:**  $y = x$   
**Blue Line:**  $y = 0.98x - 0.19$   
(Linear Least Squares Regression)

- Some instructors may do a poor job at informing students their current grades
- In general, students may tend to overestimate their abilities

# About GPA Booster Classes...

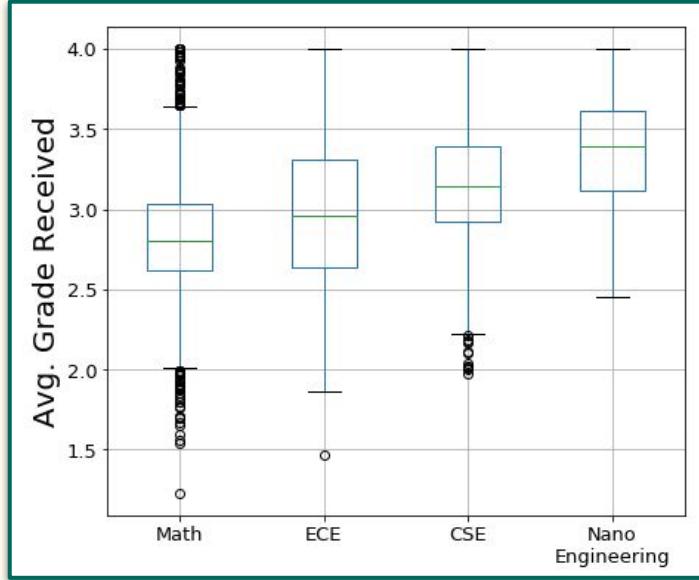


*Source: "UCSD Memes for Sleep Deprived Teens" Facebook Page*

# ...Which Departments Contain the Most?

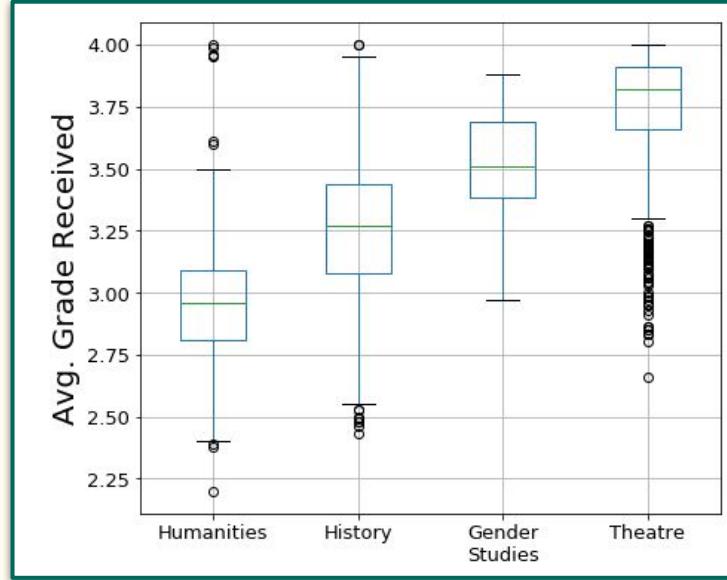
## STEM Departments

Overall  $3.06 \pm 0.37$  GPA Received



## Non-STEM Departments

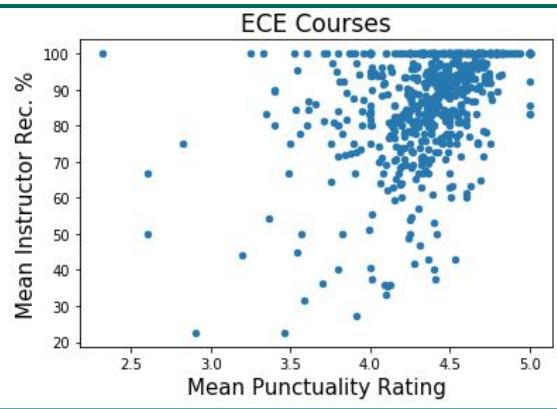
Overall  $3.40 \pm 0.33$  GPA Received



- MATH, ECE, and CSE GPA gap may be unfair
- Perhaps latin honors should be department-specific

<u>Latin Honor Conferred</u>	<u>Final GPA at UCSD</u>
Summa Cum Laude	3.936-4.000
Magna Cum Laude	3.852-3.935
Cum Laude	3.725-3.851

# Attributes Most Conducive to Positive Student Experience?

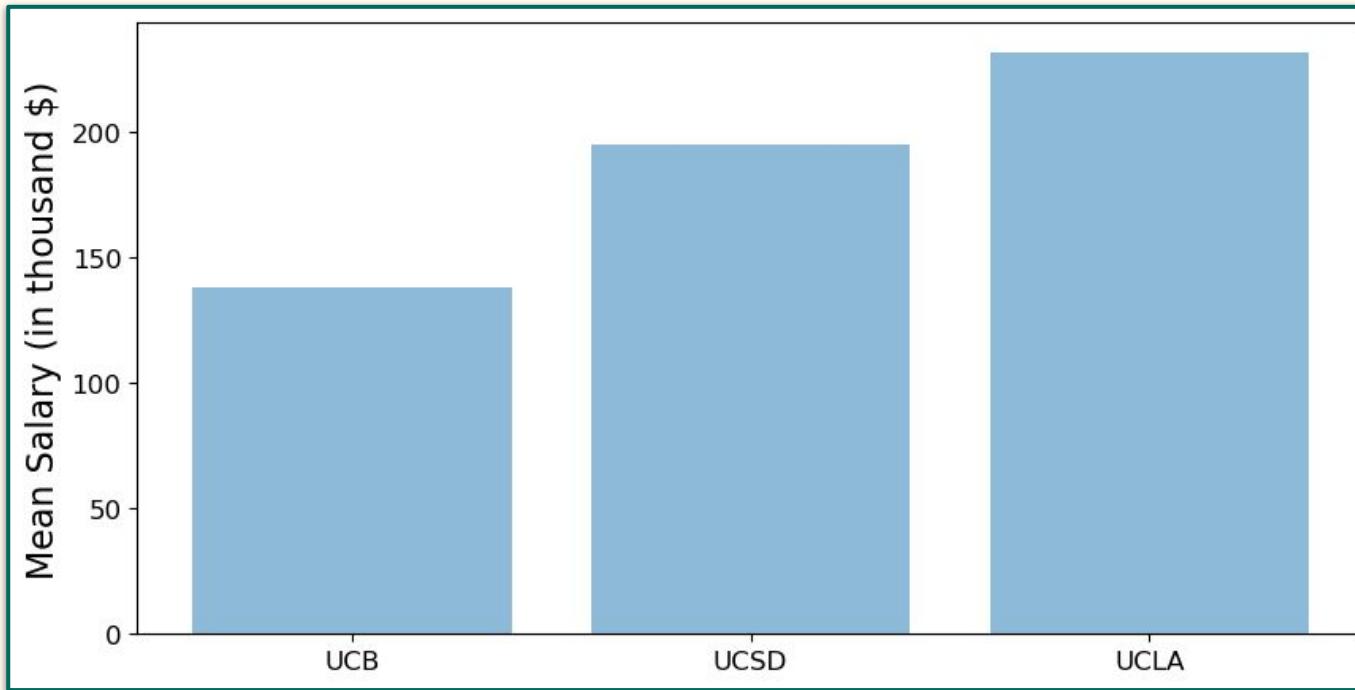


Correlation Magnitude	Interpretation
0.70 to 0.90	High correlation
0.50 to 0.70	Moderate correlation

Instructor Evaluation Criterion	Correlation with Overall Rating
Explanation Quality	0.89
Preparedness	0.83
Command of the Material	0.81
Attention-Holding	0.80
Expression of Concern for Students' Learning	0.79
Understanding of differences (eg race, gender)	0.76
Clear & Audible Speech	0.70
Academic Integrity Enforcement	0.71
Punctuality	0.66
Accessibility Outside Class	0.57
Exam Representativeness	0.52

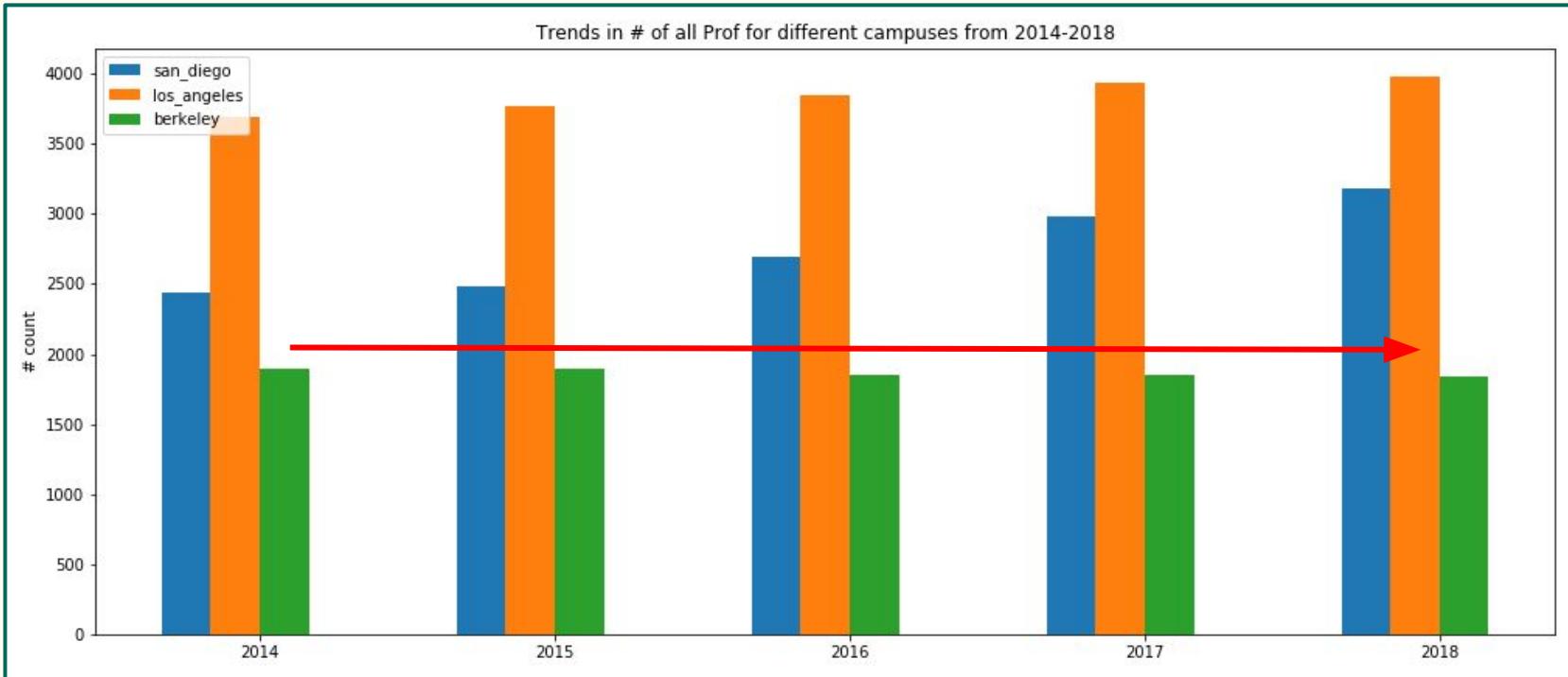
- Instructors could focus on highly correlated traits

# Which School has the Highest Paid Professors?



- Professors working at UCLA earn the most money.

# Growth in number of Professors over time



- UCSD and UCLA are growing rapidly while UCB is in equilibrium

# UCSD Employment Title vs Teaching Quality?

Title	Median Salary	# Employed	Ratings
Lecturer	\$44,000	482	91% ± 11%
Senior Lecturer *	\$120,000	15	93% ± 9%
Assistant Professor	\$91,000	229	88% ± 13%
Associate Professor *	\$102,000	234	89% ± 11%
Full Professor *	\$156,000	592	85% ± 15%

\* Tenure or Security of Employment

- Are full professors, despite their high pay & prestige, actually *worse* at teaching than “normal” lecturers?

# Employment Title & Teaching Quality Relationship?

Title	Median Salary	# Employed	Ratings
Lecturer	\$44,000	482	91% ± 11%
Full Professor	\$156,000	592	85% ± 15%

- Is this difference in mean salary statistically significant or just “noise”?
- A t-test yields  $p = 2.8 \times 10^{-13}$
- The difference in means is statistically significant.
- Cohen’s d is -0.44, indicating a medium difference.

## ➤ Causes?

- Insufficient educational training?
- Pressure to publish or perish; no time for teaching?
- Disinterest in teaching?



# Conclusion

## UCSD

There may be a tendency towards:

- Overestimating GPAs
- STEM vs Non-STEM imbalance
- Important teaching attributes
- Lecturers outperforming professors

## UCSD, UCLA, UCB

Findings include:

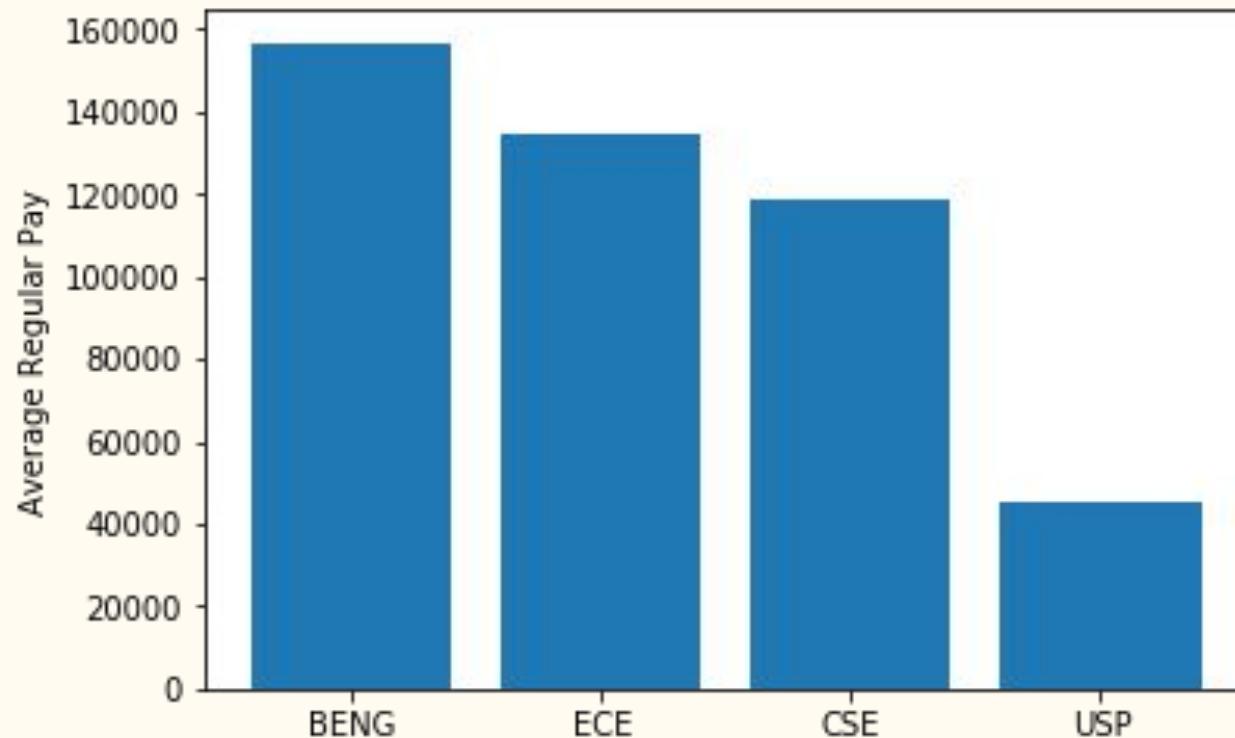
- Salary comparisons
- UCSD's growth



Thank you!

backup

# Highest and Lowest Paid Departments

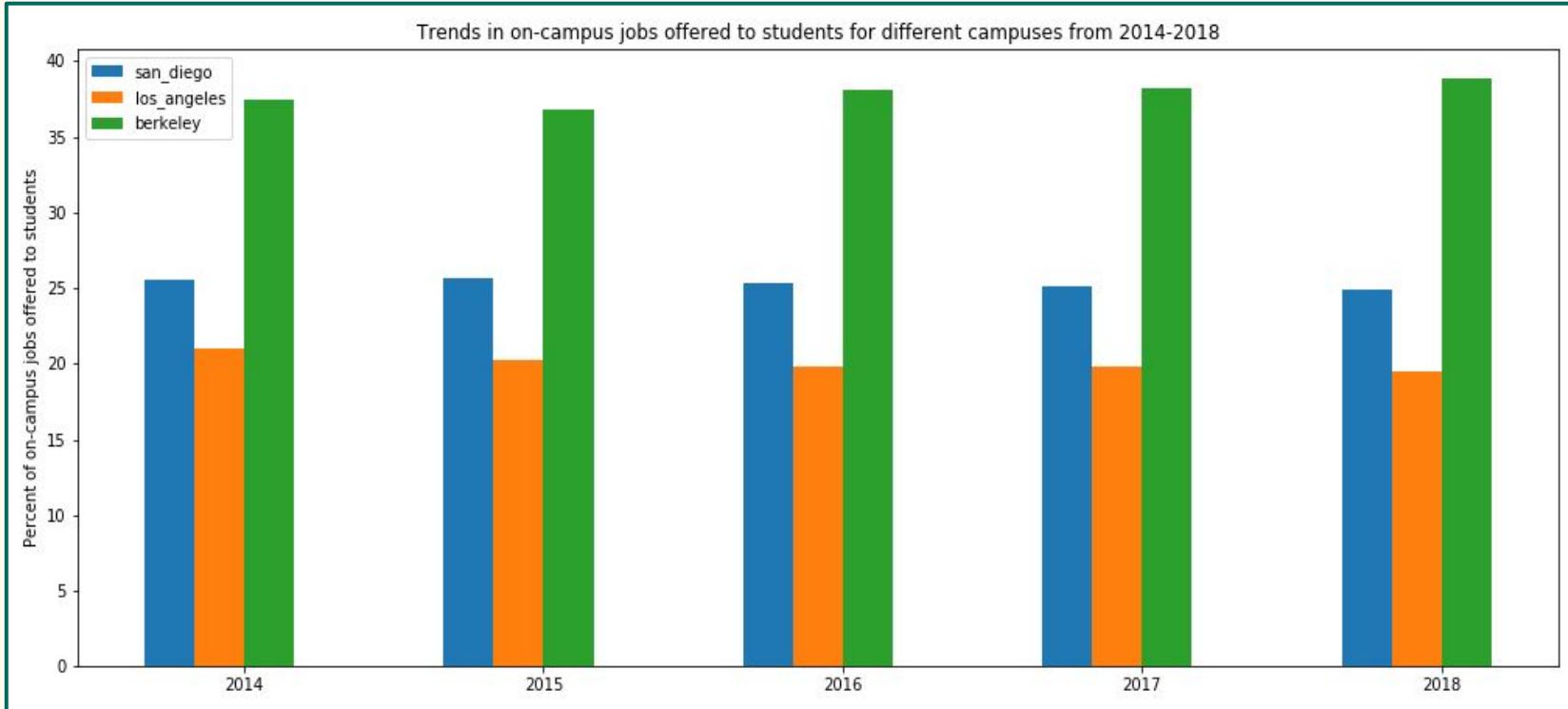


# Dataset Introduction

- We will perform an exploratory analysis of education at UCSD
- For this, we created two datasets
  - **CAPE surveys** -> course feedback from students
  - **UC Salaries** -> salary and title of all UC employees



# Funding Opportunities for Students

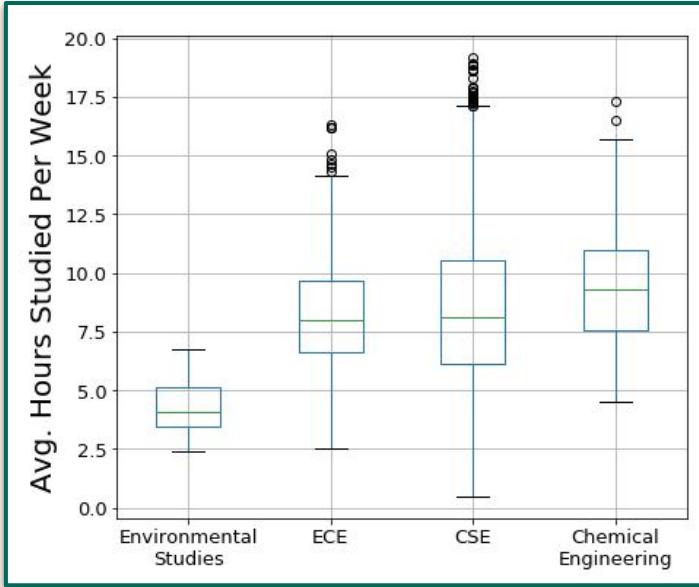


- Number of opportunities w.r.t. total campus jobs remains constant
- UC Berkeley has highest number of jobs (38%) for students

# Most Time Consuming Departments?

## STEM Departments

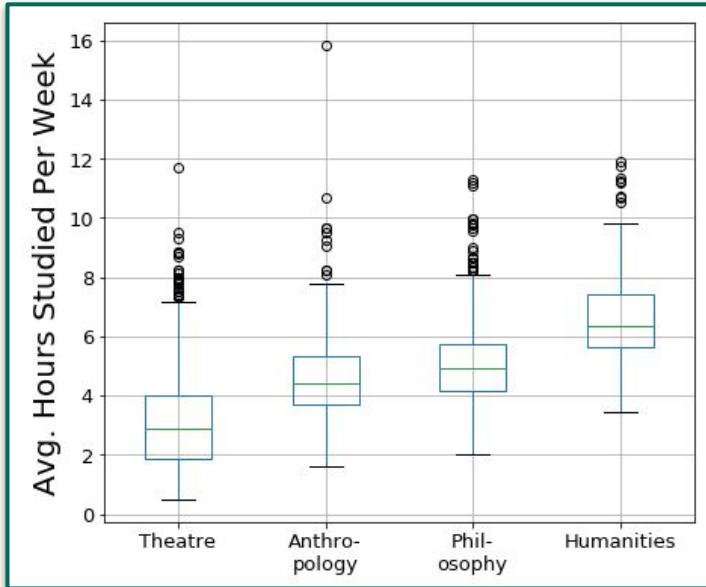
Overall  $6.7 \pm 2.5$  hours studied per week



*Shown: Min & Max Departments,  
along with ECE & CSE*

## Non-STEM Departments

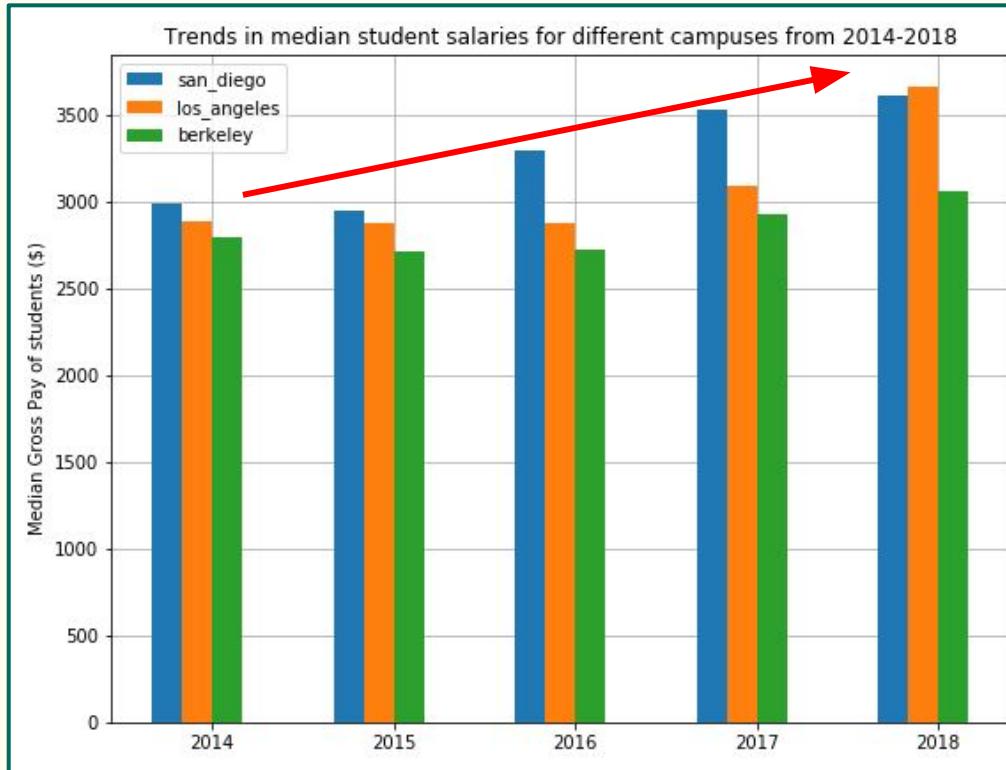
Overall  $4.7 \pm 1.7$  hours studied per week



*Shown: Min & Max Departments, along  
with two ranked in between*

- **STEM majors might be overworked**
- **Non-STEM majors might be underworked**

# Funding opportunities for students



- Student salaries grow ~5% every year across all campuses

# UCOP Employee Pay Dataset Overview

Focus on 3 schools for year 2018 among all UC Schools

UC San Diego	45207 entries	Title (e.g. assistant professor)
UC Los Angeles	68493 entries	
UC Berkeley	35383 entries	Payment (gross, regular, overtime, other)



# Educator Title Designations

## Professor Track

Assistant Professor

**Associate Professor \***

**Full Professor \***

## Teaching Professor Track

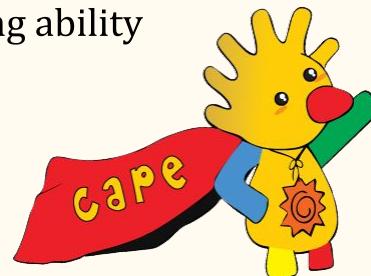
Lecturer

**Senior Lecturer \***

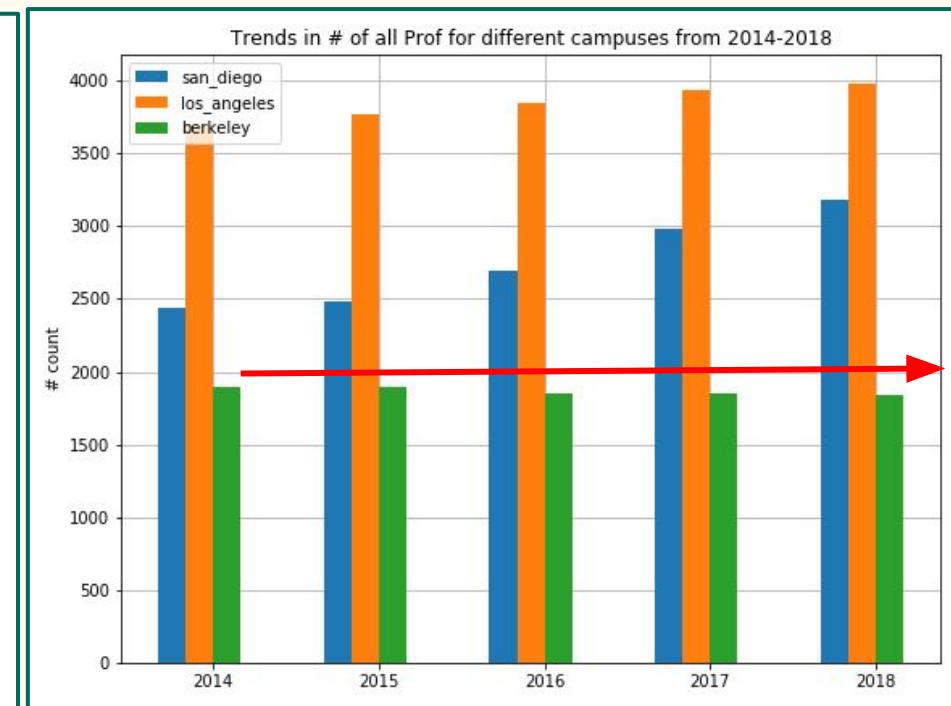
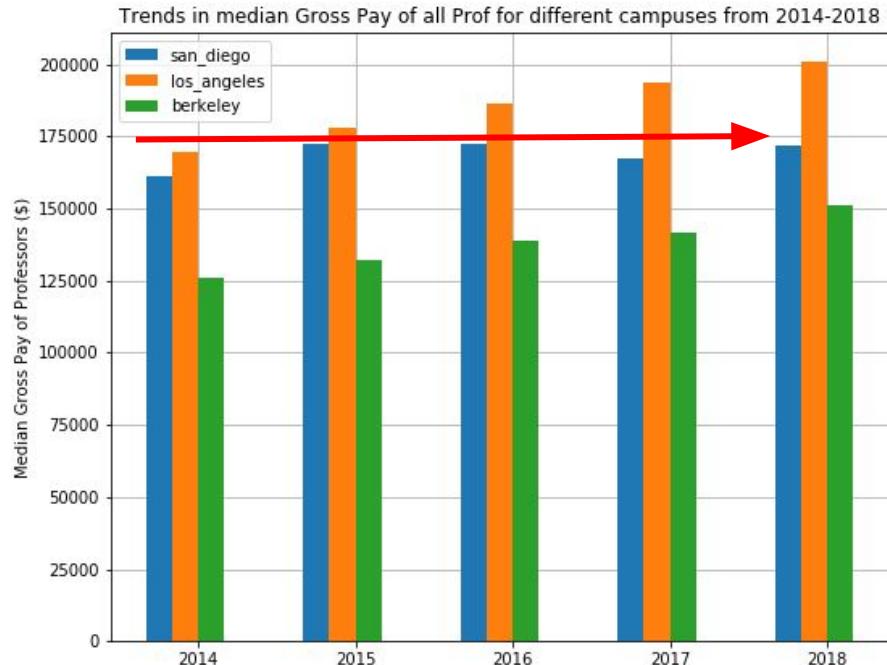
(\* Indicates Tenure or Security of Employment)

# CAPE Dataset Biases

- Asks **general questions**:
  - “Do you recommend the instructor, overall?”
  - “How many hours do you study per week on average?”
- Presents **detailed statements**, students rate 1 ~ 5 (strongly disagree ~ strongly agree):
  - “Instructor's speech is clear and audible”
  - “Instructor is accessible outside of class”
- Provides an approximation to the truth
  - **Response rate:**  $51.4\% \pm 20.4\%$
  - **Noisy:** Professor incentivise responses for extra credit -> “garbage” responses.
  - **Negativity Bias:** Negative things tend to affect us more than positive things
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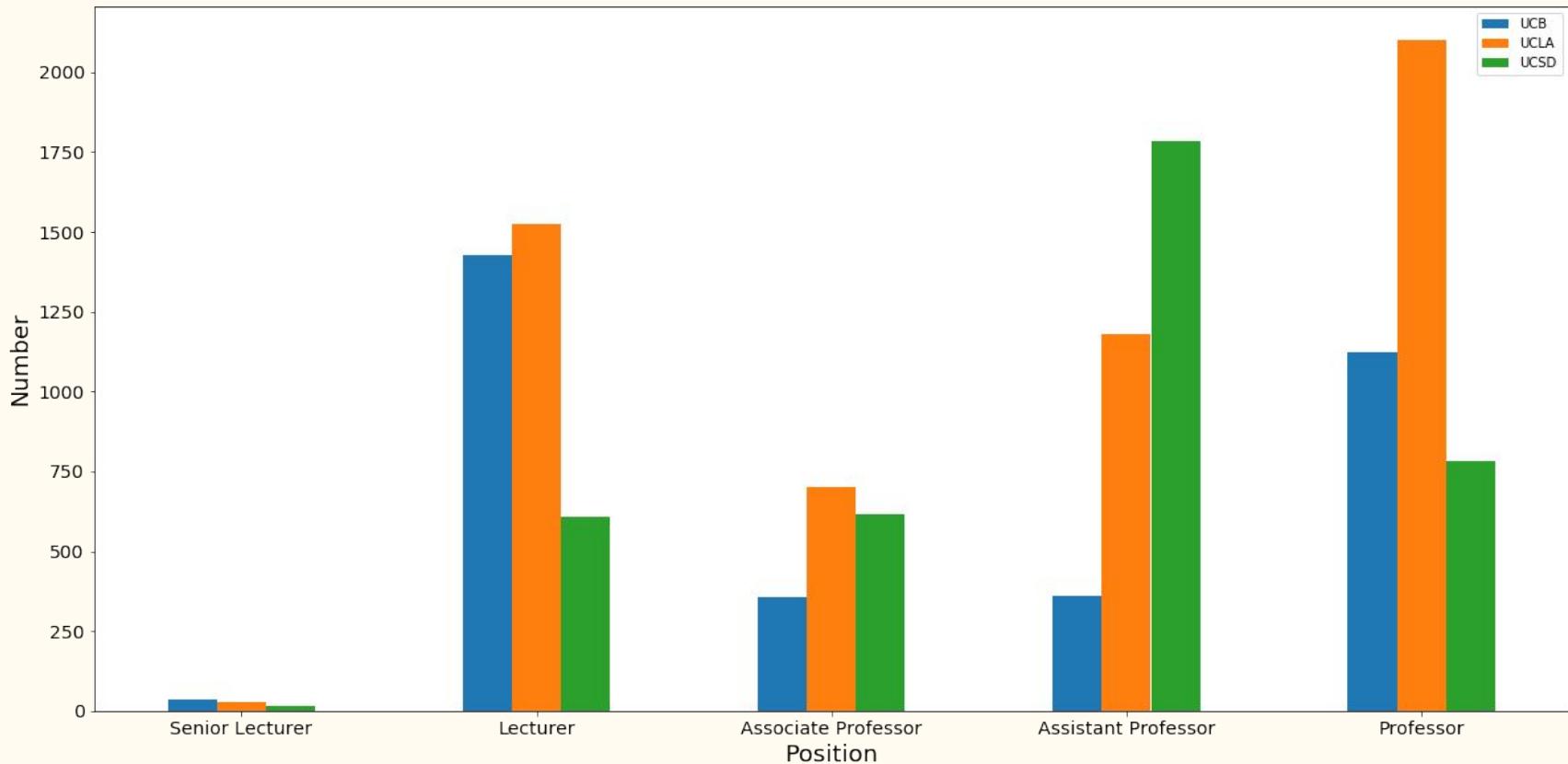


# Salaries and # of all Professors



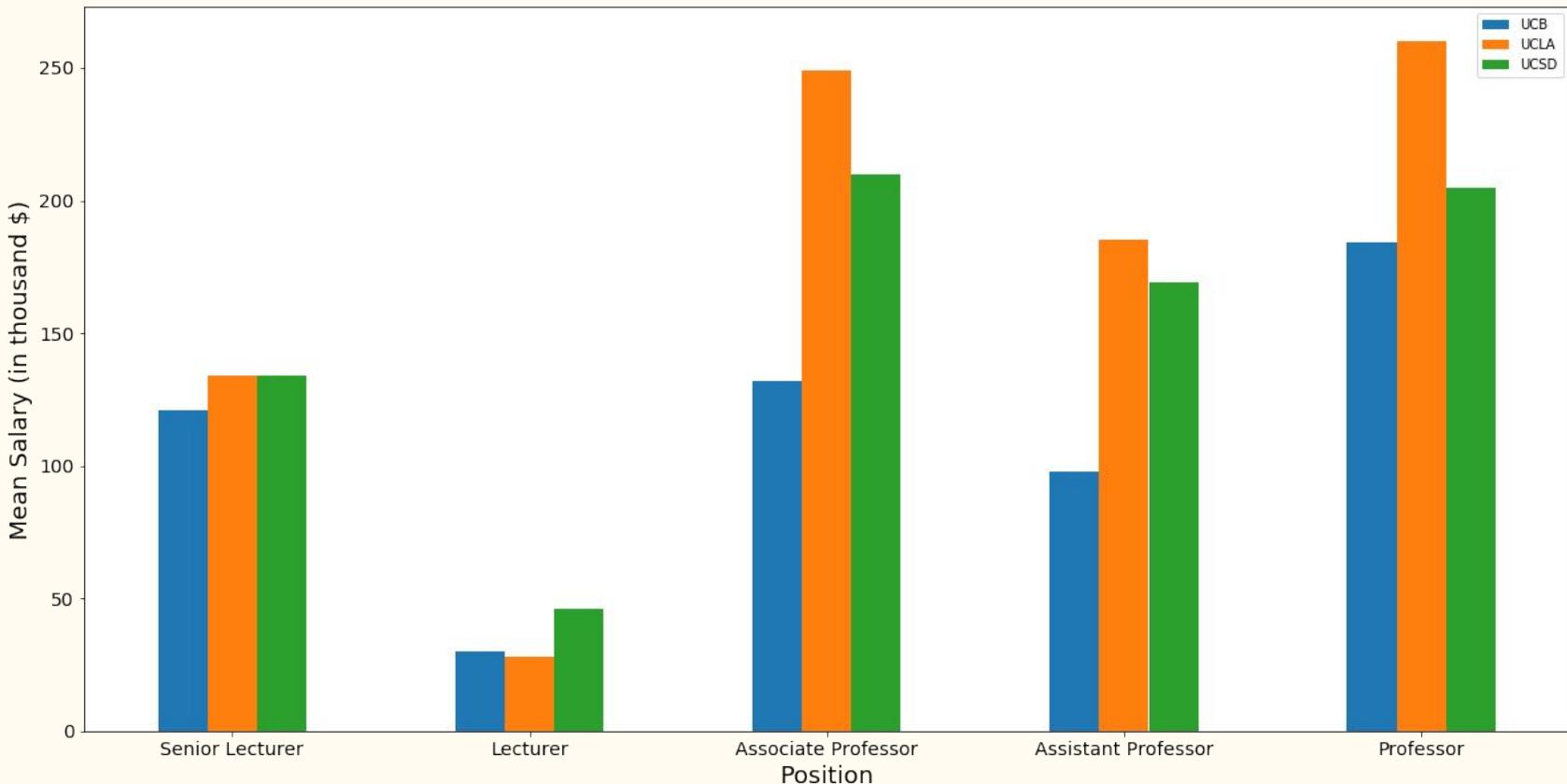
- UC San Diego family has been growing but hiring more Asst Professors.
- UC Berkeley hasn't started expansion yet!

# Professor Distribution Between Different Schools (2018)



- UCLA has the highest number of professors, associate professors and lecturers.
- UCSD has the highest number of assistant professors.
- UCB has the highest number of senior lecturers.

# Salary Analysis Between Different Schools (2018)



➤ On average, all positions (except lecturers) earn the most money from UCLA.

# Conclusions

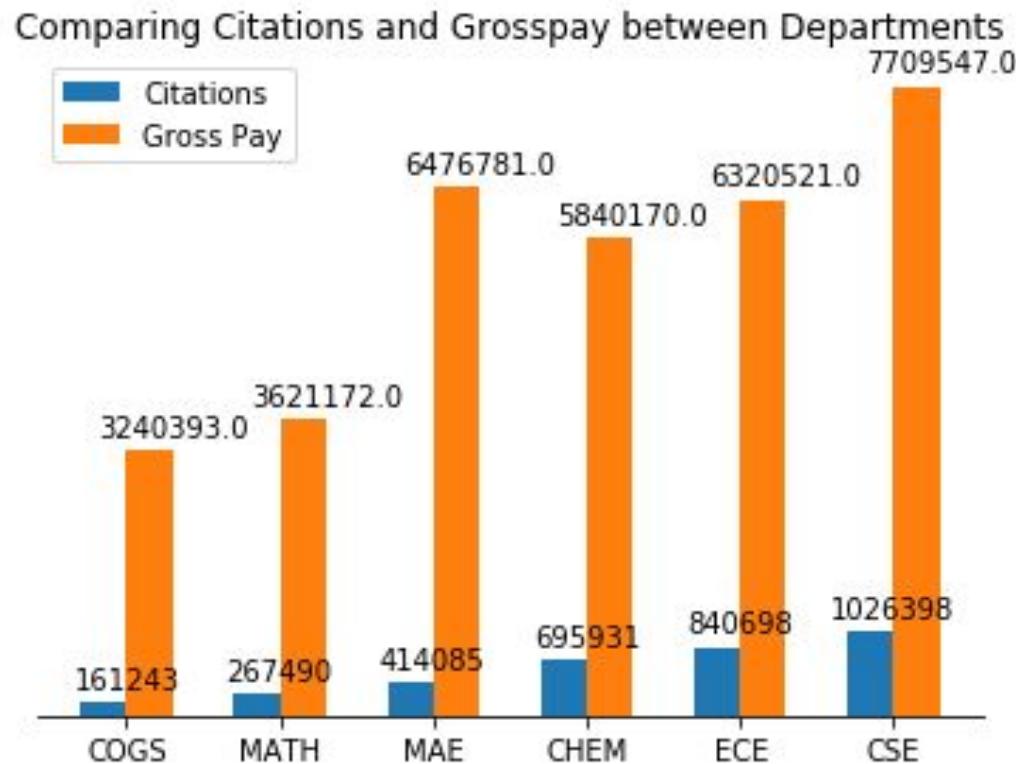
## UCSD

- Expected vs Received GPA
- STEM vs Non-STEM imbalances
- Important teaching attributes
- Professor ratings vs title

## UCSD, UCLA, UCB

- Salary comparisons
- UCSD's growth
- Student Funding Opportunities

# Citations vs Payment



Research opportunities depends upon the saturation of a field and not the gross pay of professors