

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

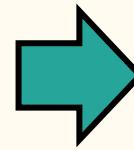


UCOP Wages

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)

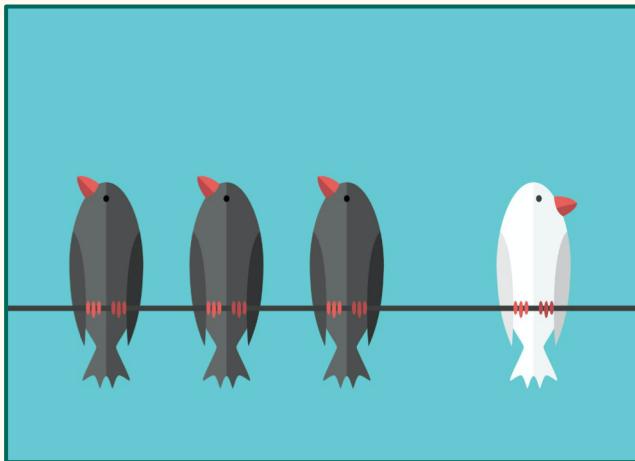


UC San Diego : 31487
Intersection: 89%

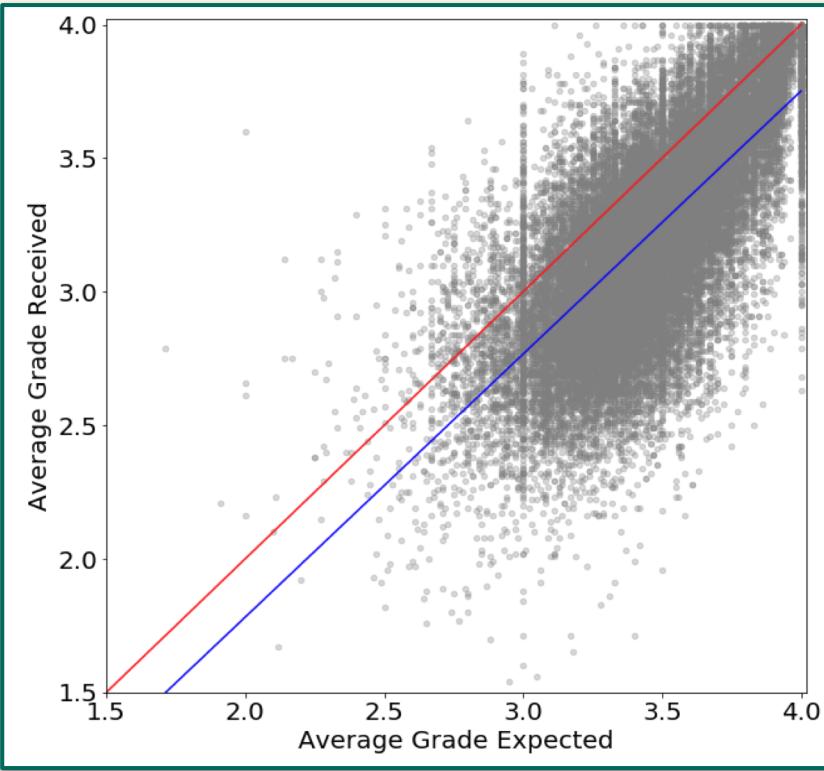
CAPE Dataset Biases

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...

Going into your "easy A" class final that turned out hard



346

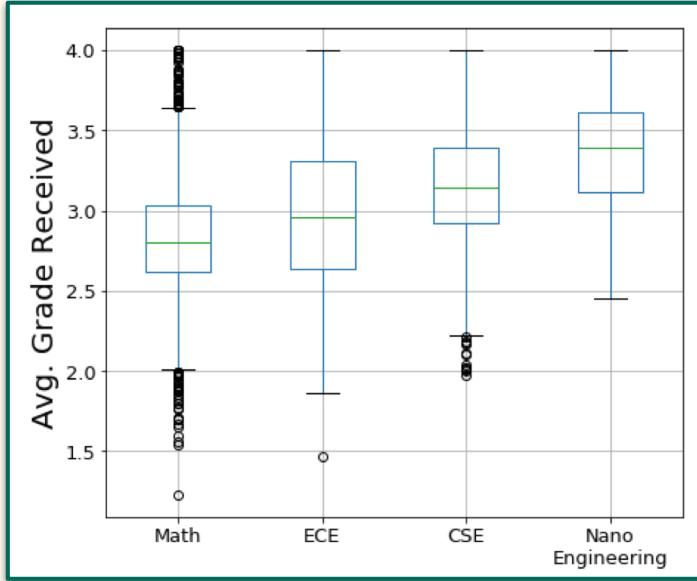
96 Comments

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

...Which Departments Contain the Most?

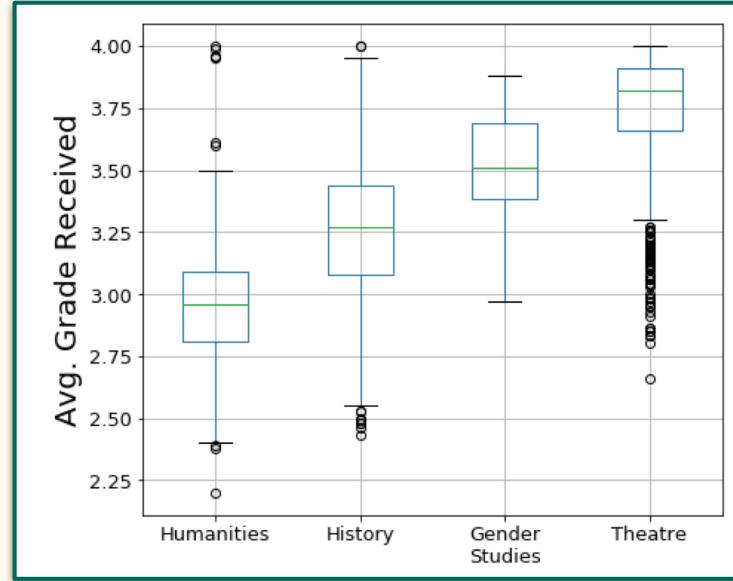
STEM Departments

Overall 3.06 ± 0.37 GPA Received



Non-STEM Departments

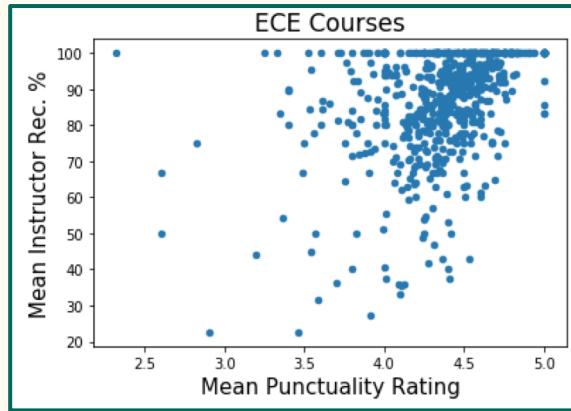
Overall 3.40 ± 0.33 GPA Received



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

| Latin Honor Conferred | Final GPA at UCSD |
|-----------------------|-------------------|
| 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

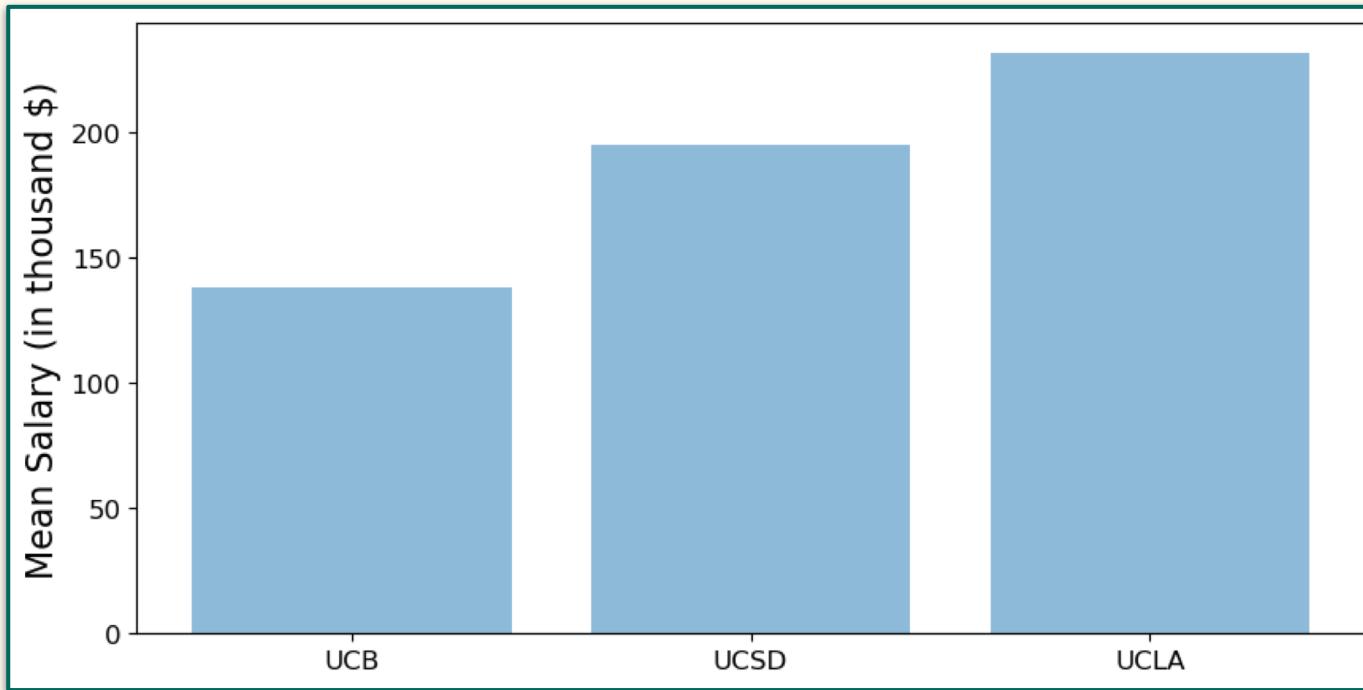


| <u>Correlation Magnitude</u> | <u>Interpretation</u> |
|------------------------------|-----------------------|
| 0.70 to 0.90 | High correlation |
| 0.50 to 0.70 | Moderate correlation |

| <u>Instructor Evaluation Criterion</u> | <u>Correlation with Overall Rating</u> |
|--|--|
| 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 |

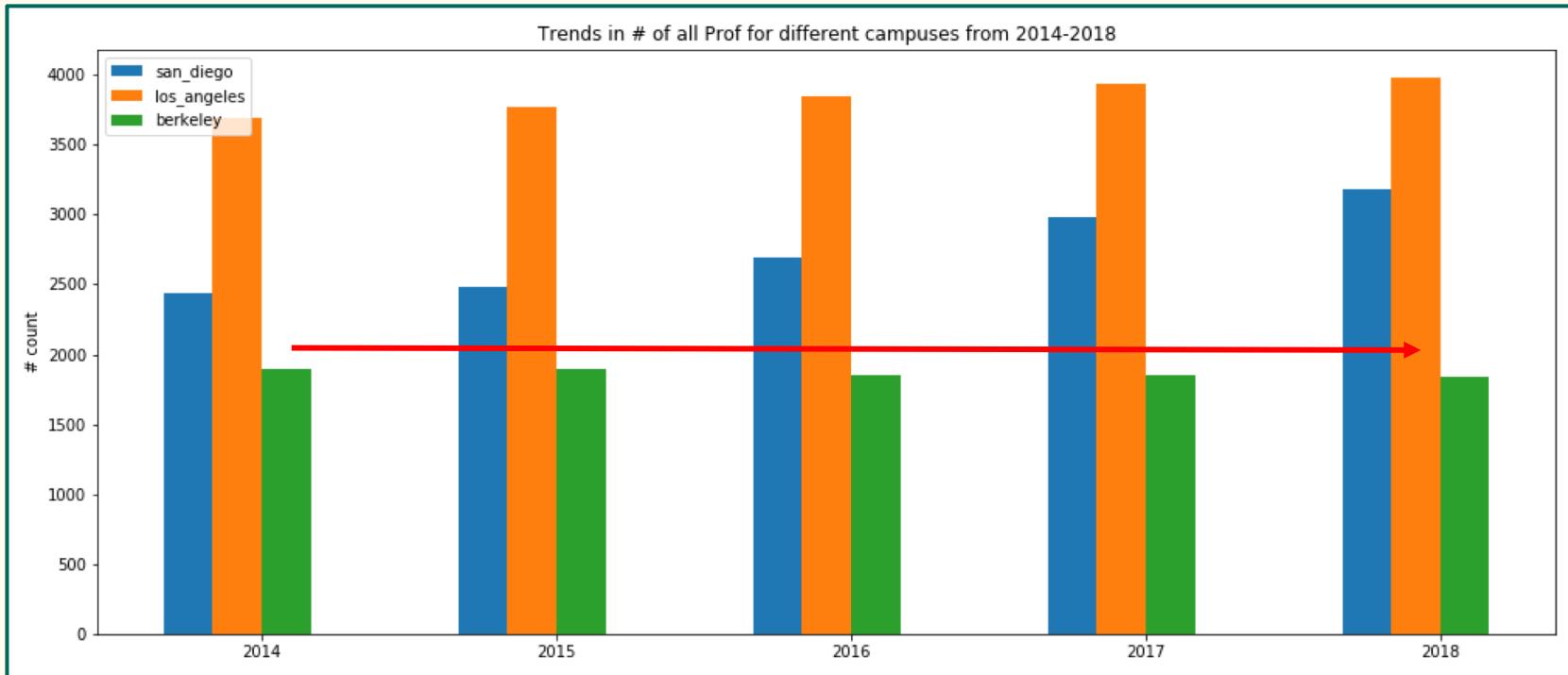
- Instructors could focus on highly correlated traits.

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 |
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| 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?

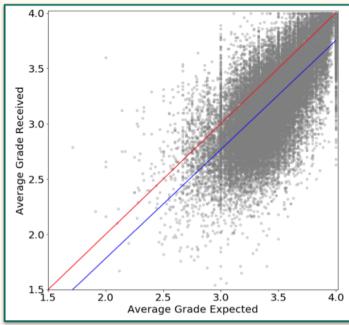
- Insufficient educational training?
- Pressure to publish or perish; no time for teaching?
- Disinterest in teaching?



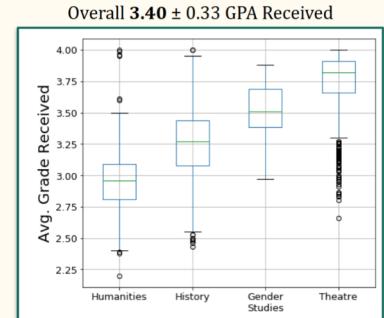
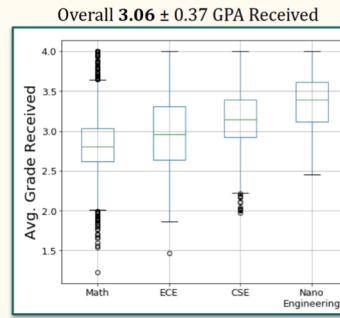
Conclusion

Statistically, there may be a tendency towards:

Overestimating GPAs



STEM vs Non-STEM Imbalance



Important Teaching Attributes

| Instructor Evaluation Criterion | Correlation with Overall Rating |
|--|---------------------------------|
| Explanation Quality | 0.89 |
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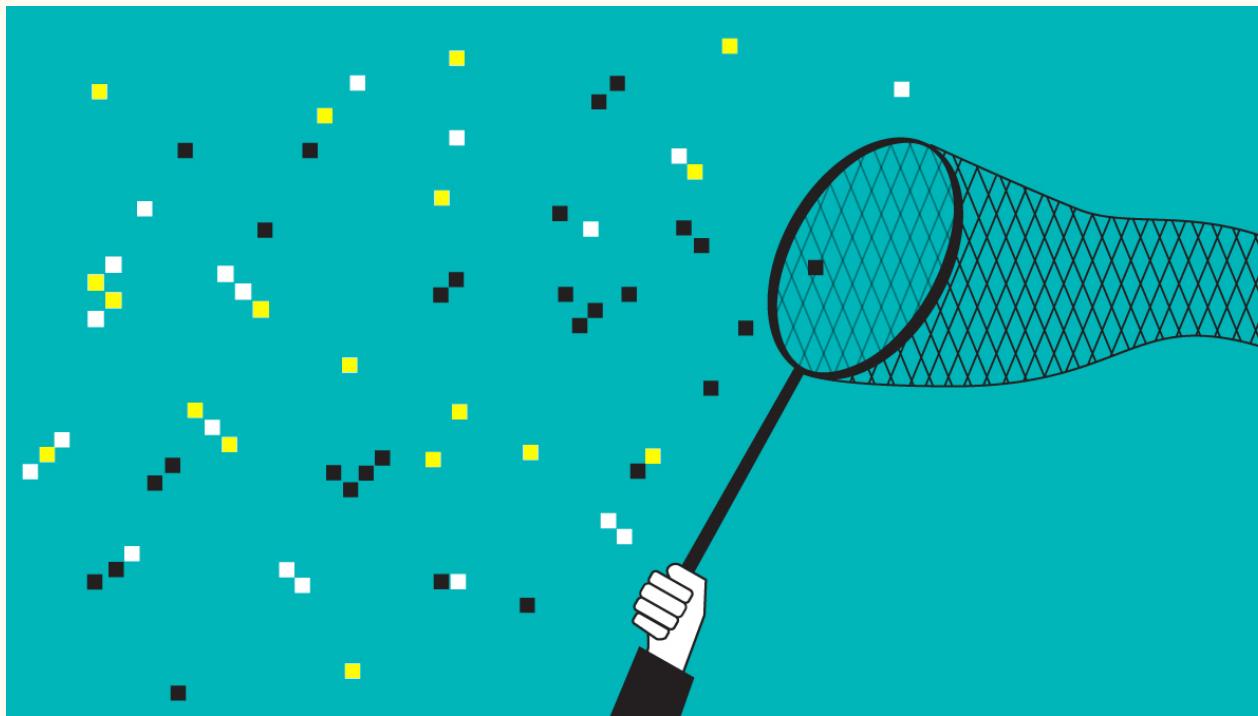
Lecturers Outperforming Professors

| Title | Ratings |
|----------------|-----------------|
| Lecturer | $91\% \pm 11\%$ |
| Full Professor | $85\% \pm 15\%$ |

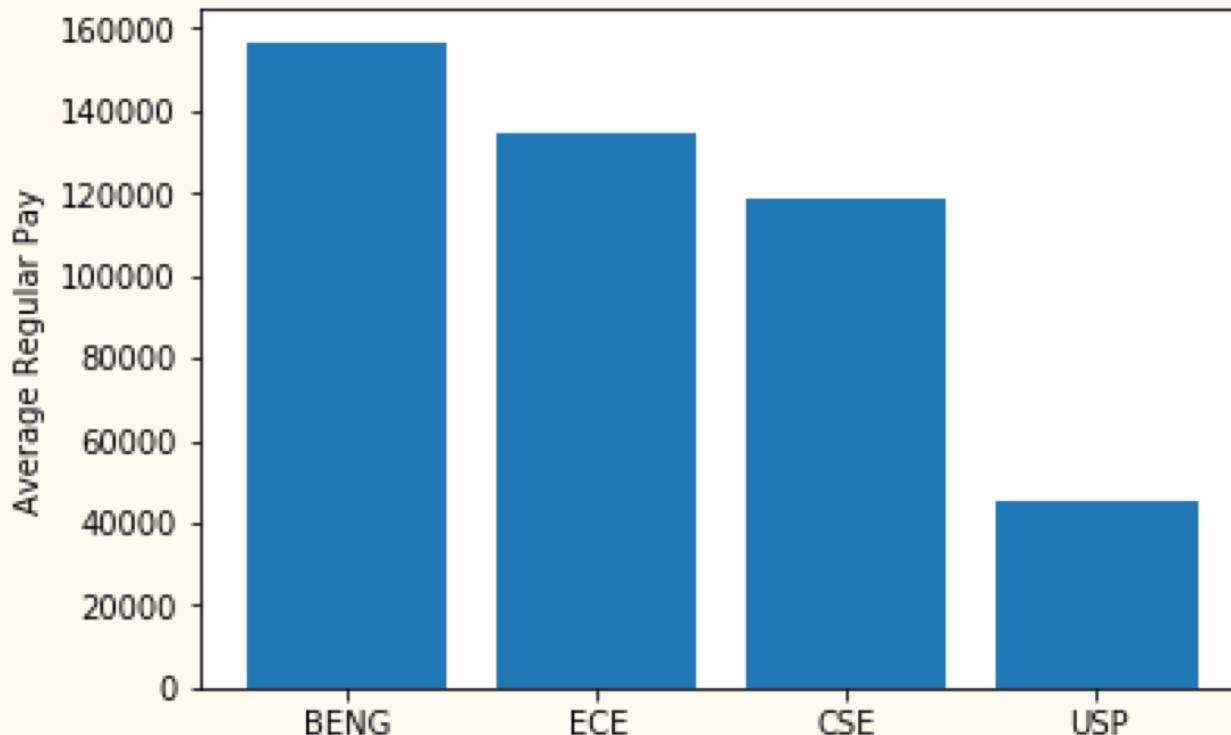


Thank you!

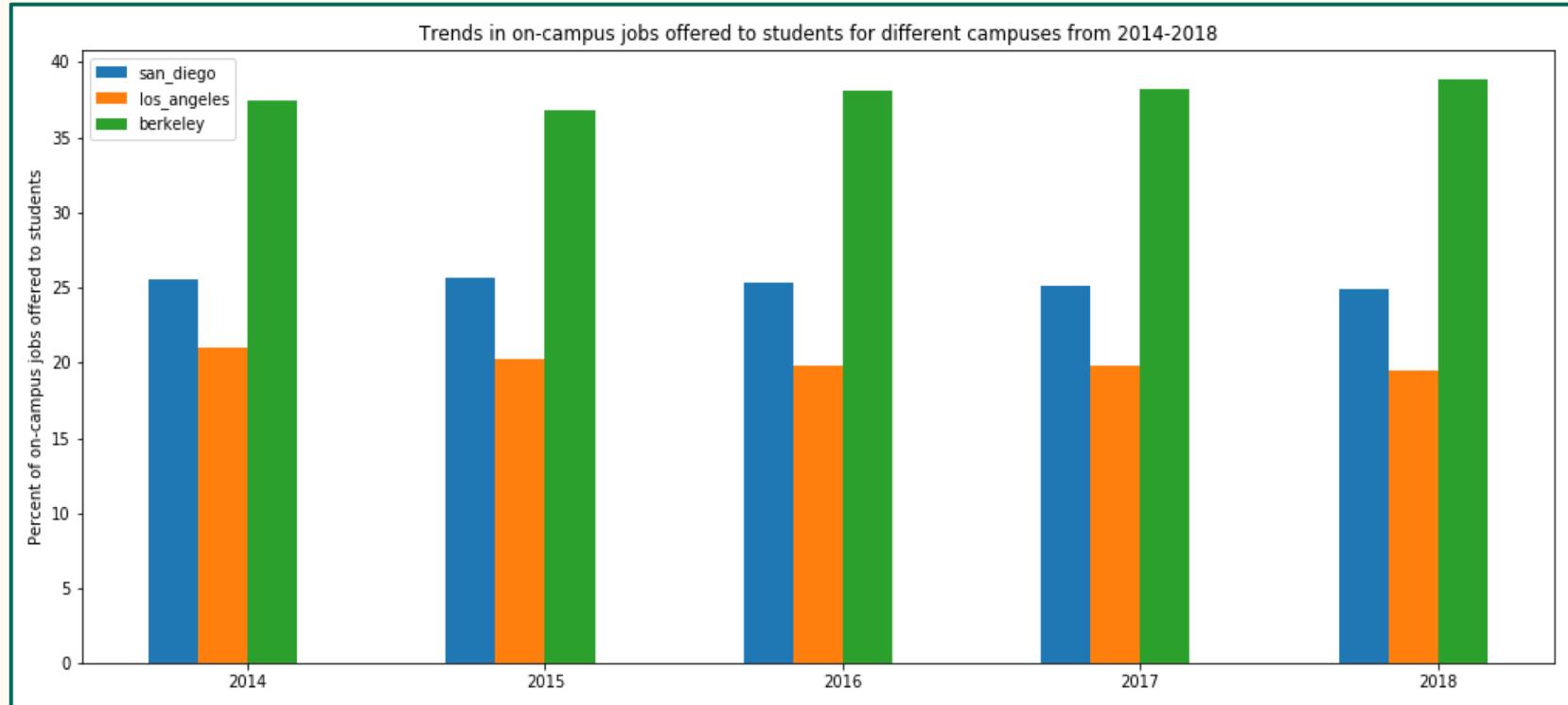
Some Additional Analysis We Performed



Highest and Lowest Paid Departments



Funding Opportunities for Students

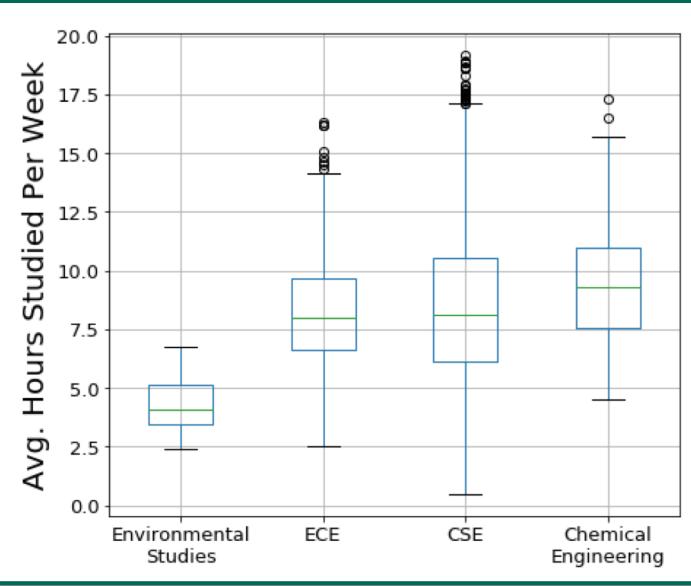


- Number of opportunities w.r.t. total campus jobs remains constant
- UC Berkeley has highest number of jobs (38%) for students

Most Time Consuming Departments

STEM Departments

Overall 6.7 ± 2.5 hours studied per week

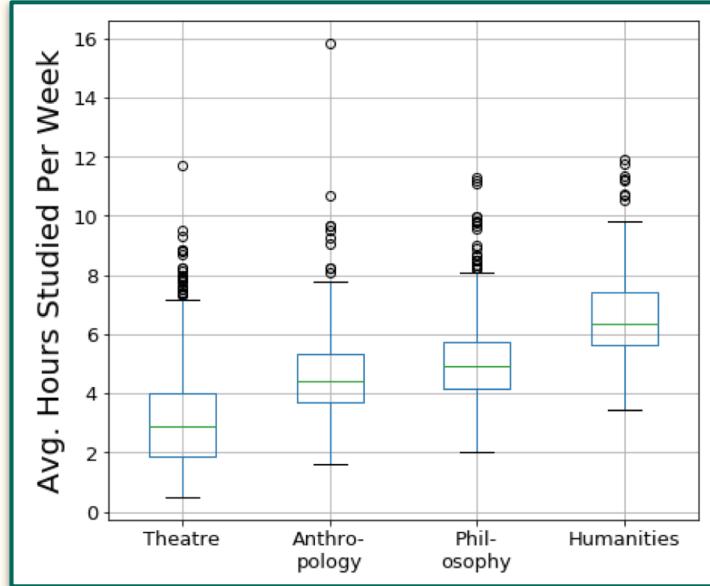


*Shown: Min & Max Departments,
along with ECE & CSE*

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

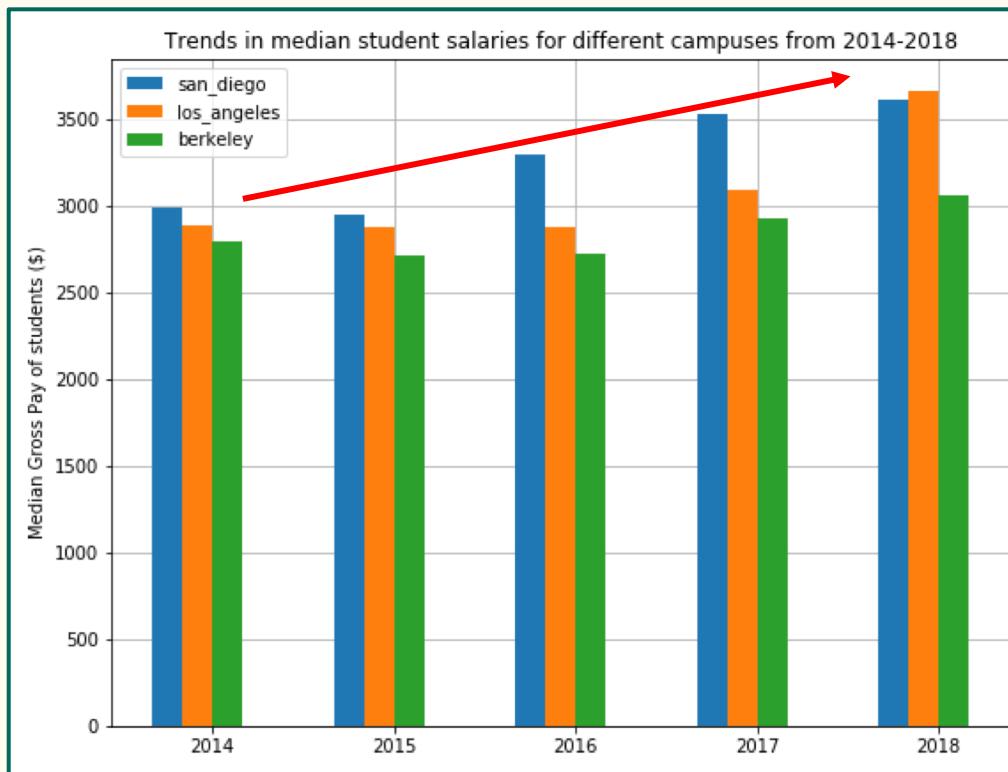
Non-STEM Departments

Overall 4.7 ± 1.7 hours studied per week



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

Funding Opportunities for Students



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

Educator Title Designations

Professor Track

Assistant Professor

Associate Professor *

Full Professor *

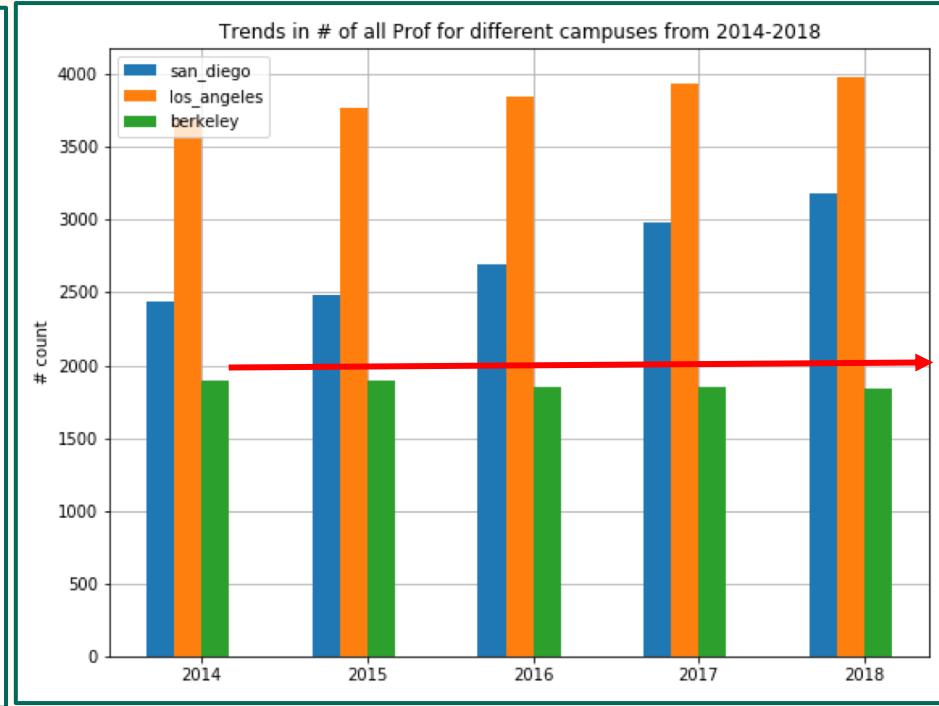
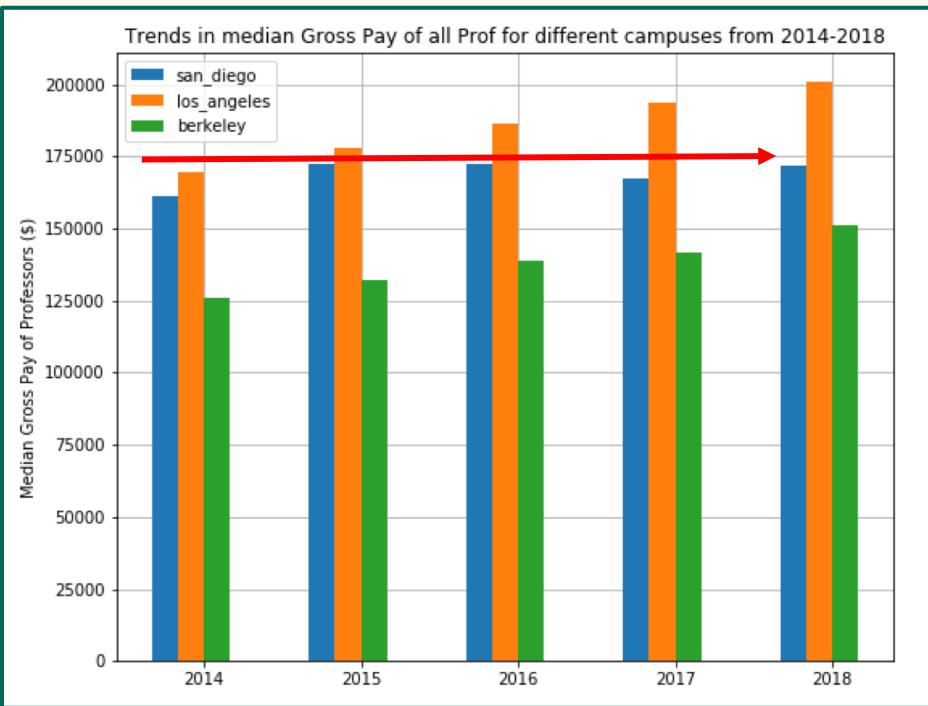
Teaching Professor Track

Lecturer

Senior Lecturer *

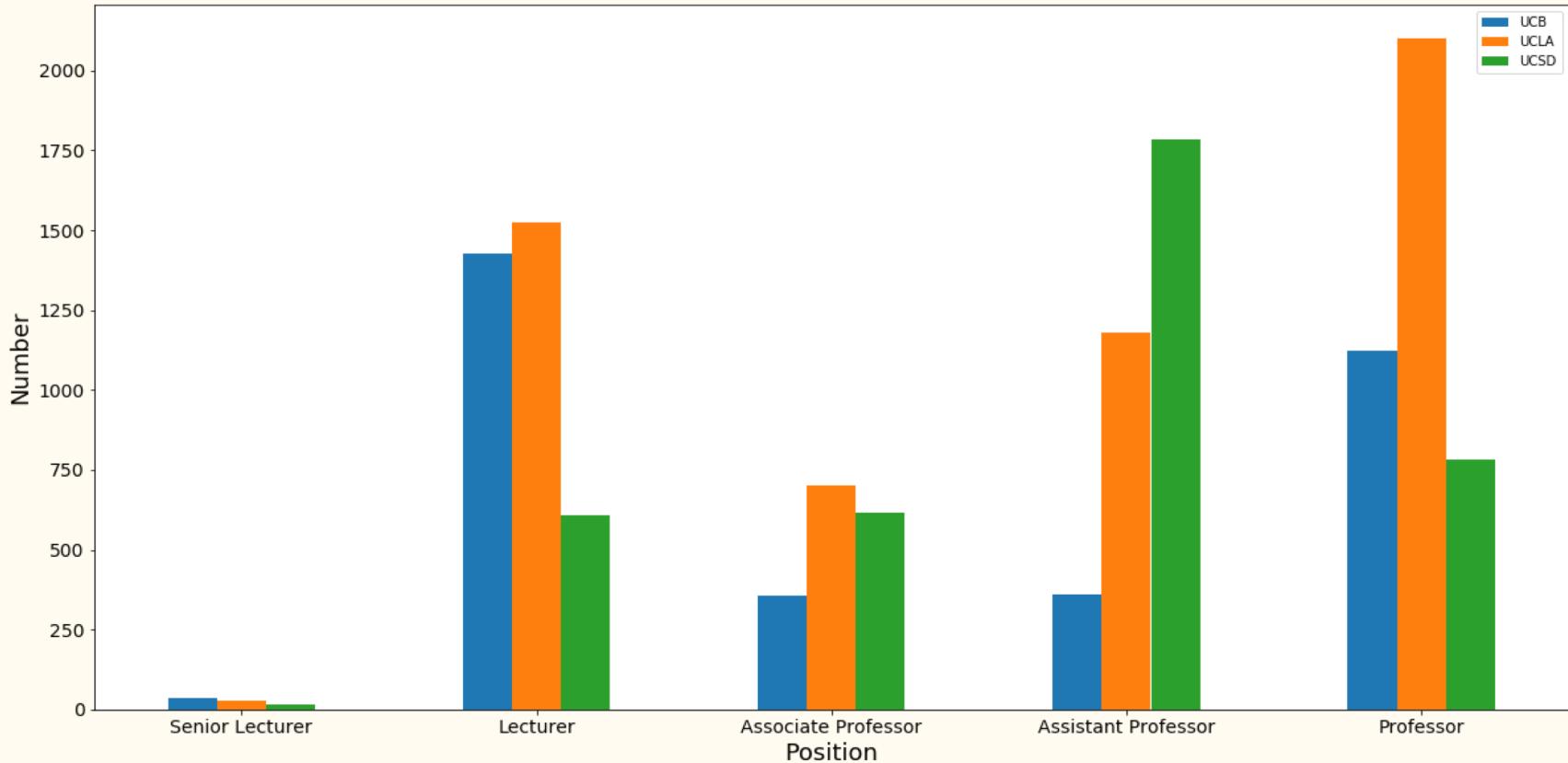
(* Indicates Tenure or Security of Employment)

Salaries and # of all Professors



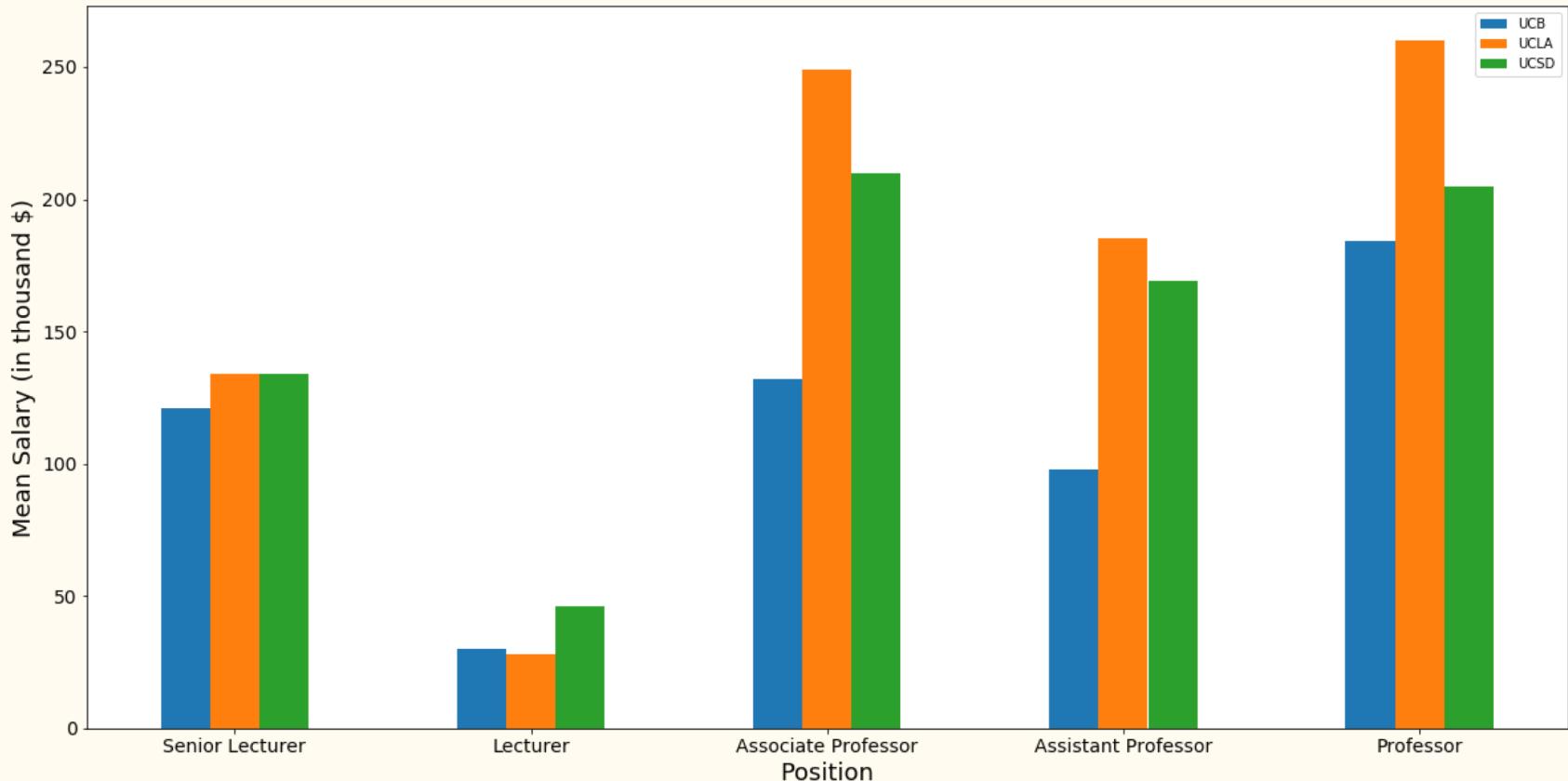
- UC San Diego **family has been growing but hiring more Asst Professors.**
- UC Berkeley **hasn't started expansion yet!**

Professor Distribution Between Different Schools



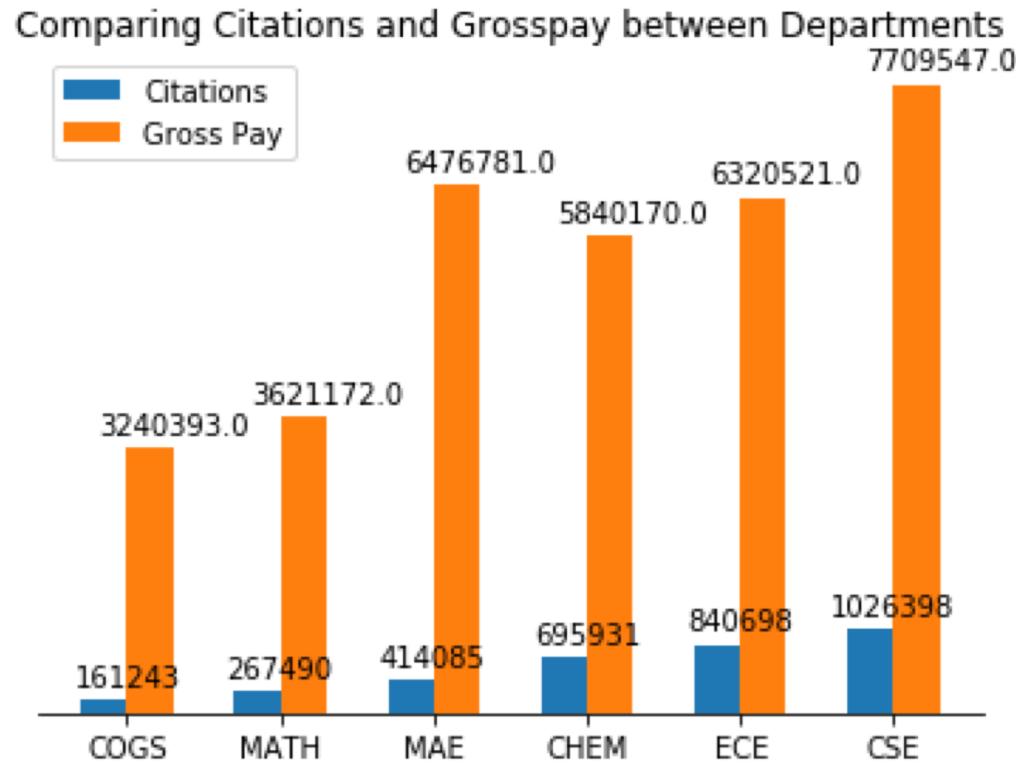
- UCLA has the highest number of professors, associate professors and lecturers.
- UCSD has the highest number of assistant professors.
- UCB has the highest number of senior lecturers.

Salary Analysis Between Different Schools (2018)



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

Citations vs Payment



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

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