

# UCSD Course Recommendation System

ECE 143

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RIP Sunny G : (  
1972-2023

# Outline



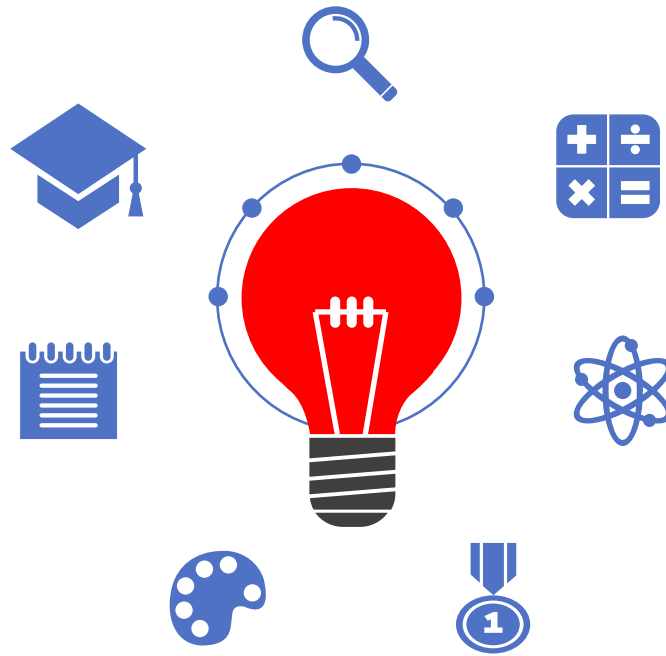
1. Motivation
2. Methodology
3. Dataset
4. Figures and Analysis



# Motivation



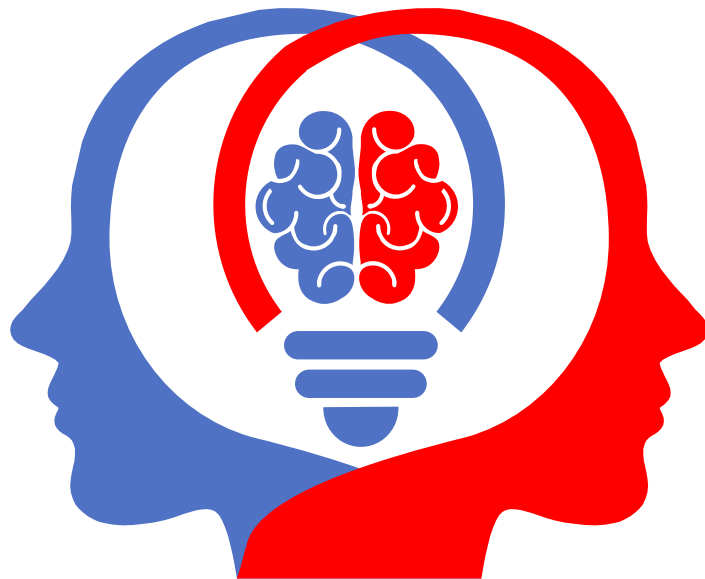
- UCSD is a BIG school
  - 106 departments
  - 2452 unique classes
- Class selection can be difficult and overwhelming
  - Especially for freshman and transfer students
- CAPE obsolete as of Spring 2023
  - SET data is not public
  - Preserve data while available



# Methodology



- Scrape course evaluations from CAPE
- Clean data
  - Remove null values
  - Remove outdated evaluations
- Survey user for course preferences
  - Use responses to calc rec score
- Give recommendations and insights through ranks and visualizations



# Dataset



Raw  
Data ->

Instructor	Course	Term	Enroll	Evals Made	Rcmnd Class	Rcmnd Instr	Study Hrs/wk	Avg Grade Expected	Avg Grade Received
Unpingco, Jose H.	ECE 143 - Programming for Data Analysis (A)	WI23	96	57	98.1%	98.1%	7.50	A- (3.80)	A- (3.82)
Unpingco, Jose H.	ECE 143 - Programming for Data Analysis (A)	FA22	100	64	100.0%	98.4%	6.79	A- (3.89)	A- (3.85)

- UCSD Course Evaluations from Spring 2019 - Spring 2023
- Subset of data is made based on user needs (Quarter Offered and Desired Departments)
- Columns are split for analysis
- Categories are normalized with percentiles relative to department
- Assigned weights based on user preferences collected earlier
- Rec Score = Sum of weighted and normalized data



# Data Set Analysis

# GPA by Quarter

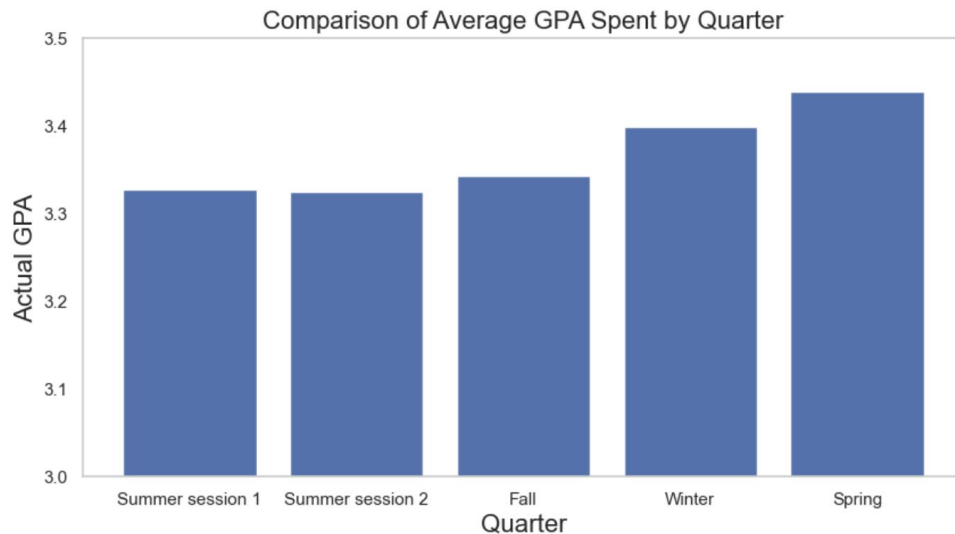


## Observation

- GPA consistent between quarters
  - Only deviates by 0.1 points
  - Slightly lower in summer quarters

## Conclusion

- Quarter shouldn't affect your decision to take a class as GPA is relatively constant



# Time Spend by Quarter

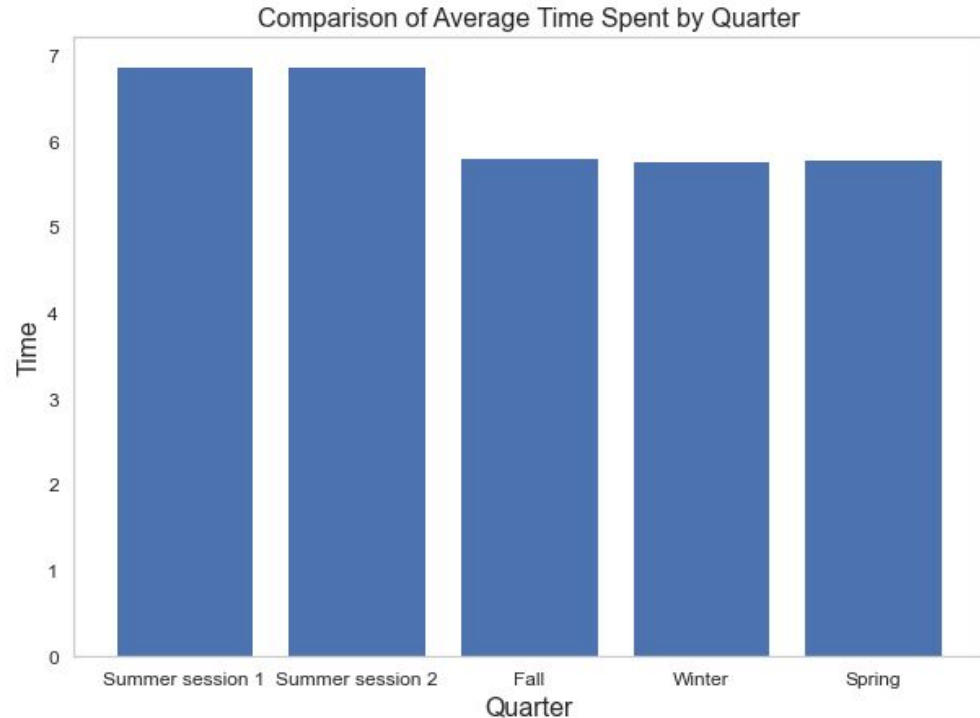


## Observation

- Time is consistent between quarters
- Summer Session only ~1 hr more work than standard quarter despite 1/2 time

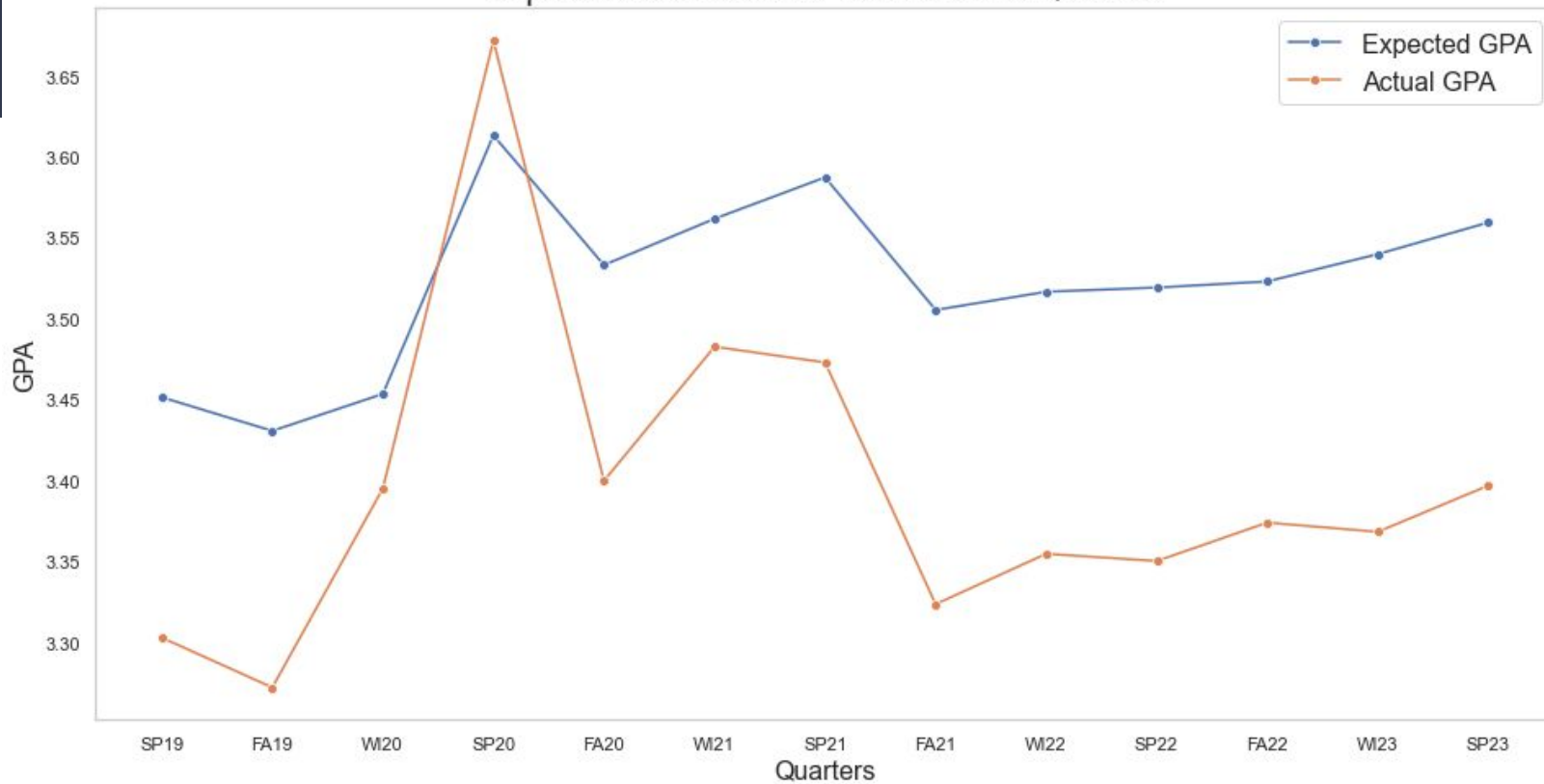
## Conclusion

- Quarter shouldn't affect your decision to take a class as time is relatively constant
- May be beneficial to take summer classes in terms of time efficiency





Expected and Actual GPA in Different Quarters



# Recommendation System

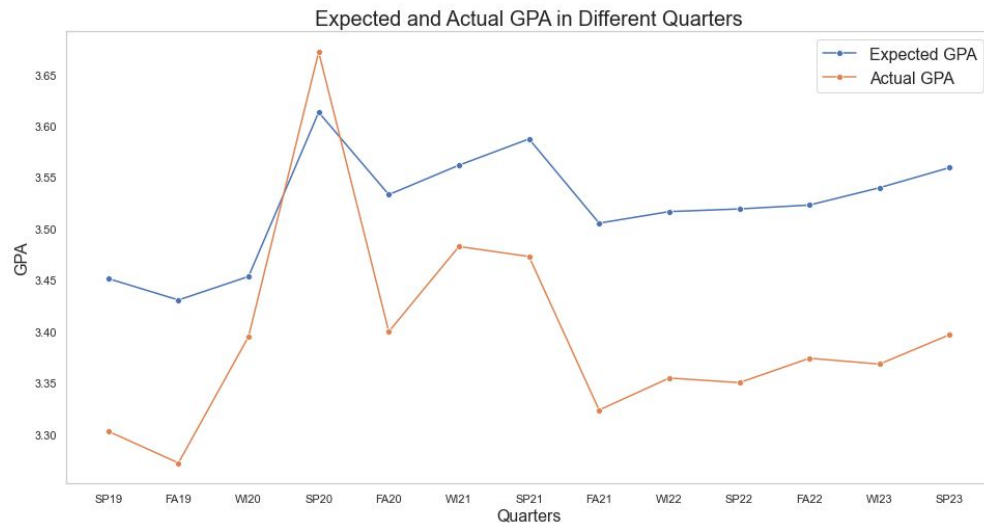


## Observation:

- GPA spike during remote instruction
- Increasing trend since Fall 2021
- Expected GPA is typically higher than actual GPA

## Conclusion

- Do not underestimate your courses
- Difference can be used as measure of relative difficulty



# Average Course GPA by ECE Depth

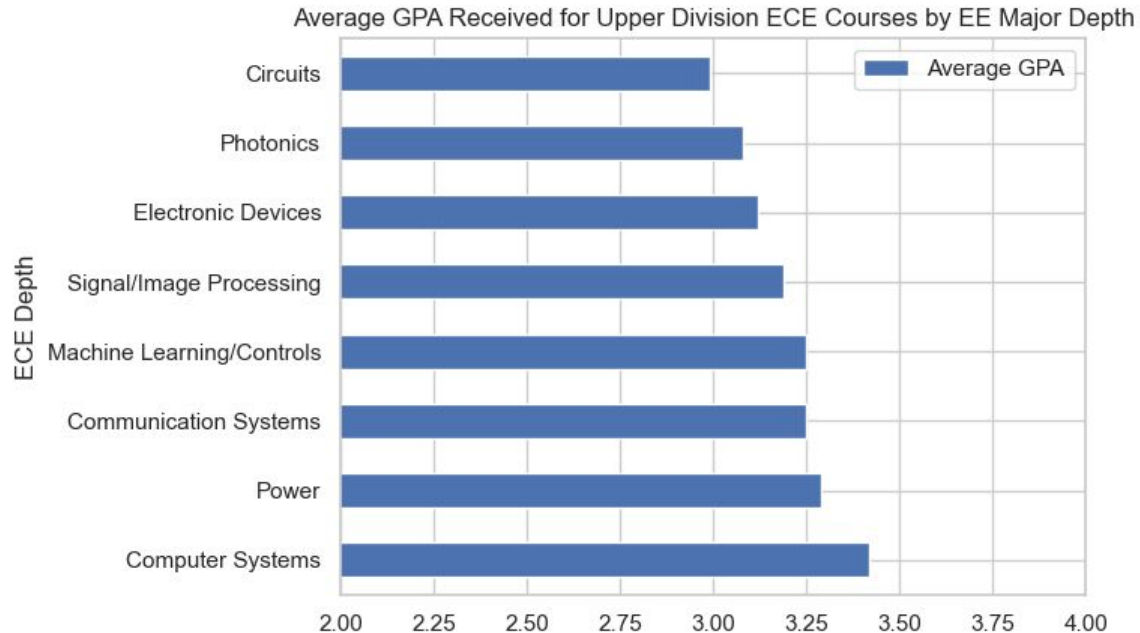


## Observation

- Circuits courses has lowest GPA
- Electronic Devices courses have the highest GPA
- GPA is relatively consistent across depths

## Conclusion

- There are other factors more important than GPA for choosing the depth



# Time Spend by ECE Depth

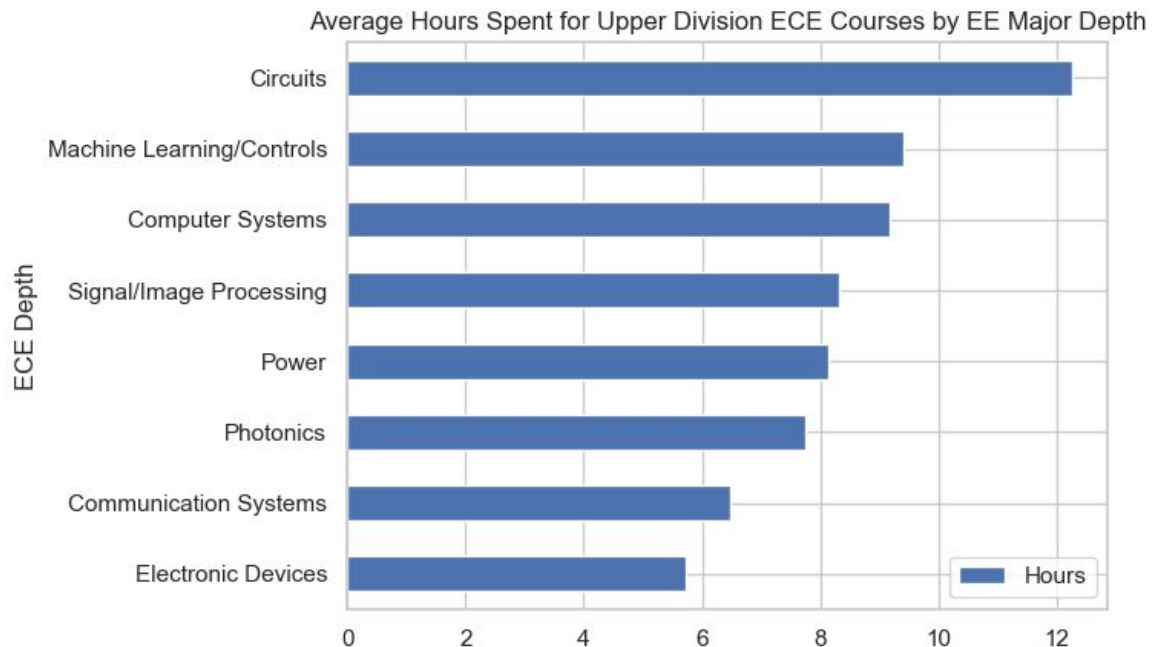


## Observation

- Circuits takes most time
- Electronic Devices takes least time

## Conclusion

- There is striking difference between the time spent in the course
- Time should be a major consideration when choosing your depth



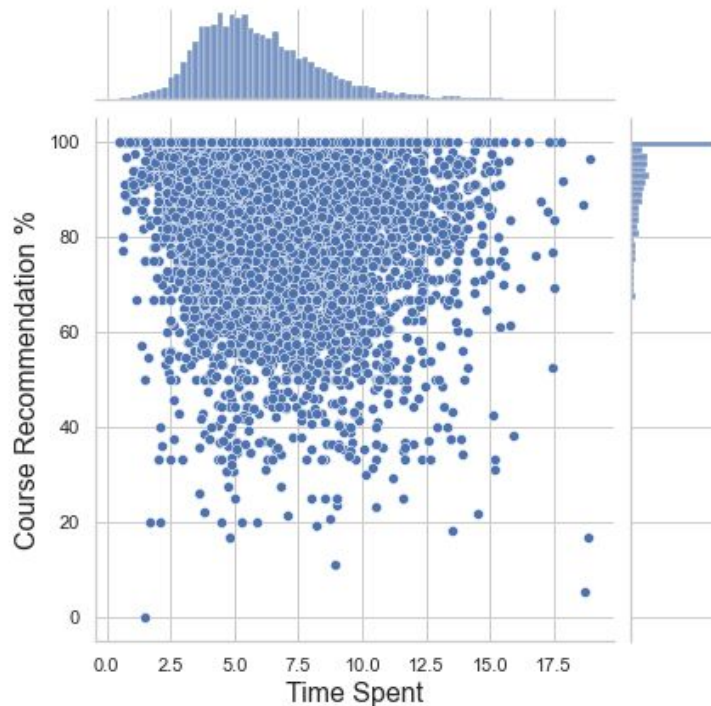
# Plotting Correlations

# Time Spent vs Course Recommendation %



- Expected to see that rec % decrease with increasing time spent
- No correlation seen
- Why?
  - Majority of data is 100% rec
  - People just recommend classes regardless
- Let's try taking away sampling bias

Correlation between Time Spent and Course Recommendation %

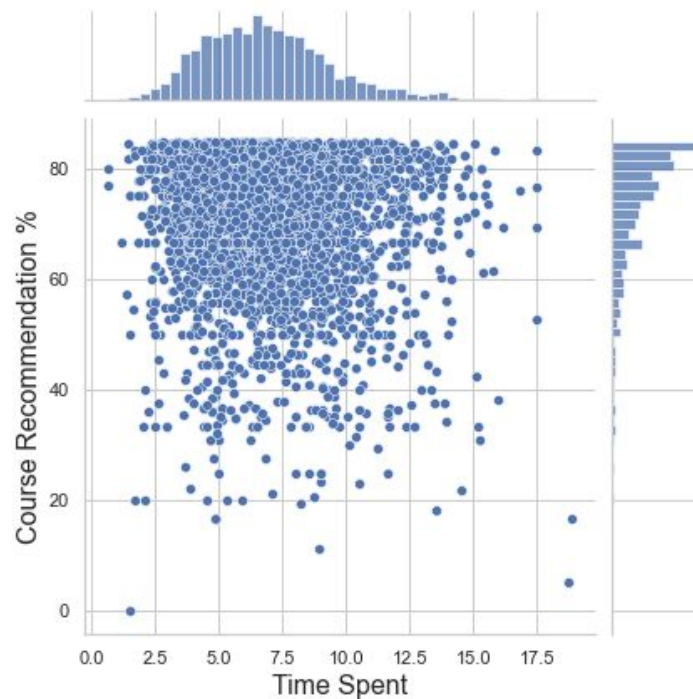


# Time Spent vs Course Recommendation %



- Taking only courses with less than 85% rec
- Still no correlation seen holds true for all other parameters

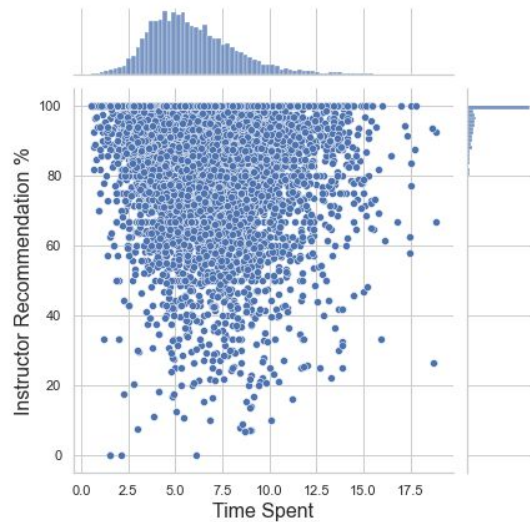
Correlation between Time Spent and Course Recommendation %



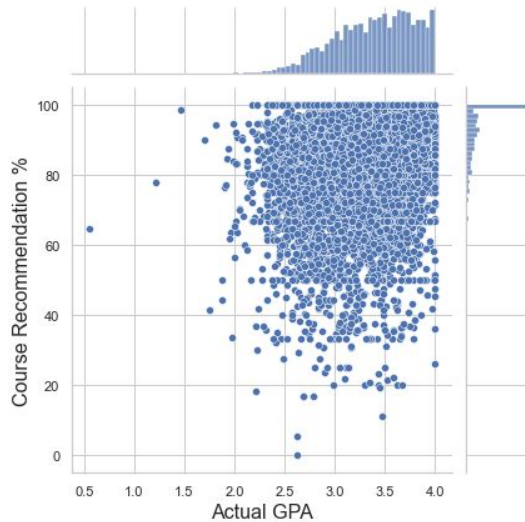
# Other Correlations



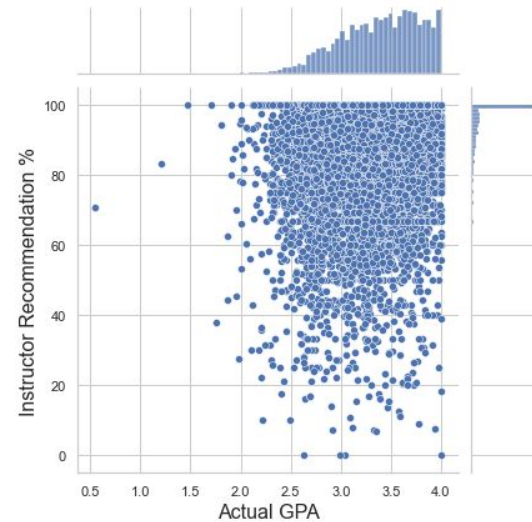
Correlation between Time Spent and Instructor Recommendation %



Correlation between Actual GPA and Course Recommendation %



Correlation between Actual GPA and Instructor Recommendation %





# What does this mean for us?



- No obvious correlation between any of our parameters and recommendation %
- Given recommendation % not a good measure of how good a class it is
- Necessary shift to user input for customized recommendation



# Recommendation System

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## Input the weights

Please provide your preferences for each category on a scale of 1 to 10, separated by spaces

(GPA, Time Spent, Exp vs True GPA, % Rec Course, % Rec Prof):

For example, enter: 10 10 5 5 5

Enter ratings separated by spaces: 10 10 10 5 5

[10, 10, 10, 5, 5]

5.0



0.0



2.5



0.5



3.0



1.0



3.5



1.5



4.0



2.0



4.5



# Recommendation System



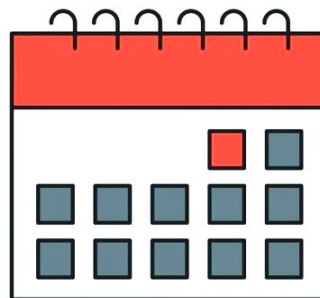
## Input the desired quarters

Please input a space separated list of desired quarters using the corresponding numbers:

1. Fall
2. Winter
3. Spring
4. Summer Session 1
5. Summer Session 2

For example, entering `1 2 3` will select Fall, Winter, and Spring.

Enter quarter numbers separated by spaces: 2  
[2]



# Recommendation System



## Input the desired departments

Please input a space separated list of desired quarters Ex: ECE CSE

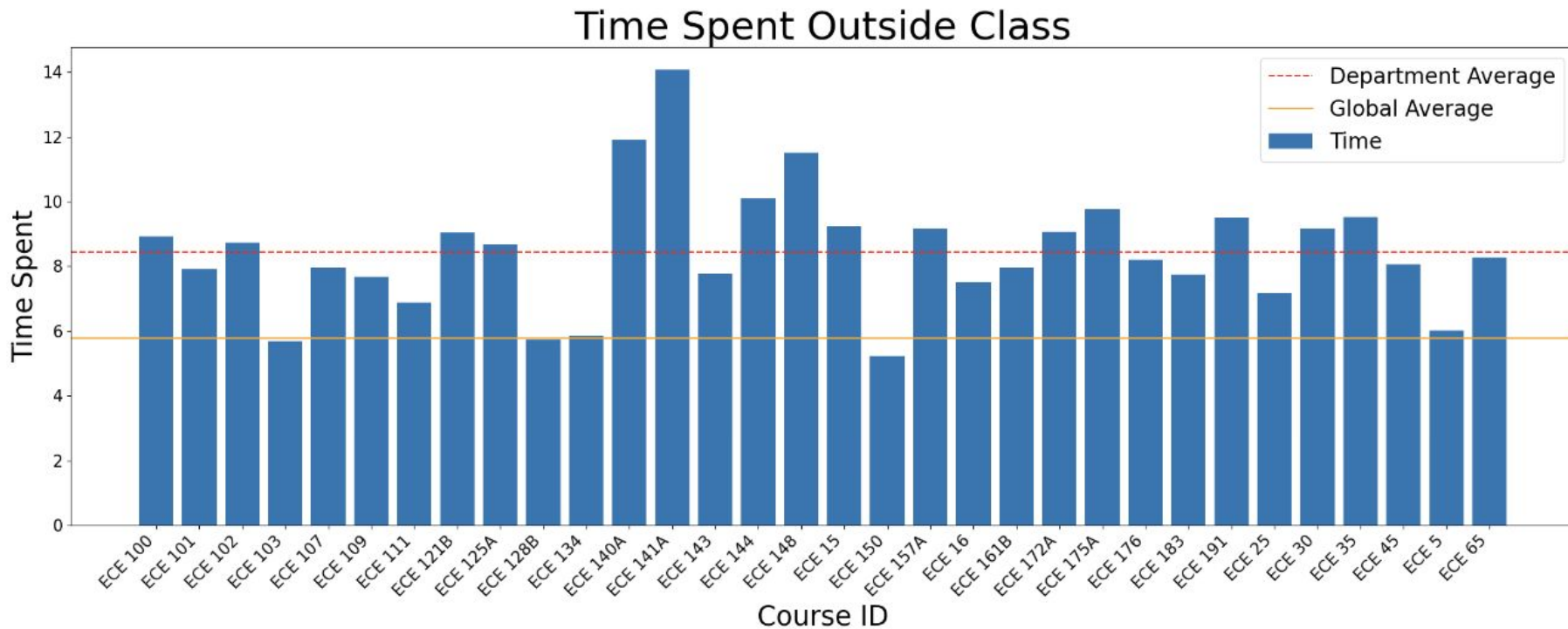
Enter department names separated by spaces: ece  
['ECE']

Based on your preferences, these are the top 5 classes we recommend for you:

	Course_ID	Course_Name
0	ECE 134	Electrnc Materls Sci/Integ Cir
1	ECE 16	Rapid Hardware & Software Dsn
2	ECE 143	Programming for Data Analysis
3	ECE 111	Advanced Digital Design Proj
4	ECE 128B	Power Grid Modernization



# Recommendation System



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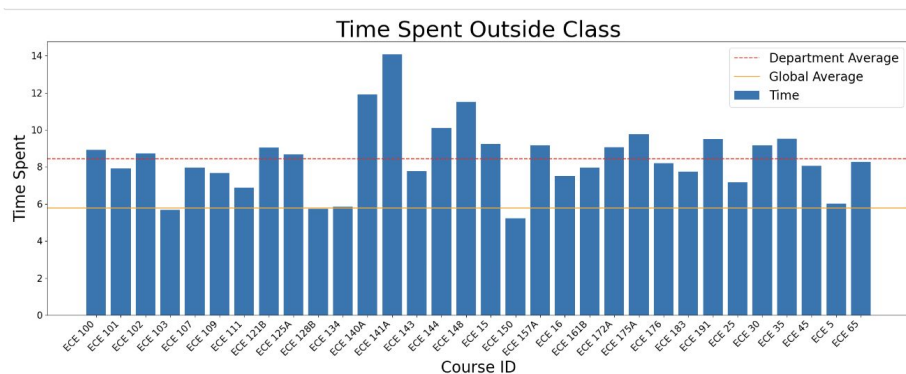


## Observation

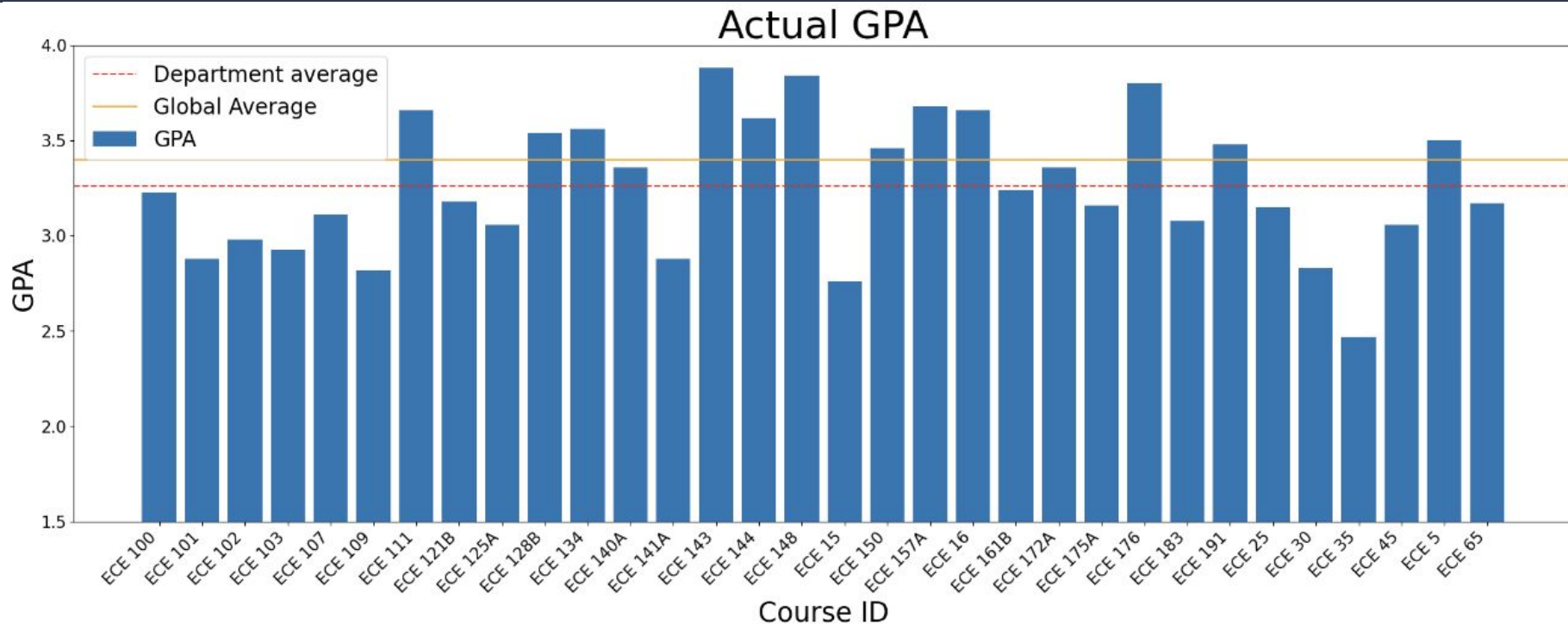
- ECE department spends more time studying than other departments
- large variation between classes

## Conclusion

- Take time into consideration when choosing classes



# Recommendation System





# Recommendation System

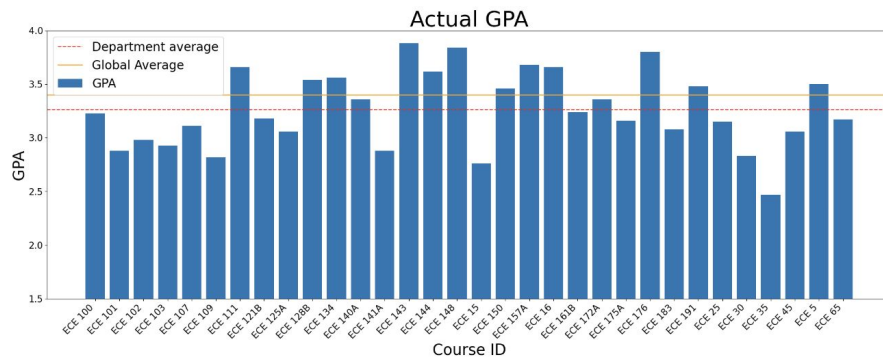


## Observation

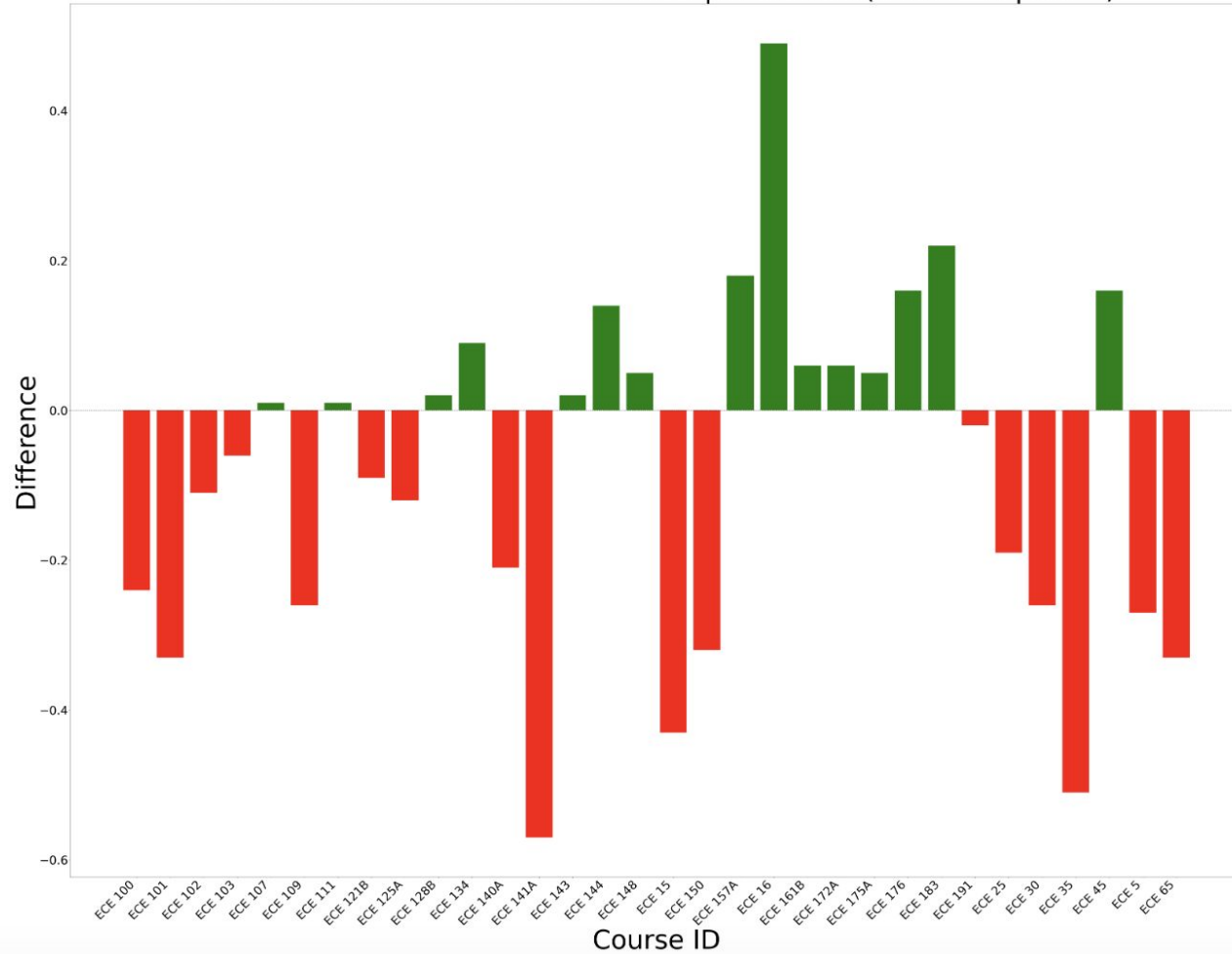
- On average ECE classes has a lower GPA than other departments

## Conclusion

- Based on the department, the course difficulty differs in UCSD
- GPA can be a good measure to consider the right department



Difference between Acutal GPA and Expected GPA (Actual - Expected)



# Recommendation System

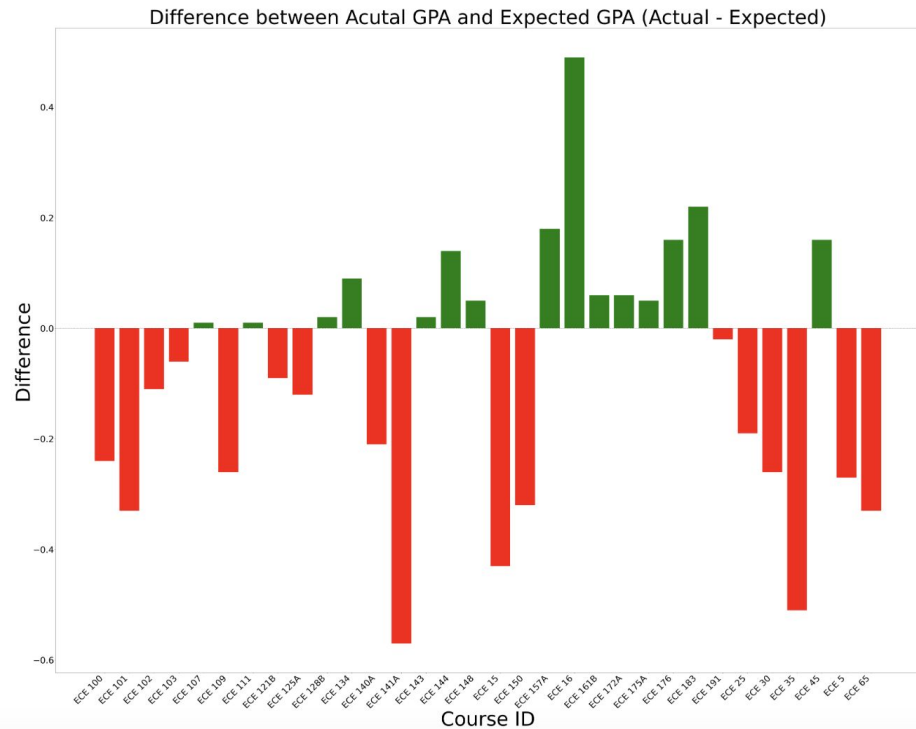


## Observation

- Green bars depict a higher actual GPA than Expected
- Red bars depict a higher expected GPA than Actual

## Conclusion

- Acts as a measure of perceived difficulty
- Courses having green bars are recommended



# EE Depth Recommendation Scores

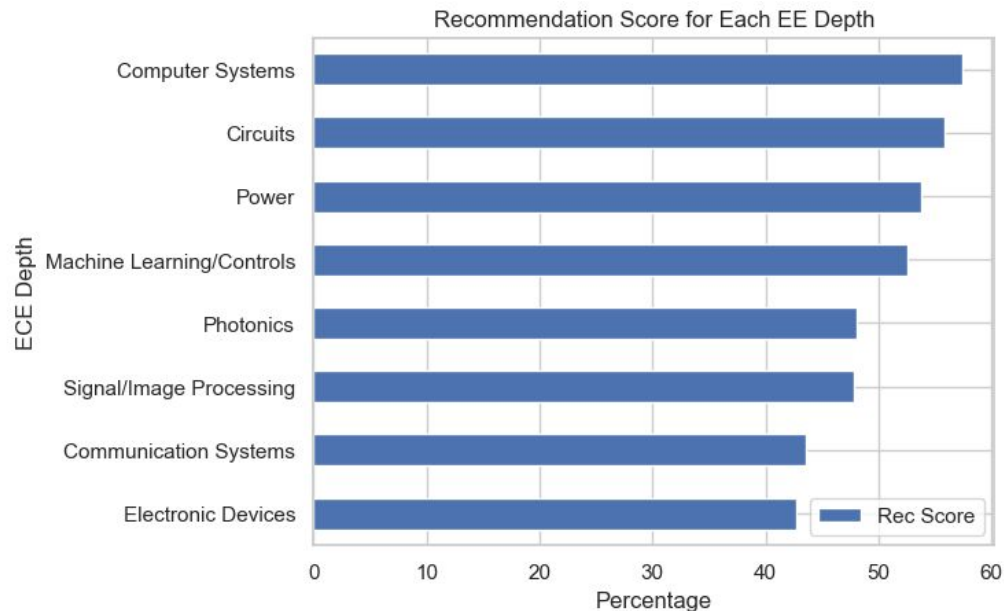


## Observation

- Circuits ranked high despite high time and low GPA
  - High instructor and course rec %

## Conclusion

- ECE Depth are roughly equal
  - Relatively even in terms of rec score  $\pm 7$  points



# Recommendation System



## Check if a specific class is recommended or not

Type the class you are interested in and we will let you know the best professors and if we recommend it or not. The departments should be selected before

Ex. ECE 143

Type you desired class: ece 35

'ECE 35'

Based on your preferences, these are the professors ranked for ECE 35:

	instr
0	Gilja, Vikash
1	Taur, Yuan
2	Schurgers, Curt

We strongly do not recommend taking this class.

Based on your preferences we give it a ranking of 20.4/100



# Recommendation System



## Check if a specific class is recommended or not

Type the class you are interested in and we will let you know the best professors and if we recommend it or not. The departments should be selected before

Ex. ECE 143

Type you desired class: ece 143

'ECE 143'

Based on your preferences, these are the professors ranked for ECE 143:

instr  
0 Unpingco, Jose H.

We strongly recommend taking this class.

Based on your preferences we give it a ranking of 77.28/100



Thank You,  
Any Questions?