

WASC Report

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Guiding Question Five: We are interested in ascertaining whether the academic material studied by students have distinct patterns across campus – for example, whether patterns of study in disciplines are constant across completers within all schools/divisions versus patterns being unique to completers within particular schools/divisions. What differences exist between freshman entrants and transfers?

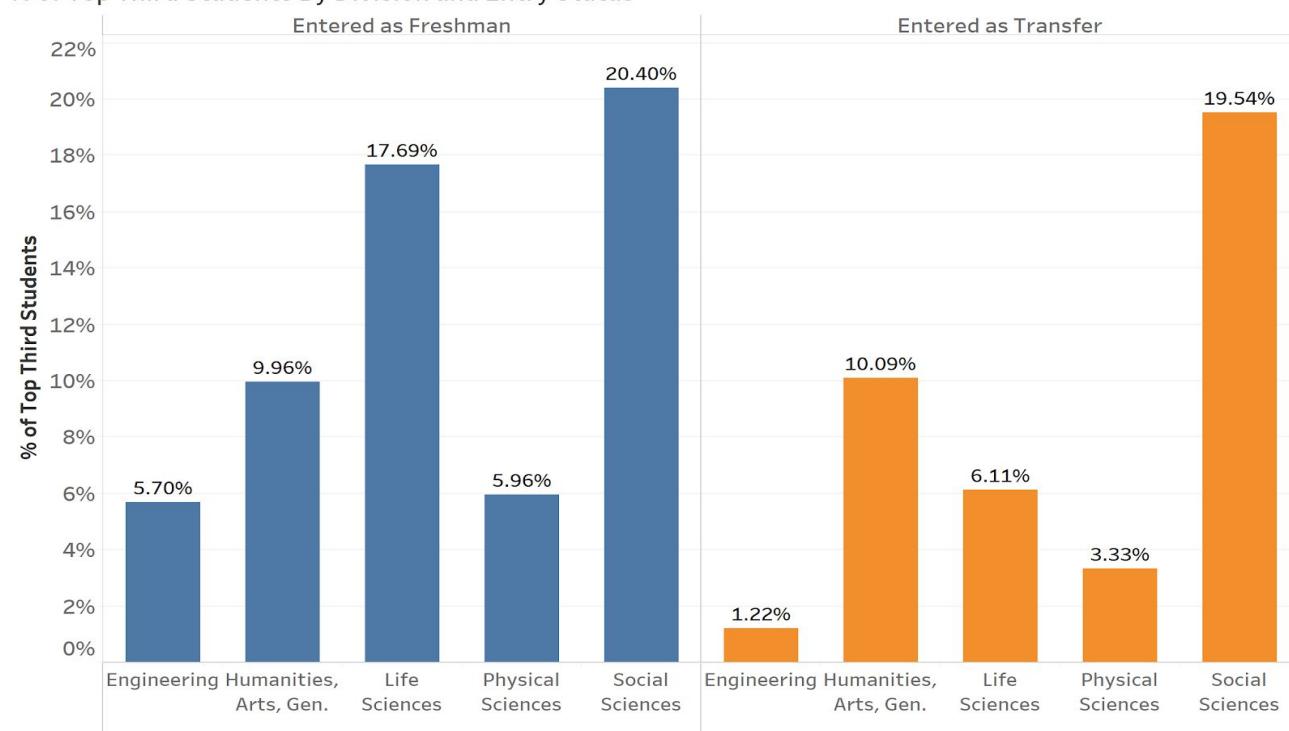
Abstract

Given the WASC dataset, we were tasked with analyzing patterns across campus. This includes studying patterns in disciplines across completers within schools and divisions as well as analyzing patterns between freshmen entrants and transfer students. In this report we discuss which divisions tend to have higher GPAs, which divisions students are switching in and out of for their degrees, as well as those same patterns across transfers and freshmen. A major finding was that most students who switch out of their divisions tend to switch into the social science division. We also look at students who are studying abroad and which divisions they tend to come from, and how this relates to the top third of students with the highest GPAs. Next, we analyze why transfer students tend to take longer to graduate, how this is related to their course load, and the differences in coursework across divisions. Finally, we created two multinomial regression models predicting the division a student will graduate in and average course term to graduate. We look at predictors such as taking courses over the summer, amount of courses taken during the school year, and how these differ across divisions and between freshmen and transfer students.

Question 1 :

Are there certain divisions that have a higher amount of students in the top third of GPA performance than others? Within this context, is there a significant difference between transfers and students?

% of Top Third Students By Division and Entry Status



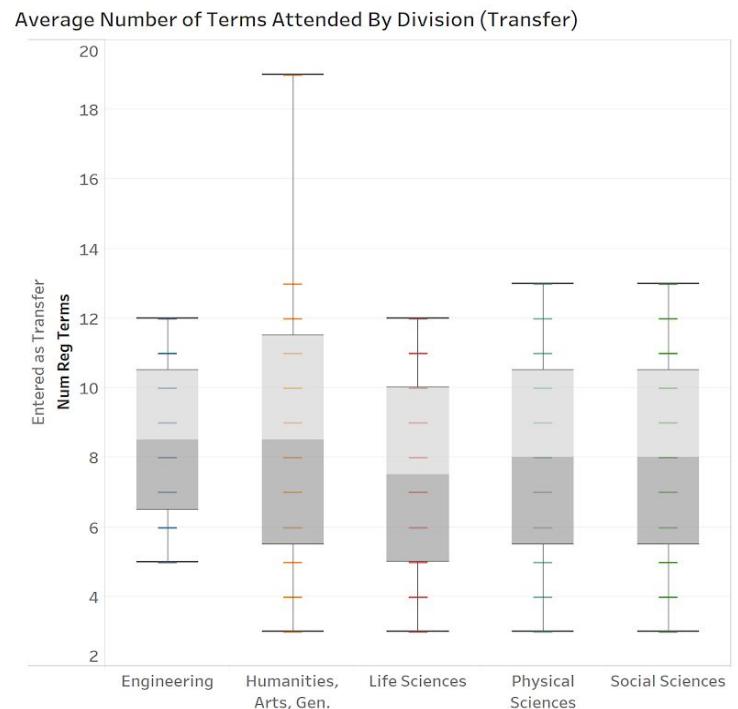
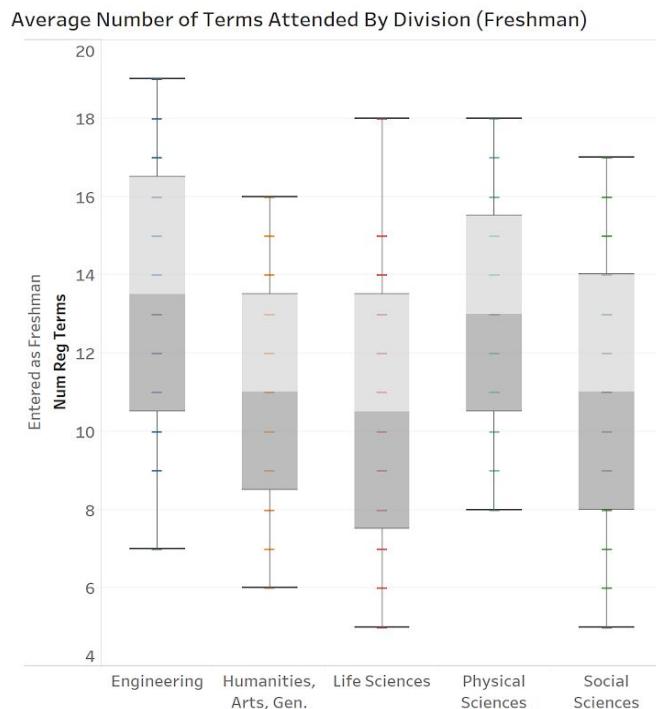
As illustrated above, about 40% of the top third GPA students are enrolled in the Social Sciences division with an even mix of freshman entrants and transfers. It is apparent that the Engineering and Physical Sciences division have the least amount of student with top GPAs since there is only a combined 15% from the two fields that made the cut. In particular, engineers who came into UCLA as transfers have the least representation in the top third GPAs. However, this is also because there are not a lot of them as shown in the chart below. When comparing entry status, trends are similar across the board except that there is a sizable increase in freshman entrants over transfers that are in the top third GPAs from the Life Sciences division. This could be because students who came in as freshman have taken general electives that boost their GPAs while transfers are mostly taking upper division courses.

Freshman	FrEntryDiv	FrFinalDiv	FrDifference	FrPercDifference
Engineering	956	863	-93	-0.097280335
Humanities, Arts, and General	1081	937	-144	-0.133209991
Life Sciences	2162	1996	-166	-0.076780759
Physical Sciences	1096	675	-421	-0.384124088
Social Sciences	1603	2427	824	0.514036182

Transfers	AsEntryDiv	AsFinalDiv	AsDifference	AsPercDifference
Engineering	239	232	-7	-0.029288703
Humanities, Arts, and General	1006	990	-16	-0.015904573
Life Sciences	850	812	-38	-0.044705882

Question 2:

Are there certain divisions where students tend to enroll in more terms to earn their degree ?
 Within this context, is there a significant difference between transfers and students?



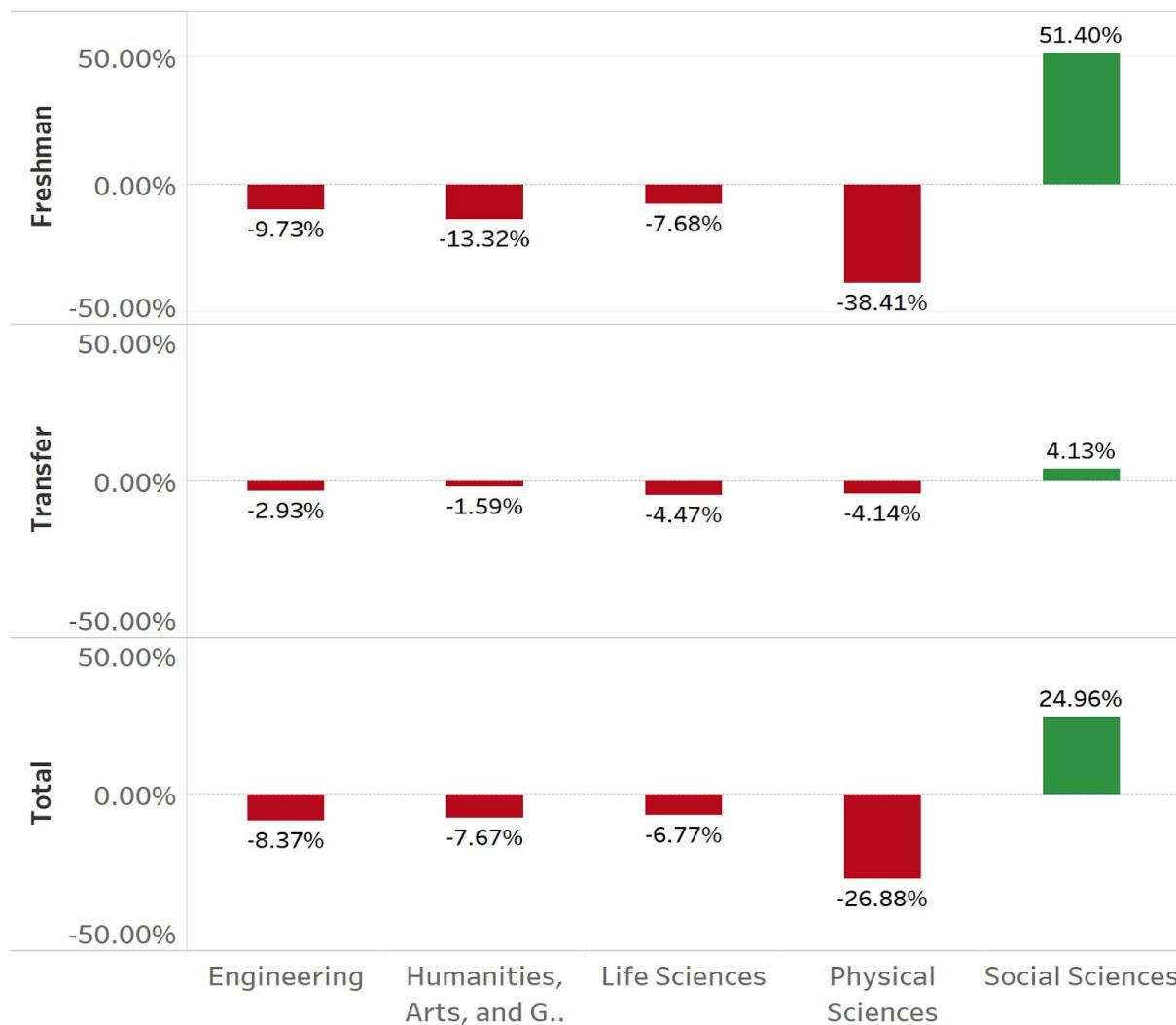
As depicted above, there is a noticeable variation in the amount of terms it takes for freshman entrants to earn their degrees. For freshman entrants, the divisions where students take the longest are Engineering and Physical Sciences. On average, students in these two fields take 13-14 terms to complete their degree while other divisions usually range from 10-11. One or

two terms is a significant difference because a single term consists of 3-4 courses and can cost hefty fees along with valuable time. In contrast, transfers take about the same number of terms for their degree regardless of division which makes sense because they have to complete their general education courses before being admitted to UCLA which reduces the variation that can occur. On average, transfers take around 8 terms which is the standard two years allotted for them to complete their degree. Also, transfers know what their career goals are so they usually do not change their majors as much compared to freshman who tend to use their first few years to figure out their aspiration

Question 3 :

Are there certain divisions that students are more likely to switch in or out of? Within this context, is there a significant difference between transfers and students?

% Division Change by Freshman, Transfer, and Total



Evidently, freshman entrants are much more inclined to change their division than transfers which makes sense given the amount of time they spend at UCLA. If a student does end up switching divisions, there is a high probability that he/she will be joining the Social Sciences regardless if they are a transfer or freshman entrant. This is mostly likely correlated with the number of students in the top third GPAs coming from the Social Science division indicating a lighter workload and simpler examinations. However, most transfers do not change their division as the most dramatic decrease for them is only a 4.47% decrease in the Life Sciences. On the other hand, the Physical Sciences division lost 38.41% of their freshmen entrants while the Social Sciences increased their pool by 51.40%. A reason for this is because many freshmen will start off wanting to pursue a career in the Physical Sciences division, but as they start taking upper division courses for their majors, the classes start getting extremely competitive forcing the switch. In summary, the overall trend is that if students are not performing well in their initial divisions or lost their passion for it, they will change to the Social Sciences division.

Question 4. ():

Are there any difference between freshman and transfer students regarding ratios? What about based on divisions?

Based on the data Students, we were able to compare the top third ratio, withdrew ratio, aboard ratio, and quarter ratio. The column third.ratio indicates the target students based on their status are in the top third or not in terms of GPA. The table shows that about 33.04% of transfer students tend to be in the top third and about 33.27% students who started as freshman tend to be in the top third. The column withdrew.ratio indicates whether the students have ever withdrawn or not and the results indicate that about 21.61% transfer students have withdrawn and about 16.76% students who started as freshman have withdrawn. In terms of studying abroad, only 2.9% of transfer admits went to study abroad, while 10.23% of students who started as freshman did. The last column quarter ratio indicates whether students took quarters off or not and 55.7% transfer students took quarters off, while 37.94% of students who started as freshman took quarters off.

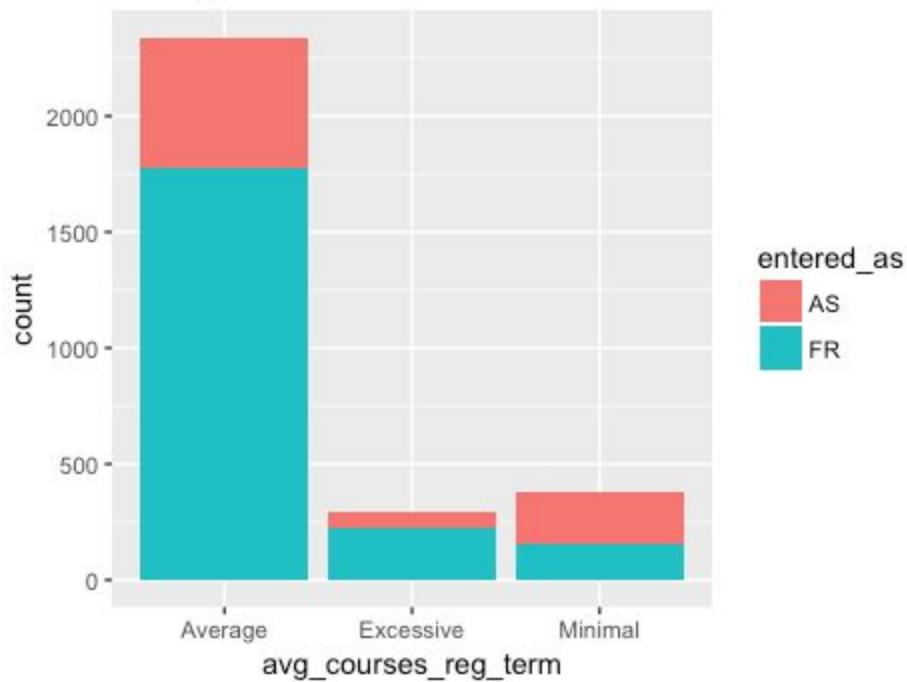
	division_on_entry	third.ratio	withdraw.ratio	abroad.ratio	quarter.ratio
1	College of Letters and Science: Humanities	0.3936031	0.21736292	0.09464752	0.5613577
2	College of Letters and Science: International Institute	0.3937008	0.33070866	0.11023622	0.6496063
3	College of Letters and Science: Life Sciences	0.2956403	0.16110354	0.08140327	0.3715940
4	College of Letters and Science: Physical Sciences	0.2663438	0.21670702	0.05871671	0.5369249
5	College of Letters and Science: Social Sciences	0.3735225	0.19414894	0.07978723	0.4491726
6	Henry Samueli School of Engineering and Applied Science	0.2401674	0.11715481	0.02008368	0.2895397
7	Herb Alpert School of Music	0.4081633	0.21088435	0.05442177	0.5510204
8	School of Nursing	0.4210526	0.05263158	0.00000000	0.1578947
9	School of the Arts and Architecture	0.4503817	0.25190840	0.08778626	0.5877863
10	School of Theater, Film, and Television	0.4831507	0.17808219	0.06164384	0.7191781

The table shows the similarities in results from the tables between freshmen and transfers, but this table shows ratio based on divisions. Students in the North campus divisions tend to have a higher chance to be in the top third than the one in the South campus divisions. However, Nursing students have the lowest withdraw ratio followed by Engineering students. An interesting observation is nursing students do not study abroad. In terms of taking quarters off, arts related divisions tend to have a higher ratio than others. Out of the Art divisions, School of Theater, Film, and Television has the highest quarter off ratio, which is about 70%.

Question 5. ():

Do students have different patterns in terms of taking classes in regular quarters?

Average courses taken based on Students status



The plot above shows classes taken based on student status.

I divided the amount of courseworks based on how many classes they take.

I first use histogram in order to check where to cut and I noticed that many people tend to take around 3 or 4 courses during a quarter, therefore, I used "Average" for people who take 3 or 4 courses. For "Excessive", I defined them as students who take more than 4 classes. "Minimal" is defined as students who take less than 3 courses per quarter.

Most of freshman students tend to take average amount of courseworks, but the proportion of taking more than 4 courses was large.

Question 6. ():

What will be the relationship between study abroad and students being in the top third in terms of GPA on average courseworks they had?

In order to find out, multinomial regression is needed because the dependent variable avg_courses_reg_term has three levels and the independent variables have two levels each.

Coefficients:

	(Intercept)	abroadTRUE	third1
Excessive	-2.460375	-0.5010280	1.0578691
Minimal	-1.805052	0.4451444	-0.2650992

Std. Errors:

	(Intercept)	abroadTRUE	third1
Excessive	0.08928094	0.2786524	0.1255211
Minimal	0.06657718	0.1798884	0.1309549

Value/SE (Wald statistics):

	(Intercept)	abroadTRUE	third1
Excessive	-27.55767	-1.798039	8.427820
Minimal	-27.11218	2.474558	-2.024355

Analysis of Deviance Table (Type II tests)

Response: avg_courses_reg_term

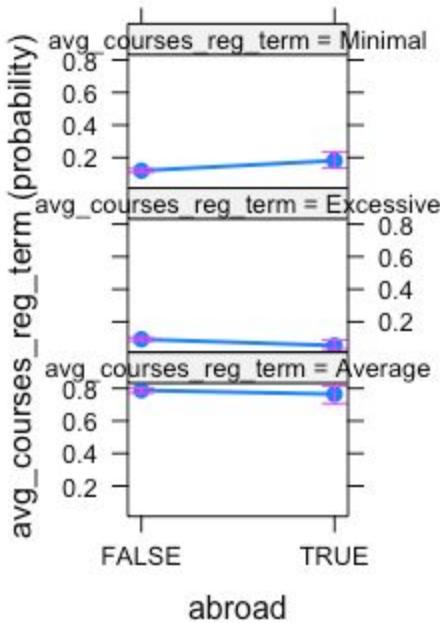
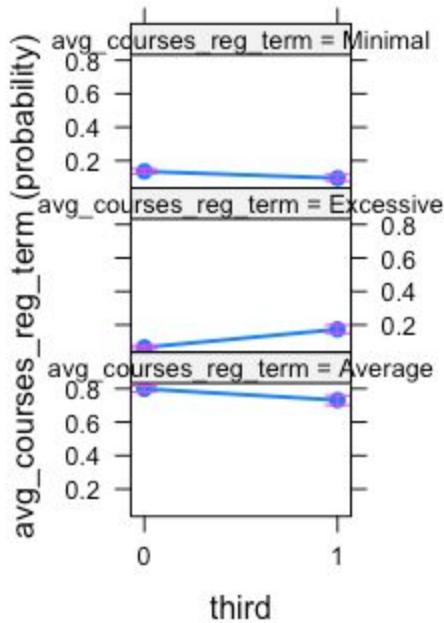
	LR Chisq	Df	Pr(>Chisq)
abroadTRUE	10.562	2	0.005087 ***
third1	80.084	2	<2.2e-16 ***

The anova table indicates that both study abroad and being in the top third in terms of GPA have a significant effect on the average amount of courseworks.

In order to interpret, check the coefficients.

	(Intercept)	abroadTRUE	third1
Excessive	0.08540292	0.6059075	2.8802268
Minimal	0.16446583	1.5607155	0.7671298

1. The odds of taking excessive coursework, which is more than 4 courses per quarter, compared to Average coursework, which is taking 3~4 classes per quarter, is 2.88 times higher for student in the top third.
2. The odds of taking Minimal coursework, which is taking less than 3 classes per quarter, compared to Average coursework is about 18% lower for students who are in the top third.
3. The odds of taking Excessive coursework compared to Average coursework is 40% lower for students who did study abroad.
4. The odds of taking Minimal coursework compared to Average coursework is 1.56 times higher for students who did study abroad.

abroad effect plot**third effect plot**

The plot on the left shows the probability of taking courses per quarter for students who did study abroad.

1. The probability of taking Minimal(less than 3 courses per quarter) coursework is higher for the students who did study abroad(0.2) compared to the students who did not (0.1).
2. The probability of taking Excessive(more than 4 courses per quarter) coursework is higher for the students who did not study abroad(0.1) compared to the students who did study abroad (0.05).
3. The probability of taking Average(between 3 and 4 courses per quarter) coursework is higher for the students who did not study abroad (0.8) compared to the students who did study abroad (0.77).

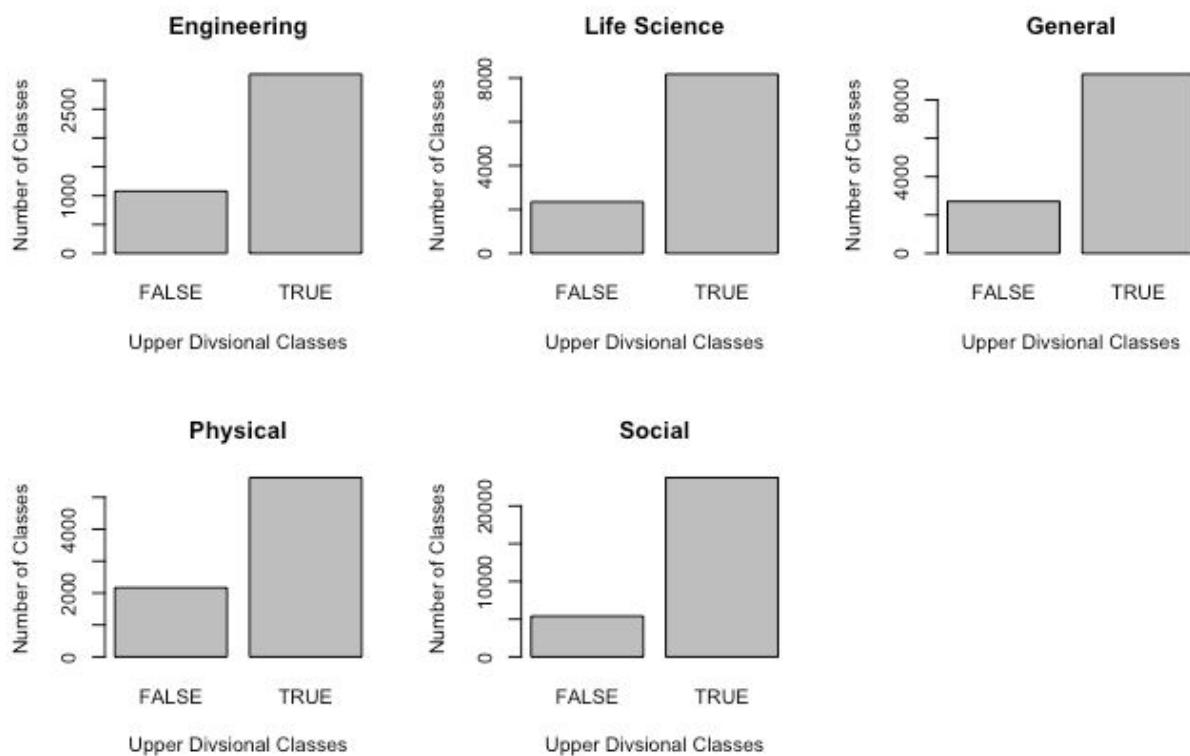
The plot on the right shows the probability of taking courses per quarter for students who are in the top third in terms of GPA.

1. The probability of taking Minimal coursework is higher for the students who are not in the top third (0.15) compared to the students who are in the top third (0.1).
2. The probability of taking Excessive coursework is much higher for the students who are in the top third (0.2) compared to the students who are not in the top third (0.01).
3. The probability of taking Average coursework is higher for the students who are not in the top third (0.8) compared to the students who are in the top third (0.7).

Question 7. ()

Why are transfers taking longer to graduate?

On average, most people take about 4 years to graduate while being a full-time student the whole time. Which is, on average taking 12-16 units per a quarter. When calculating the average number of quarters to graduate for freshmen and transfers here at UCLA, it shows that freshmen on average take 12.339 quarters while transfers are taking 7.2 quarters. So we can conclude that while students that come straight from high school are graduating on time, transfer student are taking an additional quarter or even up to a year. As you see below these graphs represent all the lower divisional classes that each transfer student is taking. If we separate by the six divisions we see, engineering majors on average take 4.65 lower division classes, life science majors on average take 2.89 lower division classes, general majors on average take 2.91 lower division classes, physical majors on average take 4.07 lower division classes and Social majors on average take 2.55 lower division classes. From the graphs below show the number of classes that each transfer student took with respect to their division. False represents the classes that were not upper divisional class.



The result of transfer taking longer to graduate can be proven by their respected community college not able to provide the classes that are equivalent to UCLA and therefore fore to take extra classes to make up for it. However, there is another potential reason why that transfer are taking longer than freshmen. This factor that can't really be measure as it is the time transfers are allow to enroll in classes. As a transfer student most students are more likely to take a upper

division classes while taking a few lower division classes. However, transfers student are most likely to get the last of picking when it comes to classes. During orientation the incoming freshmen are schedule ahead of the transfer students despite being an “upperclassmen” and are allow to enroll in the lower division classes before the transfers. Second the current freshmen that are about to be 2nd years already have their classes and therefore more spots that these transfer need are putting them back until the next quarter. However, the main problem isn’t just transfers not getting their classes but also the lower divisional classes are prerequisites for upper divisional classes that are only offer during certain time of the school year. For example, Stats 20 is a prerequisites for Stats 101a, which is only offer during the fall and sometimes winter, and if a student isn’t allow to get stats 20 during the fall quarter and force to take during the winter quarter then that student will potential be behind a whole sequence of classes. With that being said this could also have an affect on whether or not transfers are in the top 3rd of the class.

Question 8. ():

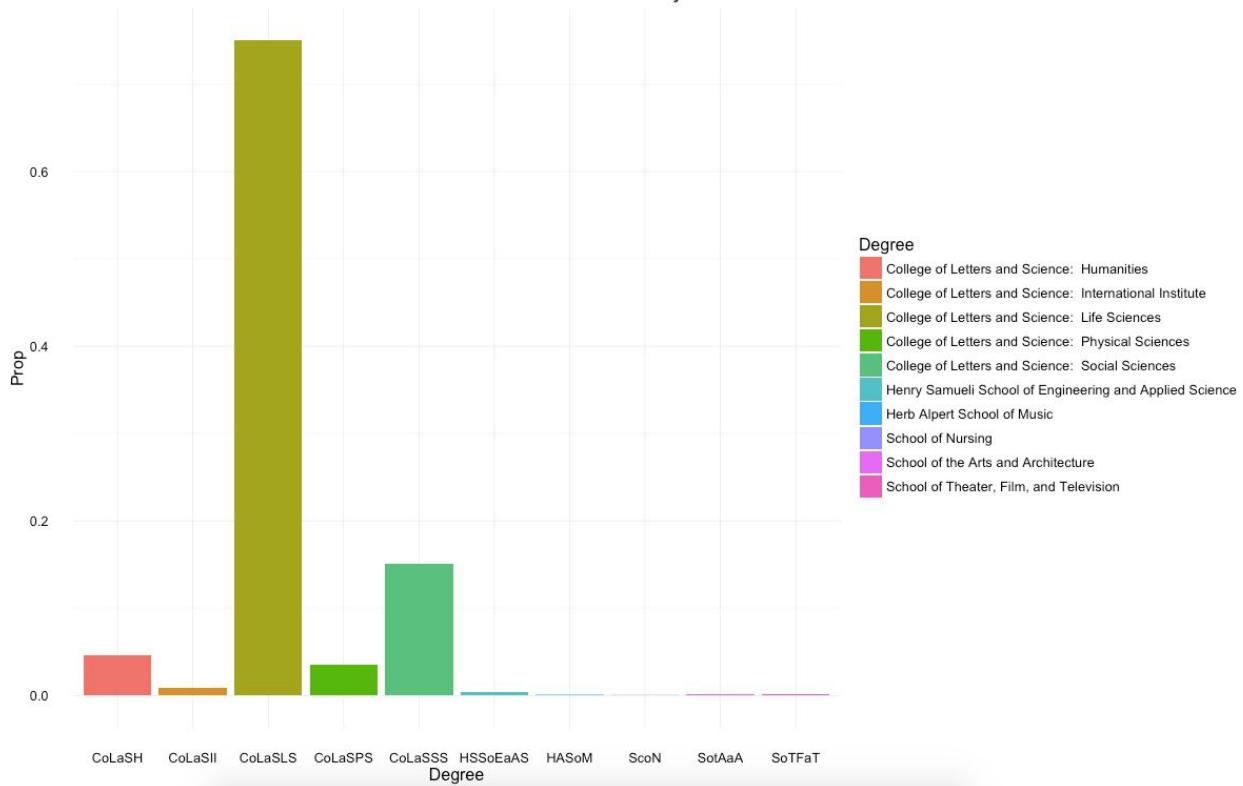
Life Sciences

For life science divisions, which are School of Nursing and Letters and Science: Life sciences, how many students stick with their divisions?

College of Letters and Science: Life Science

Entry	Degree	Freq	Prop
1	College of Letters and Science: Humanities	134	0.0456403270
2	College of Letters and Science: International Institute	27	0.0091981853
3	College of Letters and Science: Life Sciences	2202	0.7500000000
4	College of Letters and Science: Physical Sciences	104	0.0354223433
5	College of Letters and Science: Social Sciences	444	0.1512261560
6	Henry Samueli School of Engineering and Applied Science	13	0.0044277929
7	Herb Alpert School of Music	2	0.0006811989
8	School of Nursing	1	0.0003406995
9	School of the Arts and Architecture	4	0.0013623978
10	School of Theater, Film, and Television	5	0.0017029973

Students Who Entered as Life Science and What Divisions They Graduated in



Students who entered as freshmen

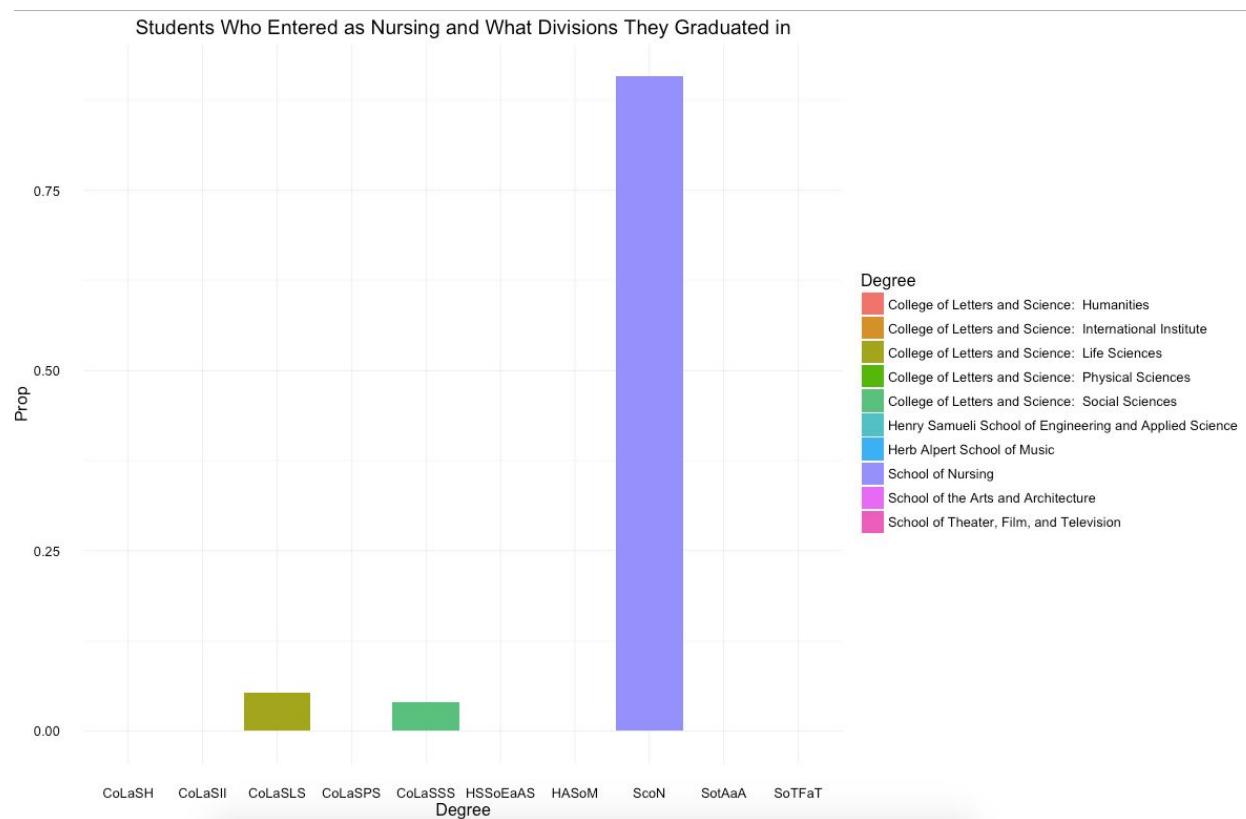
Degree	Freq	Prop
College of Letters and Science: Humanities	123	0.0584878745
College of Letters and Science: International Institute	26	0.0123632905
College of Letters and Science: Life Sciences	1432	0.6809320019
College of Letters and Science: Physical Sciences	90	0.0427960057
College of Letters and Science: Social Sciences	407	0.1935330480
Henry Samueli School of Engineering and Applied Scie...	13	0.0061816453
Herb Alpert School of Music	2	0.0009510223
School of Nursing	1	0.0004755112
School of the Arts and Architecture	4	0.0019020447
School of Theater, Film, and Television	5	0.0023775559

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	11	0.01320528
College of Letters and Science: International Institute	1	0.00120048
College of Letters and Science: Life Sciences	770	0.92436975
College of Letters and Science: Physical Sciences	14	0.01680672
College of Letters and Science: Social Sciences	37	0.04441777

School of Nursing

	Entry	Degree	Freq	Prop
11	College of Letters and Science: Humanities	School of Nursing	0	0.00000000
12	College of Letters and Science: International Institute	School of Nursing	0	0.00000000
13	College of Letters and Science: Life Sciences	School of Nursing	4	0.05263158
14	College of Letters and Science: Physical Sciences	School of Nursing	0	0.00000000
15	College of Letters and Science: Social Sciences	School of Nursing	3	0.03947368
16	Henry Samueli School of Engineering and Applied Science	School of Nursing	0	0.00000000
17	Herb Alpert School of Music	School of Nursing	0	0.00000000
18	School of Nursing	School of Nursing	69	0.90789474
19	School of the Arts and Architecture	School of Nursing	0	0.00000000
20	School of Theater, Film, and Television	School of Nursing	0	0.00000000



Students who entered as freshmen

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	0	0.00000000
College of Letters and Science: International Institute	0	0.00000000
College of Letters and Science: Life Sciences	4	0.06779661
College of Letters and Science: Physical Sciences	0	0.00000000
College of Letters and Science: Social Sciences	3	0.05084746
Henry Samueli School of Engineering and Applied Scie...	0	0.00000000
Herb Alpert School of Music	0	0.00000000
School of Nursing	52	0.88135593
School of the Arts and Architecture	0	0.00000000
School of Theater, Film, and Television	0	0.00000000

Degree	Freq	Prop
College of Letters and Science: Humanities	0	0
College of Letters and Science: International Institute	0	0
College of Letters and Science: Life Sciences	0	0
College of Letters and Science: Physical Sciences	0	0
College of Letters and Science: Social Sciences	0	0
School of Nursing	17	1

The first table shows people who got admitted in the Life Science divisions and their graduation degrees. About 75% of students who started as Life Science divisions maintained their divisions, while 25% of students decided to change their divisions. Out of those 25% students, most of them decided to study Social Science instead, followed by Humanities and Physical Science. The second table shows people who got admitted in the Nursing division. About 90% of students decided to study nursing at UCLA.

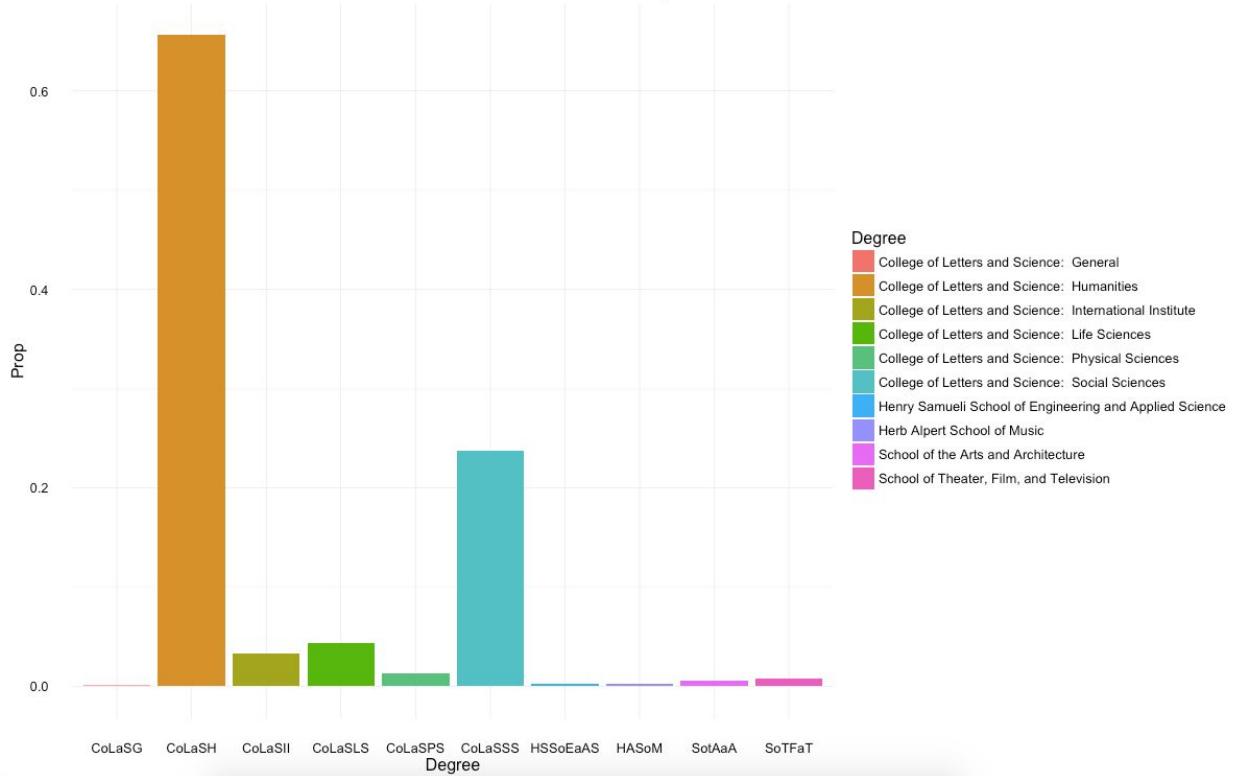
Humanities

For the humanities divisions (School of Arts and Architecture, School of Music, and Letters and Science: Humanities) how many students stay within their divisions and how many students change to another division for their degree?

College of Letters and Sciences: Humanities

Entry	Degree	Freq	Prop
1 College of Letters and Science: Humanities	College of Letters and Science: General	1	0.0006527415
2 College of Letters and Science: Humanities	College of Letters and Science: Humanities	1005	0.6560052219
3 College of Letters and Science: Humanities	College of Letters and Science: International Institute	50	0.0326370757
4 College of Letters and Science: Humanities	College of Letters and Science: Life Sciences	66	0.0430809399
5 College of Letters and Science: Humanities	College of Letters and Science: Physical Sciences	20	0.0130548303
6 College of Letters and Science: Humanities	College of Letters and Science: Social Sciences	363	0.2369451697
7 College of Letters and Science: Humanities	Henry Samueli School of Engineering and Applied Scie...	4	0.0026109661
8 College of Letters and Science: Humanities	Herb Alpert School of Music	4	0.0026109661
9 College of Letters and Science: Humanities	School of the Arts and Architecture	8	0.0052219321
10 College of Letters and Science: Humanities	School of Theater, Film, and Television	11	0.0071801567

Students Who Entered as Humanities and What Divisions They Graduated in



Humanities students who entered as freshman

Degree	Freq	Prop
College of Letters and Science: General	1	0.001426534
College of Letters and Science: Humanities	265	0.378031384
College of Letters and Science: International Institute	30	0.042796006
College of Letters and Science: Life Sciences	64	0.091298146
College of Letters and Science: Physical Sciences	16	0.022824536
College of Letters and Science: Social Sciences	301	0.429386591
Henry Samueli School of Engineering and Applied Scie...	4	0.005706134
Herb Alpert School of Music	4	0.005706134
School of the Arts and Architecture	6	0.008559201
School of Theater, Film, and Television	10	0.014265335

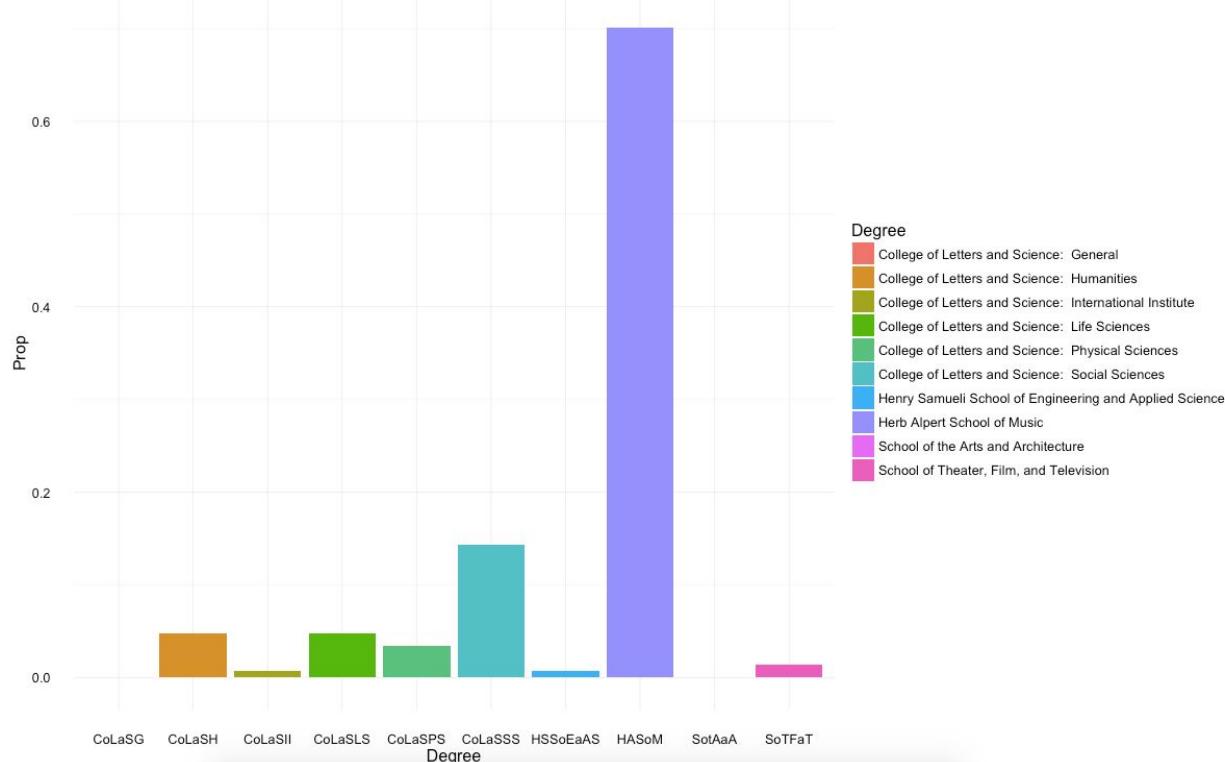
Humanities students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	740	0.890493381
College of Letters and Science: International Institute	20	0.024067389
College of Letters and Science: Life Sciences	2	0.002406739
College of Letters and Science: Physical Sciences	4	0.004813478
College of Letters and Science: Social Sciences	62	0.074608905
Herb Alpert School of Music	0	0.000000000
School of the Arts and Architecture	2	0.002406739
School of Theater, Film, and Television	1	0.001203369

Herb Alpert School of Music

	Entry	Degree	Freq	Prop
1	Herb Alpert School of Music	College of Letters and Science: General	0	0.0000000000
2	Herb Alpert School of Music	College of Letters and Science: Humanities	7	0.047619048
3	Herb Alpert School of Music	College of Letters and Science: International Institute	1	0.006802721
4	Herb Alpert School of Music	College of Letters and Science: Life Sciences	7	0.047619048
5	Herb Alpert School of Music	College of Letters and Science: Physical Sciences	5	0.034013605
6	Herb Alpert School of Music	College of Letters and Science: Social Sciences	21	0.142857143
7	Herb Alpert School of Music	Henry Samueli School of Engineering and Applied Scie...	1	0.006802721
8	Herb Alpert School of Music	Herb Alpert School of Music	103	0.700680272
9	Herb Alpert School of Music	School of the Arts and Architecture	0	0.0000000000
10	Herb Alpert School of Music	School of Theater, Film, and Television	2	0.013605442

Students Who Entered as Music and What Divisions They Graduated in



Music students who entered as freshmen

Music students who entered as transfers

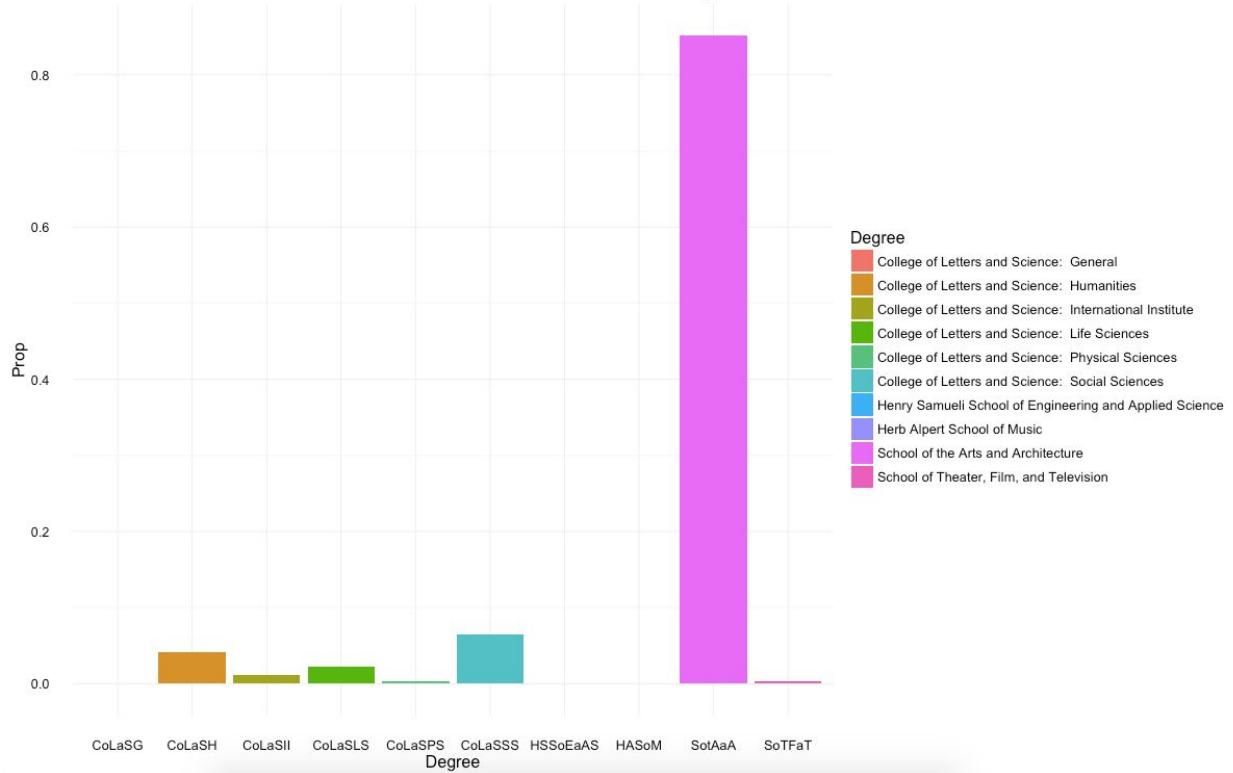
Degree	Freq	Prop
College of Letters and Science: General	0	0.000000000
College of Letters and Science: Humanities	6	0.054054054
College of Letters and Science: International Institute	1	0.009009009
College of Letters and Science: Life Sciences	7	0.063063063
College of Letters and Science: Physical Sciences	4	0.036036036
College of Letters and Science: Social Sciences	17	0.153153153
Henry Samueli School of Engineering and Applied Scie...	1	0.009009009
Herb Alpert School of Music	74	0.666666667
School of the Arts and Architecture	0	0.000000000
School of Theater, Film, and Television	1	0.009009009

Degree	Freq	Prop
College of Letters and Science: Humanities	1	0.02777778
College of Letters and Science: International Institute	0	0.00000000
College of Letters and Science: Life Sciences	0	0.00000000
College of Letters and Science: Physical Sciences	1	0.02777778
College of Letters and Science: Social Sciences	4	0.11111111
Herb Alpert School of Music	29	0.80555556
School of the Arts and Architecture	0	0.00000000
School of Theater, Film, and Television	1	0.02777778

School of the Arts and Architecture

Entry	Degree	Freq	Prop
1	School of the Arts and Architecture	College of Letters and Science: General	0
2	School of the Arts and Architecture	College of Letters and Science: Humanities	11
3	School of the Arts and Architecture	College of Letters and Science: International Institute	3
4	School of the Arts and Architecture	College of Letters and Science: Life Sciences	6
5	School of the Arts and Architecture	College of Letters and Science: Physical Sciences	1
6	School of the Arts and Architecture	College of Letters and Science: Social Sciences	17
7	School of the Arts and Architecture	Henry Samueli School of Engineering and Applied Scie...	0
8	School of the Arts and Architecture	Herb Alpert School of Music	0
9	School of the Arts and Architecture	School of the Arts and Architecture	223
10	School of the Arts and Architecture	School of Theater, Film, and Television	1

Students Who Entered as Arts and Architecture and What Divisions They Graduated in



Art students who entered as freshmen

Degree	Freq	Prop
College of Letters and Science: General	0	0.000000000
College of Letters and Science: Humanities	10	0.055248619
College of Letters and Science: International Institute	3	0.016574586
College of Letters and Science: Life Sciences	6	0.033149171
College of Letters and Science: Physical Sciences	1	0.005524862
College of Letters and Science: Social Sciences	17	0.093922652
Henry Samueli School of Engineering and Applied Science	0	0.000000000
Herb Alpert School of Music	0	0.000000000
School of the Arts and Architecture	143	0.790055249
School of Theater, Film, and Television	1	0.005524862

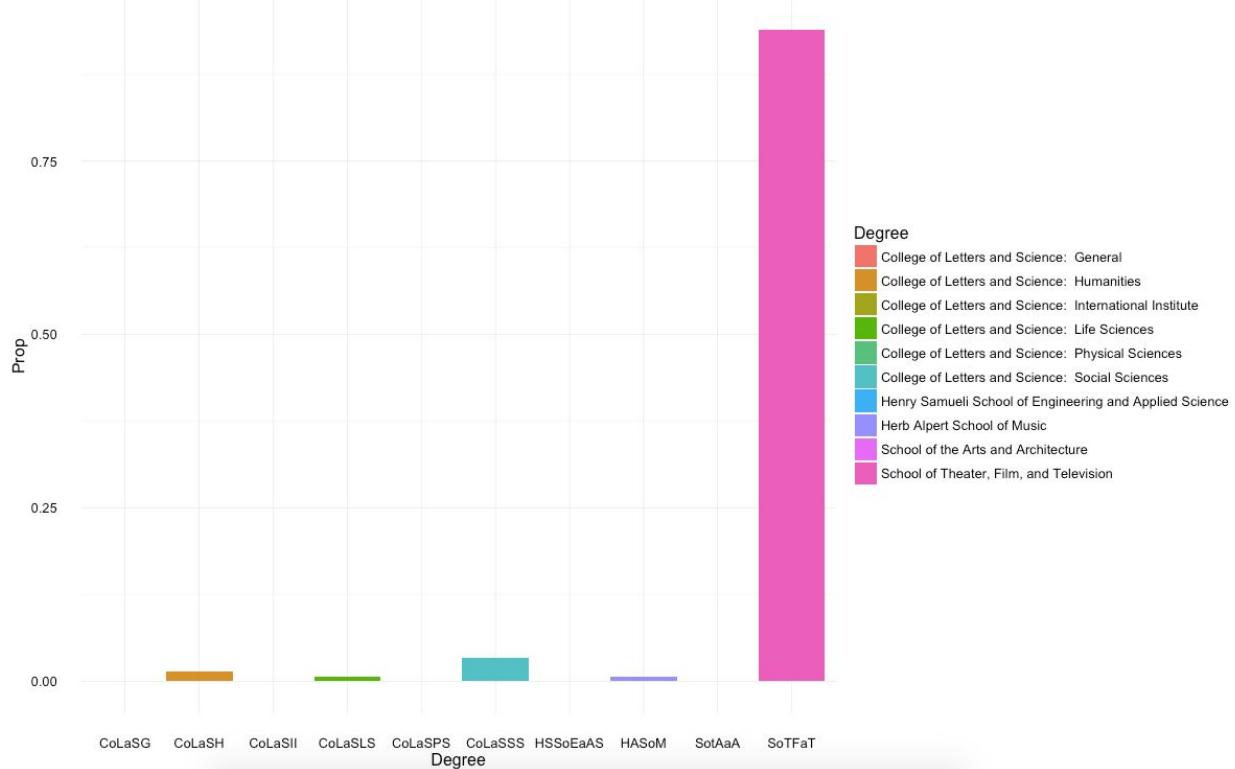
Art students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	1	0.01234568
College of Letters and Science: International Institute	0	0.00000000
College of Letters and Science: Life Sciences	0	0.00000000
College of Letters and Science: Physical Sciences	0	0.00000000
College of Letters and Science: Social Sciences	0	0.00000000
Herb Alpert School of Music	0	0.00000000
School of the Arts and Architecture	80	0.98765432
School of Theater, Film, and Television	0	0.00000000

School of Theater, Film, and Television

	Entry	Degree	Freq	Prop
1	School of Theater, Film, and Television	College of Letters and Science: General	0	0.000000000
2	School of Theater, Film, and Television	College of Letters and Science: Humanities	2	0.013698630
3	School of Theater, Film, and Television	College of Letters and Science: International Institute	0	0.000000000
4	School of Theater, Film, and Television	College of Letters and Science: Life Sciences	1	0.006849315
5	School of Theater, Film, and Television	College of Letters and Science: Physical Sciences	0	0.000000000
6	School of Theater, Film, and Television	College of Letters and Science: Social Sciences	5	0.034246575
7	School of Theater, Film, and Television	Henry Samueli School of Engineering and Applied Scie...	0	0.000000000
8	School of Theater, Film, and Television	Herb Alpert School of Music	1	0.006849315
9	School of Theater, Film, and Television	School of the Arts and Architecture	0	0.000000000
10	School of Theater, Film, and Television	School of Theater, Film, and Television	137	0.938356164

Students Who Entered as Theater and What Divisions They Graduated in



Theater students who entered as freshmen

Theater students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: General	0	0.00000000
College of Letters and Science: Humanities	2	0.02272727
College of Letters and Science: International Institute	0	0.00000000
College of Letters and Science: Life Sciences	1	0.01136364
College of Letters and Science: Physical Sciences	0	0.00000000
College of Letters and Science: Social Sciences	4	0.04545455
Henry Samueli School of Engineering and Applied Scie...	0	0.00000000
Herb Alpert School of Music	1	0.01136364
School of the Arts and Architecture	0	0.00000000
School of Theater, Film, and Television	80	0.90909091

Degree	Freq	Prop
College of Letters and Science: Humanities	0	0.00000000
College of Letters and Science: International Institute	0	0.00000000
College of Letters and Science: Life Sciences	0	0.00000000
College of Letters and Science: Physical Sciences	0	0.00000000
College of Letters and Science: Social Sciences	1	0.01724138
Herb Alpert School of Music	0	0.00000000
School of the Arts and Architecture	0	0.00000000
School of Theater, Film, and Television	57	0.98275862

The three larger tables show students who were admitted as the three fields in the “General” category. The first table is students who were admitted into the College of Letters and Sciences: Humanities division. About 65.6% of people who were admitted as Humanities maintained their divisions. Of the 34.4% of the students who switched divisions, the majority at 23.7% switched to Social Sciences in the College of Letters and Sciences. The second table is students who were admitted into the Herb Alpert School of Music. About 70% of students stayed in the music department, and once again we can see that most the students who switched divisions switched into the Social Sciences division at 14.3%. The third table shows students who were admitted into the School of Arts and Architecture. About 85.11% of students decided to stay in the School of Arts and Architecture and 6.5% of students switched to Social Sciences.

Engineering

For the engineering division (Henry Samueli School of Engineering and Applied Science) how many students stay within engineering and how many students change to another division for their degree?

Entry	Degree	Freq	Prop
1 Henry Samueli School of Engineering and Applied Scie...	College of Letters and Science: Humanities	18	0.01506276
2 Henry Samueli School of Engineering and Applied Scie...	College of Letters and Science: International Institute	3	0.00251046
3 Henry Samueli School of Engineering and Applied Scie...	College of Letters and Science: Life Sciences	50	0.04184100
4 Henry Samueli School of Engineering and Applied Scie...	College of Letters and Science: Physical Sciences	44	0.03682008
5 Henry Samueli School of Engineering and Applied Scie...	College of Letters and Science: Social Sciences	61	0.05104603
6 Henry Samueli School of Engineering and Applied Scie...	Henry Samueli School of Engineering and Applied Scie...	1017	0.85104603
7 Henry Samueli School of Engineering and Applied Scie...	School of the Arts and Architecture	2	0.00167364

Students who entered as freshmen

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	17	0.017782427
College of Letters and Science: International Institute	3	0.003138075
College of Letters and Science: Life Sciences	49	0.051255230
College of Letters and Science: Physical Sciences	38	0.039748954
College of Letters and Science: Social Sciences	60	0.062761506
Henry Samueli School of Engineering and Applied Scie...	787	0.823221757
School of the Arts and Architecture	2	0.002092050

Degree	Freq	Prop
College of Letters and Science: Humanities	1	0.0041841
College of Letters and Science: Life Sciences	1	0.0041841
College of Letters and Science: Physical Sciences	6	0.0251046
College of Letters and Science: Social Sciences	1	0.0041841
Henry Samueli School of Engineering and Applied Scie...	230	0.9623431

Most engineering students stay with engineering, at 85% graduating with engineering degrees. 5% of those who switched divisions switched to social sciences, and 4% switch to life sciences.

Physical Sciences

For the physical science division (College of Letters and Science: Physical Sciences) how many students stay within physical science and how many students change to another division for their degree?

Entry	Degree	Freq	Prop
1 College of Letters and Science: Physical Sciences	College of Letters and Science: Humanities	62	0.0375302663
2 College of Letters and Science: Physical Sciences	College of Letters and Science: International Institute	17	0.0102905569
3 College of Letters and Science: Physical Sciences	College of Letters and Science: Life Sciences	273	0.1652542373
4 College of Letters and Science: Physical Sciences	College of Letters and Science: Physical Sciences	970	0.5871670702
5 College of Letters and Science: Physical Sciences	College of Letters and Science: Social Sciences	268	0.1622276029
6 College of Letters and Science: Physical Sciences	Henry Samueli School of Engineering and Applied Scie...	54	0.0326876513
7 College of Letters and Science: Physical Sciences	Herb Alpert School of Music	4	0.0024213075
8 College of Letters and Science: Physical Sciences	School of Nursing	1	0.0006053269
9 College of Letters and Science: Physical Sciences	School of the Arts and Architecture	2	0.0012106538
10 College of Letters and Science: Physical Sciences	School of Theater, Film, and Television	1	0.0006053269

Students who entered as freshmen

Degree	Freq	Prop
College of Letters and Science: Humanities	52	0.0474452555
College of Letters and Science: International Institute	17	0.0155109489
College of Letters and Science: Life Sciences	254	0.2317518248
College of Letters and Science: Physical Sciences	472	0.4306569343
College of Letters and Science: Social Sciences	241	0.2198905109
Henry Samueli School of Engineering and Applied Scie...	52	0.0474452555
Herb Alpert School of Music	4	0.0036496350
School of Nursing	1	0.0009124088
School of the Arts and Architecture	2	0.0018248175
School of Theater, Film, and Television	1	0.0009124088

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	10	0.017985612
College of Letters and Science: Life Sciences	19	0.034172662
College of Letters and Science: Physical Sciences	498	0.895683453
College of Letters and Science: Social Sciences	27	0.048561151
Henry Samueli School of Engineering and Applied Scie...	2	0.003597122

We find that most students ended up switching out of physical sciences, with only 43% of freshman entrants graduating with physical science degrees. Most freshman entrants switched to life sciences at 23% and another 21% switched to social sciences. Out of both freshmen and

transfers, 58% of students kept their physical science degrees and about 16% switched to both social sciences and life sciences.

Social Sciences

For the social science division (College of Letters and Science: Social Sciences and College of Letters and Science: International Institute) how many students stay within social science and how many students change to another division for their degree?

College of Letters and Science: International Institute

	Entry	Degree	Freq	Prop
1	College of Letters and Science: International Institute	College of Letters and Science: Humanities	22	0.086614173
2	College of Letters and Science: International Institute	College of Letters and Science: International Institute	169	0.665354331
3	College of Letters and Science: International Institute	College of Letters and Science: Life Sciences	3	0.011811024
4	College of Letters and Science: International Institute	College of Letters and Science: Physical Sciences	1	0.003937008
5	College of Letters and Science: International Institute	College of Letters and Science: Social Sciences	58	0.228346457
6	College of Letters and Science: International Institute	Henry Samueli School of Engineering and Applied Scie...	0	0.000000000
7	College of Letters and Science: International Institute	Herb Alpert School of Music	0	0.000000000
8	College of Letters and Science: International Institute	School of Nursing	0	0.000000000
9	College of Letters and Science: International Institute	School of the Arts and Architecture	1	0.003937008
10	College of Letters and Science: International Institute	School of Theater, Film, and Television	0	0.000000000

Students who entered as freshmen

Degree	Freq	Prop
College of Letters and Science: Humanities	13	0.14130435
College of Letters and Science: International Institute	39	0.42391304
College of Letters and Science: Life Sciences	2	0.02173913
College of Letters and Science: Physical Sciences	1	0.01086957
College of Letters and Science: Social Sciences	37	0.40217391
Henry Samueli School of Engineering and Applied Scie...	0	0.00000000
Herb Alpert School of Music	0	0.00000000
School of Nursing	0	0.00000000
School of the Arts and Architecture	0	0.00000000
School of Theater, Film, and Television	0	0.00000000

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	9	0.05555556
College of Letters and Science: International Institute	130	0.80246914
College of Letters and Science: Life Sciences	1	0.00617284
College of Letters and Science: Physical Sciences	0	0.00000000
College of Letters and Science: Social Sciences	21	0.12962963
School of the Arts and Architecture	1	0.00617284

Interestingly, 66% of students in the International Institute graduate in that division but only 42% of freshmen who entered as International Institute students graduate in that division. Most freshmen entrants, in fact 42%, switch to social sciences.

College of Letters and Science: Social Sciences

	Entry	Degree	Freq	Prop
1	College of Letters and Science: Social Sciences	College of Letters and Science: Humanities	138	0.0407801418
2	College of Letters and Science: Social Sciences	College of Letters and Science: International Institute	99	0.0292553191
3	College of Letters and Science: Social Sciences	College of Letters and Science: Life Sciences	123	0.0363475177
4	College of Letters and Science: Social Sciences	College of Letters and Science: Physical Sciences	63	0.0186170213
5	College of Letters and Science: Social Sciences	College of Letters and Science: Social Sciences	2937	0.8679078014
6	College of Letters and Science: Social Sciences	Henry Samueli School of Engineering and Applied Scie...	6	0.0017730496
7	College of Letters and Science: Social Sciences	Herb Alpert School of Music	2	0.0005910165
8	College of Letters and Science: Social Sciences	School of Nursing	2	0.0005910165
9	College of Letters and Science: Social Sciences	School of the Arts and Architecture	12	0.0035460993
10	College of Letters and Science: Social Sciences	School of Theater, Film, and Television	2	0.0005910165

Students who entered as freshmen

Degree	Freq	Prop
College of Letters and Science: Humanities	94	0.062210457
College of Letters and Science: International Institute	75	0.049636003
College of Letters and Science: Life Sciences	121	0.080079418
College of Letters and Science: Physical Sciences	53	0.035076109
College of Letters and Science: Social Sciences	1146	0.758438120
Henry Samueli School of Engineering and Applied Scie...	6	0.003970880
Herb Alpert School of Music	2	0.001323627
School of Nursing	2	0.001323627
School of the Arts and Architecture	10	0.006618134
School of Theater, Film, and Television	2	0.001323627

Students who entered as transfers

Degree	Freq	Prop
College of Letters and Science: Humanities	44	0.023491725
College of Letters and Science: International Institute	24	0.012813668
College of Letters and Science: Life Sciences	2	0.001067806
College of Letters and Science: Physical Sciences	10	0.005339028
College of Letters and Science: Social Sciences	1791	0.956219968
School of the Arts and Architecture	2	0.001067806

86% of students who entered as social science students stay with that division, with 4% of students switching to humanities and 3.6% of students switching to life sciences. This is by far the largest division. 95% of transfer students stay within that division, while only 75.8% of freshmen entrants graduate with social science degrees.

Guiding Questions

- Students from which Division are more likely to spend more quarters or summers to graduate?
- Students from which Division would more like to study abroad?
- Students from which Division are more likely to have GPA of top one third?
- Students from which Division tend to take, on average, more classes each quarter or summer?

A Multinomial Logistic Regression:

$$\text{Division} \sim \text{avg_courses_summer} + \text{num_summers} + \text{avg_courses_reg_term} + \text{num_reg_terms} \\ + \text{top_third} + \text{ever_abroad}$$

Data Exploration

1. *num_summers* - Total Numbers of Summers Enrolled

- Five-Number Summary - Freshman

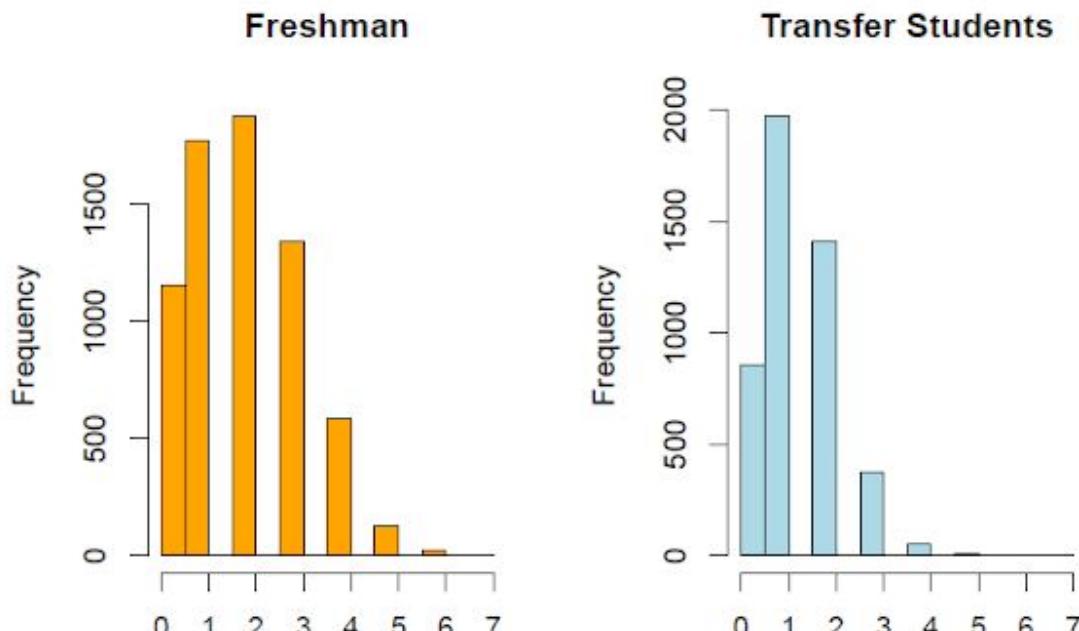
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	1	2	1.843	3	7

- Five-Number Summary - Transfer Students

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	1	1	1.329	2	7

Commonly speaking, freshman might possibly take as much as eight summers throughout their entire undergraduate study while transfer students might only take four summers. This relationship is shown by the median values in the five-number summary above. However, from the histograms down below, we can see that the distribution of the total numbers of summers enrolled is right skewed, and we might need a transformation or categorization on it. Thus, for the multinomial model, I decide to create a new categorical variable “*TotalSummerCateg*”, which divides “*num_summers*” into two levels by the medians. For freshman, the two levels are the ones who have enrolled in 2 summers or less and the ones who have enrolled in more than 2 summers. For transfer students, the two levels are the ones who have enrolled in at most 1 summer and the ones who have enrolled in more than 1 summer.

- Histograms



2. *avg_courses_summer* - Average Classes Taken Per Summer

- Five-Number Summary - Freshman

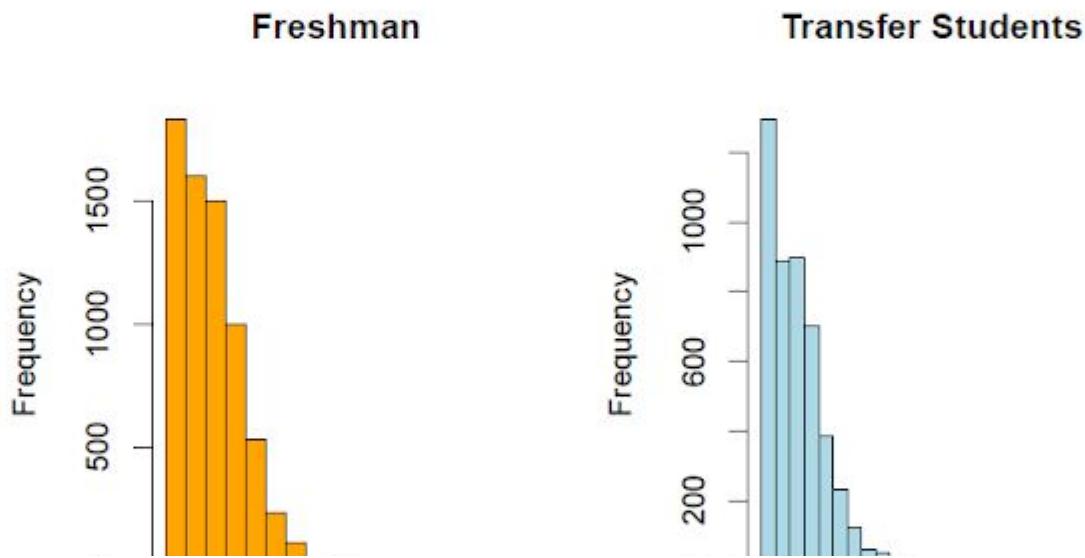
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	1	2.25	2.432	3.5	17

- Five-Number Summary - Transfer Students

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0	1	2.5	2.759	4	24

The distribution of the average numbers of classes taken per summer is also right skewed and hence needs a categorization. The median is 2.25 classes for freshman and 2.5 for transfer students. However, the maximum value for transfer students is 24 classes which is unrealistically higher than the maximum value of 17 classes for freshman, which is also quite impossible. Based on the histograms down below, there are not obvious differences in the distribution between freshman and transfer students. For this reason, for all students, I create a new categorical variable “*AvgCoursesSummerCateg*” to split “*avg_courses_summer*” into two levels, students who, on average, took 2.5 classes per summer or less, and students who, on average, took more than 2.5 classes per summer.

- Histograms



3. *num_reg_terms* - Total Numbers of Regular Quarters Enrolled

- Five-Number Summary - Freshman

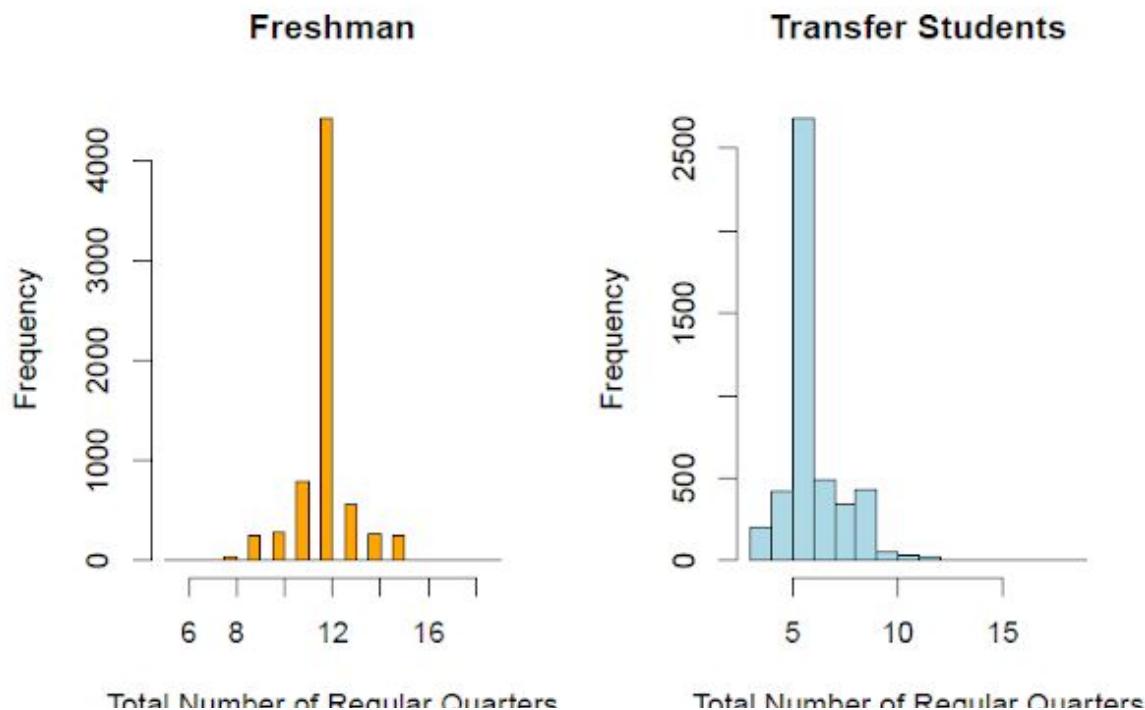
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
5	12	12	11.95	12	19

- Five-Number Summary - Transfer Students

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
3	6	6	6.457	7	19

The pattern in the distribution of the total numbers of regular quarters enrolled is obvious. I create a new categorical variable “*TotalRegTermCateg*” to split “*num_reg_terms*” by the medians. For freshman, the two levels include the ones who have enrolled in 12 regular quarters or less and the ones who have enrolled in more than 12 regular quarters. For transfer students, the cutoff then is 6 regular quarters.

- Histograms



4. *avg_courses_reg_term* - Average Classes Taken Per Regular Quarter

- Five-Number Summary - Freshman

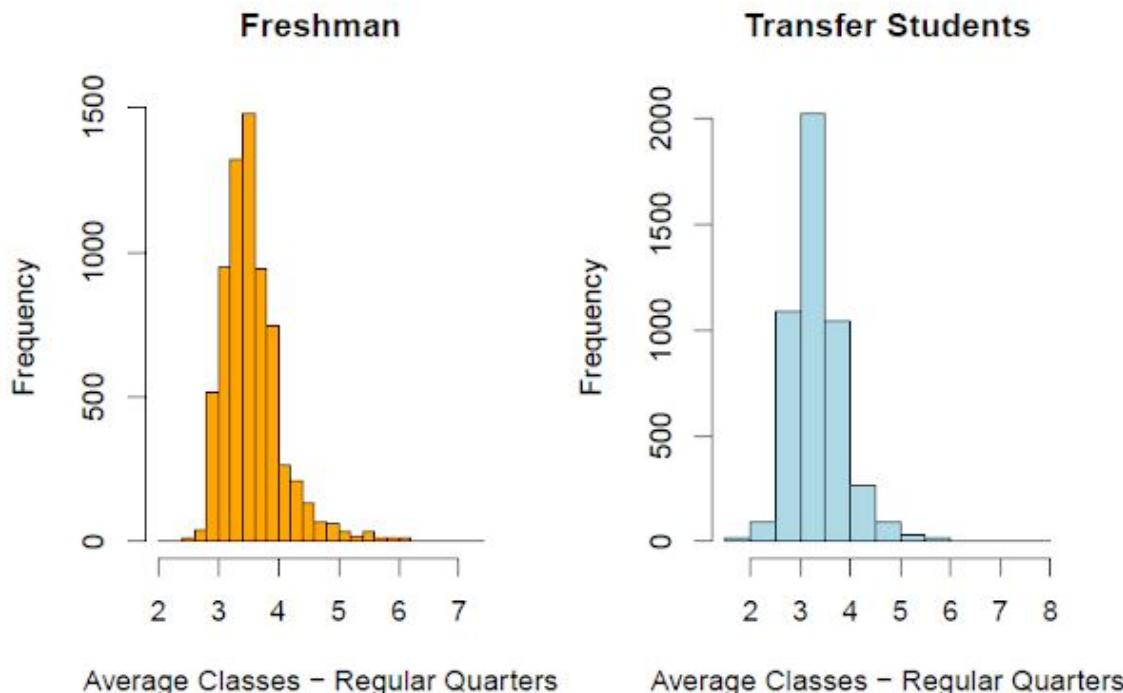
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.077	3.25	3.5	3.568	3.75	7.333

- Five-Number Summary - Transfer Students

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1.714	3	3.333	3.405	3.667	7.778

Similar to the average numbers of classes taken per summer, the average numbers of classes taken per regular quarters are also distributed with a right-skewness. So, for all students, I create a categorical variable “*AvgCoursesRegTermCateg*” to split “*avg_courses_reg_term*” into the ones who, on average, took 3.5 classes or less per regular quarter and the ones who, on average, took more than 3.5 classes per regular quarter.

- Histograms



A Multinomial Logistic Regression - Continued:

*Division ~ AvgCoursesSummerCateg + AvgCoursesRegTermCateg + TotalSummerCateg
+ TotalRegTermCateg + top_third + ever_abroad*

The ANOVA Tables

- Freshman

	LR Chisq	Df	Pr(>Chisq)
AvgCoursesSummerCateg	62.02	4	1.094e-12
AvgCoursesRegTermCateg	715.3	4	1.737e-153
TotalSummerCateg	135.1	4	3.217e-28
TotalRegTermCateg	354.5	4	1.905e-75
top_third	52.24	4	1.228e-10
ever_abroad	67.2	4	8.836e-14

- Transfer Students

	LR Chisq	Df	Pr(>Chisq)
AvgCoursesSummerCateg	45.84	4	2.66e-09
AvgCoursesRegTermCateg	175.4	4	7.304e-37
TotalSummerCateg	18.25	4	0.001104
TotalRegTermCateg	434.6	4	9.317e-93
top_third	42.44	4	1.352e-08
ever_abroad	30.41	4	4.03e-06

The ANOVA tables indicates that, for both freshman and transfer students, all variables in the multinomial model are statistically significant.

The Resulted Odds Ratios and Interpretations

Freshman

	(Intercept)	AvgCoursesSummerCategMoreThan2.5
Humanities, Arts, and General	2.419	1.228
Life Sciences	4.18	1.856
Physical Sciences	1.037	1.849
Social Sciences	7.84	1.728

Table 16: Table continues below

	AvgCoursesRegTermCategMoreThan3.5
Humanities, Arts, and General	0.18
Life Sciences	0.1998
Physical Sciences	0.3992
Social Sciences	0.1011

Table 17: Table continues below

	TotalSummerCategMoreThan2
Humanities, Arts, and General	2.686
Life Sciences	3.661
Physical Sciences	2.845
Social Sciences	2.584

Table 18: Table continues below

	TotalRegTermCategMoreThan12	top_third
Humanities, Arts, and General	0.161	2.145
Life Sciences	0.1567	1.794
	TotalRegTermCategMoreThan12	top_third
Physical Sciences	0.2784	1.675
Social Sciences	0.1372	1.642

	ever_abroadTRUE
Humanities, Arts, and General	4.922
Life Sciences	3.762
Physical Sciences	2.631
Social Sciences	4.235

➤ *AvgCoursesSummerCateg:*

Holding other variables constant and given that a student, on average, took more than 2.5 classes per summer, the odds that this student came from the Humanities, Arts, and General Division is 1.228 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 1.856 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 1.849, and for the Social Sciences Division is 1.728.

AvgCoursesRegTermCateg:

Holding other variables constant and given that a student, on average, took more than 3.5 classes per regular quarter, the odds that this student came from the Humanities, Arts, and General Division is 0.18 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 0.1998 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 0.3992, and for the Social Sciences Division is 0.1011.

TotalSummerCateg:

Holding other variables constant and given that a student has enrolled in more than 2 summers, the odds that this student came from the Humanities, Arts, and General Division is 2.686 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 3.661 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 2.845, and for the Social Sciences Division is 2.584.

TotalRegTermCateg:

Holding other variables constant and given that a student has enrolled in more than 12 regular quarters, the odds that this student came from the Humanities, Arts, and General Division is 0.161 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 0.1567 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 0.2784, and for the Social Sciences Division is 0.1372.

top_third:

Holding other variables constant and given that a student has a GPA of the top one third, the odds that this student came from the Humanities, Arts, and General Division is 2.145 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 1.794 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 1.675, and for the Social Sciences Division is 1.642.

ever_abroad:

Holding other variables constant and given that a student has the experience of studying abroad, the odds that this student came from the Humanities, Arts, and General Division is 4.922 times of the odds that this student came from the Engineering Division. the odds that this student came

from the Life Sciences Division is 3.762 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 2.631, and for the Social Sciences Division is 4.235.

Transfer Students

	(Intercept)	AvgCoursesSummerCategMoreThan2.5
Humanities, Arts, and General	37.9	1.398
Life Sciences	32.16	1.474
Physical Sciences	14.02	1.669
Social Sciences	72.79	2.101

Table 27: Table continues below

	AvgCoursesRegTermCategMoreThan3.5
Humanities, Arts, and General	0.1204
Life Sciences	0.1265
Physical Sciences	0.1766
Social Sciences	0.1336

➤ *AvgCoursesSummerCateg:*

Holding other variables constant and given that a student, on average, took more than 2.5 classes per summer, the odds that this student came from the Humanities, Arts, and General Division is 1.398 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 1.474 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 1.669, and for the Social Sciences Division is 2.101.

AvgCoursesRegTermCateg:

Holding other variables constant and given that a student, on average, took more than 3.5 classes per regular quarter, the odds that this student came from the Humanities, Arts, and General Division is 0.1204 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 0.1265 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 0.1766, and for the Social Sciences Division is 0.1336.

	TotalSummerCategMoreThan1
Humanities, Arts, and General	0.9217
Life Sciences	1.241
Physical Sciences	1.399
Social Sciences	1.01

Table 29: Table continues below

	TotalRegTermCategMoreThan6	top_third
Humanities, Arts, and General	0.04995	2.355
Life Sciences	0.04665	1.539
Physical Sciences	0.09641	1.32
Social Sciences	0.03627	1.996

	ever_abroadTRUE
Humanities, Arts, and General	15.62
Life Sciences	7.673
Physical Sciences	4.042
Social Sciences	13.53

TotalSummerCateg:

Holding other variables constant and given that a student has enrolled in more than 1 summer, the odds that this student came from the Humanities, Arts, and General Division is 0.9217 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 1.241 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 1.399, and for the Social Sciences Division is 1.01.

TotalRegTermCateg:

Holding other variables constant and given that a student has enrolled in more than 6 regular quarters, the odds that this student came from the Humanities, Arts, and General Division is 0.04995 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 0.04665 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 0.09641, and for the Social Sciences Division is 0.03627.

top_third:

Holding other variables constant and given that a student has a GPA of the top one third, the odds that this student came from the Humanities, Arts, and General Division is 2.355 times of the odds that this student came from the Engineering Division. the odds that this student came

from the Life Sciences Division is 1.539 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 1.32, and for the Social Sciences Division is 1.996.

ever_abroad:

Holding other variables constant and given that a student has the experience of studying abroad, the odds that this student came from the Humanities, Arts, and General Division is 15.62 times of the odds that this student came from the Engineering Division. the odds that this student came from the Life Sciences Division is 7.673 times of the odds that this student came from the Engineering Division. The similar odds ratio for the Physical Sciences Division is 4.042, and for the Social Sciences Division is 13.53.

Findings and Conclusion

- Students from the Engineering Division tend to enroll in more regular quarters than students from other divisions. Students from the Physical Sciences Division are also likely to take more regular quarters to graduate. On the other hand, students from the Social Sciences Division tend to enroll in the least amount of regular quarters to graduate. This patterns can be found among all students, no matter they are freshman or transfer.
- Students from the Life Sciences Division tend to take more summers than students from other divisions, and students from the Engineering Division tend to not enroll in summers. This pattern is also true for all students.
- Typically, comparing to students from other divisions, students from the Engineering Division, on average, tend to take significantly more classes during the regular quarters yet significantly less classes in summers. The reason might vary ranging from whether important classes are being offered and research opportunities to the difficulty of summer classes.
- Comparing to others, students from the Physical Sciences Division would equally like to take classes during regular quarters and summers.
- Freshmans from the Life Sciences Division tend to take more classes in summers. Transfer students from the Social Sciences Division tend to take more classes over summers.
- Among all students, the ones from the Humanities, Arts, and the General Division and Social Sciences Divisions are significantly more likely to have experiences of studying abroad than Engineering or Physical Sciences students. This makes strong sense.
- Among all students, the ones from the Engineering Division are the least likely to have a GPA of the top one third. They are at disadvantages due to a greater difficulty in all Engineering classes and a tighter schedule. Among freshmans, the Humanities, Arts, and General and the Social Sciences Division dominate the population of the top one third GPAs. Among transfer students, the ones from the Social Sciences are not likely to have

GPAAs of the top one third anymore, and instead, the Life Sciences Division makes up the portion.

UCLA has a good mixture of freshman and transfer students.

Therefore, I wanted to explore the patterns regarding average classes taken based on students status and their divisions based on the South and North.

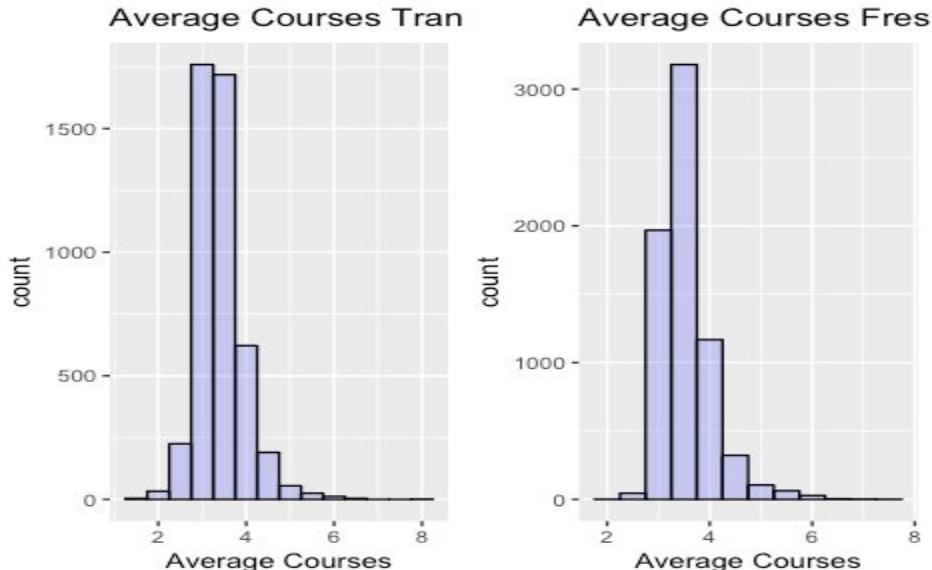
General Analysis

AS	FR
4686	6898
0.405	0.595

Based on the data I have, out of 11584 students, approximately 40% of students were transfer admits and 60% of students were freshman admits.

Data Exploration

- Avg_courses_reg_term



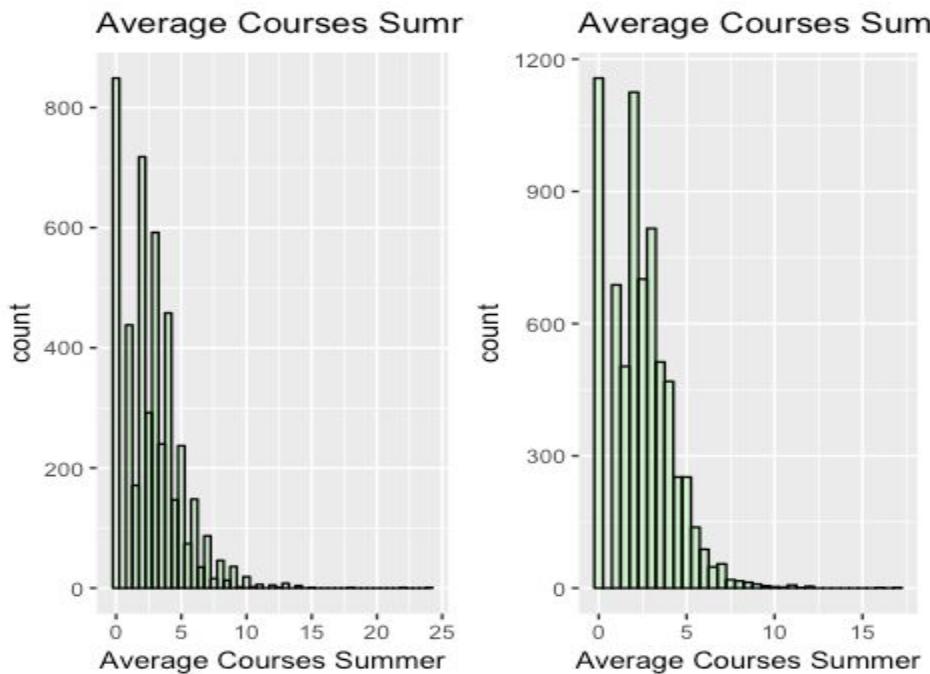
Based on the histogram from the above, both transfer students and freshman students tend to take approximately 3 to 4 courses per quarter. The mean of the freshman students is 3.568 and the mean of the transfer students is 3.4. Therefore, I separate groups based on their course work. For transfer students who took less than 3.4 average course per quarter, I assign them as "Minimal".

Those who took from 3.4 to 4 courses on average, I assign them as “Average”, and those who took more than 4 course on average, they are “Excessive”. For freshman students, students who took less than 3.5 courses on average are assigned as “Minimal”. Students who took between 3.5 and 4 classes on average are assigned as “Average”, and students who took more than 4 courses on average are grouped as “Excessive”.

Average	Excessive	Minimal	Average	Excessive	Minimal
1504	412	2732	2190	876	3820
0.324	0.089	0.588	0.318	0.127	0.555

The one on the left shows the result of the transfer students and the one on the right shows the freshman students. Regardless of the students status, they tended to take less than 3.5 courses on average per quarter. However, freshman students shows a higher proportion of taking “Excessive” courses work on average than transfer students. This might be possible due to transfer students need to fulfill their requirements in order to transfer and they already decide what majors to be, while freshman students want to explore and attempt to find their best majors.

- Avg_courses_summer



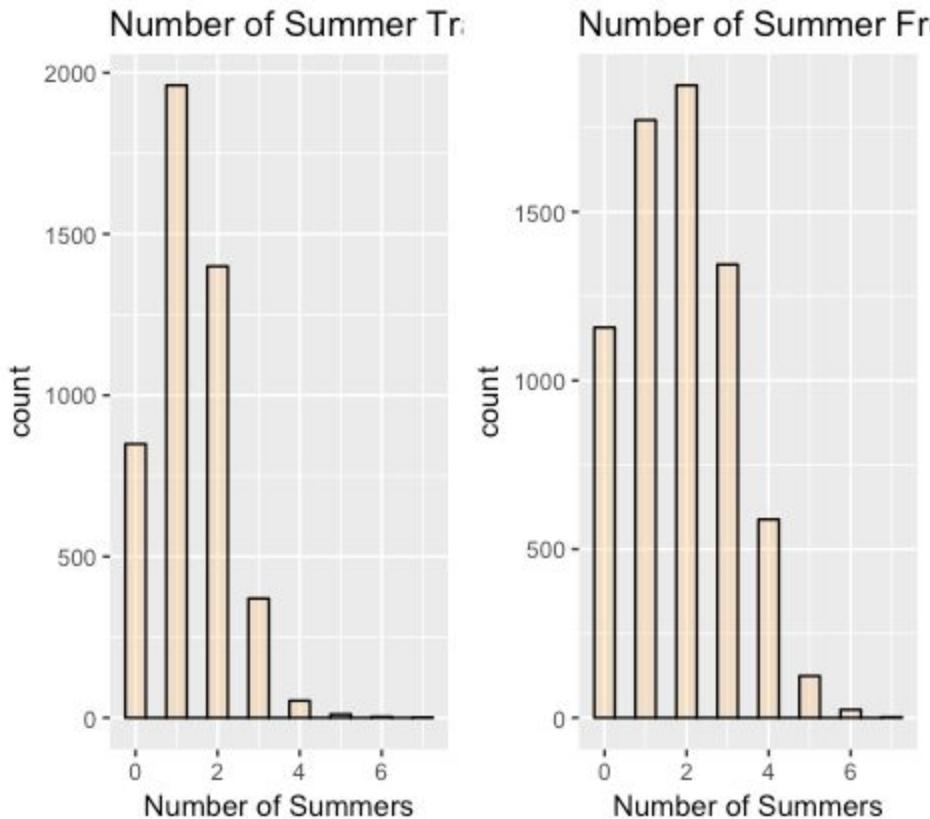
There were 2011 students, 854 transfer students and 1157 freshman students , who did not attend summer sessions. In terms of percentage, 16.77% of fresh students did not take summer sessions and 18.22% of transfer students did not take summer sessions.

Based on the histogram, freshman students on average took 2.4 courses in summer sessions and transfer students on average took 2.7 courses in summer. Therefore, freshman students who took less than 2.4 courses on average are labeled as “Average” and those who took more than 2.4 courses on average are labeled as “Excessive. Regarding transfer students, those who took less than 2.7 courses on average are labeled as “Average” and those who took more than 2.7 courses on average are labeled as “Excessive”.

	<i>Average</i>	<i>Excessive</i>		<i>Average</i>	<i>Excessive</i>
/	2484	2202	/	3627	3271
/	0.530	0.470	/	0.526	0.474

The one of the left indicates the percentage of the transfer students and the one on the right indicates the percentage of the freshman students. It turns out that both of the two groups have similar course works over summer.

- num_summers



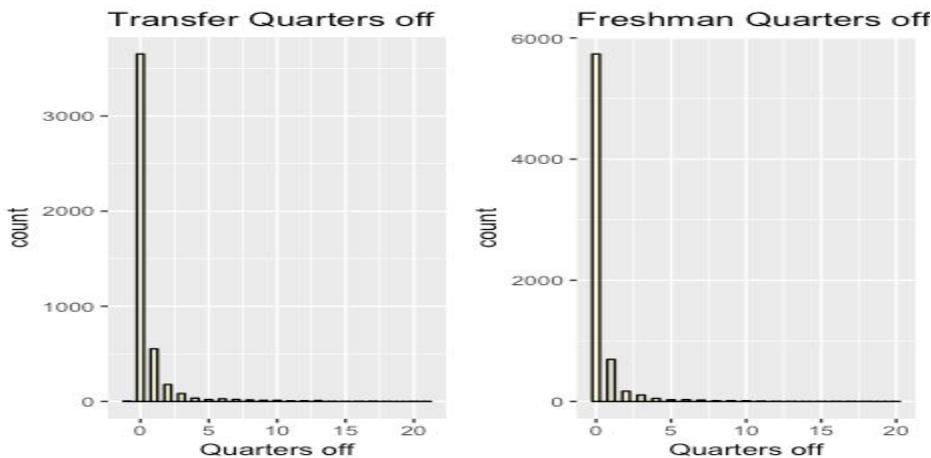
In terms of summer sessions, freshman tended to take 2 times, while transfer tends to take 1 time. The result can be predictable due to freshman students need to attend 4 years on average, while

transfer students tend to attend approximately 2 years on average, which indicates that freshman students have a higher chance to be exposed to take more summer courses. For transfer students, I assigned those who took less than 1 summer course on average as “Average” and more than 1 course as “Excessive”. For freshman students, I assigned the students who took less than 2 summer courses on average as “Average” and more than 2 courses on average as “Excessive”.

<i>Average</i>	<i>Excessive</i>	<i>Average</i>	<i>Excessive</i>
2810	1838	4804	2082
0.605	0.395	0.698	0.302

The one on the presents shows the number of summer session that transfer students took on average, and the one on the right presents the number of summer session that transfer students took on average. Compared to the transfer students, freshman students tended to take “Excessive” number of summer session.

- quarters_off

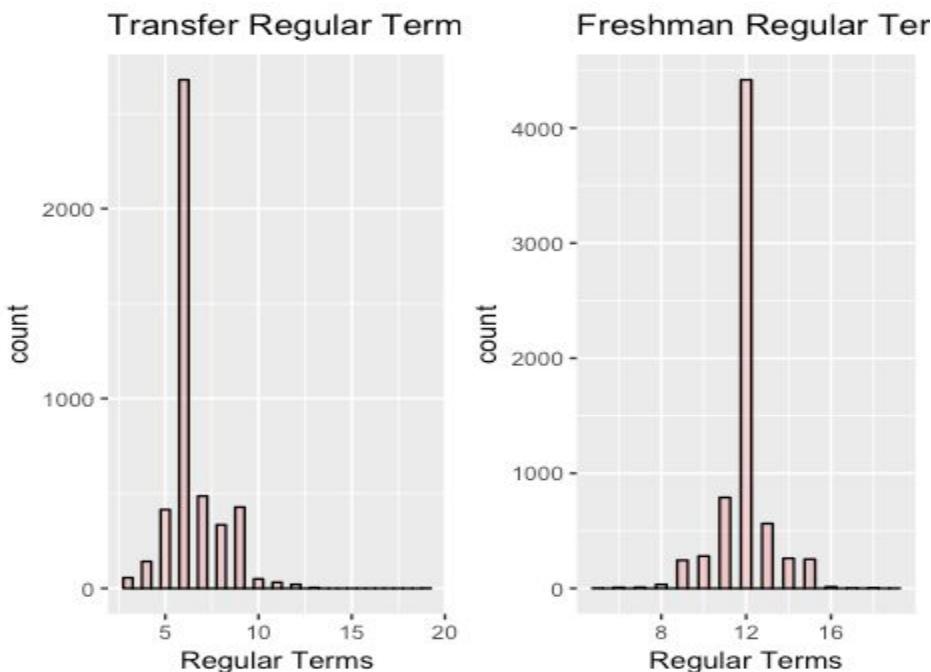


For students, it may be inevitable for them to take quarters off depending on their circumstances. The histograms indicate that both of the two students groups have a similar tendency in terms of taking quarters off. On average, transfer students took 0.5 quarter off, while freshman students took 0.3 quarter off. Therefore, transfer students who took less than 0.5 quarter off are grouped as “Average” and for those who took more than 0.5 are grouped as “Higher than Average”. Regarding freshman students, the students who took 0.3 quarter off on average are assigned as “Average” and those who took more than 0.3 quarter off on average are assigned as “Higher than Average”.

Average	Higher than Average	Average	Higher than Average
3656	992	5736	1150
0.787	0.213	0.833	0.167

The table on the left observes the percentage of transfer students' time off and the one on the right indicates the percentage of freshman students'. Both of the two groups tend to have a similar pattern in terms of taking quarters off.

- num_reg_terms

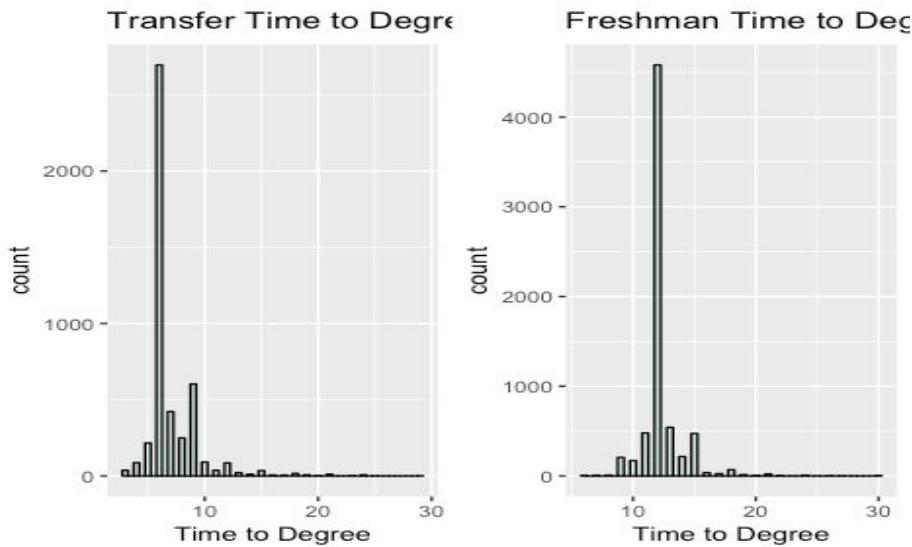


In terms of number of regular terms, transfer and freshman students have different time lengths because transfer students ideally took 6 regular academic terms in order to graduate, while freshman students took 12 academic terms. Therefore, transfer students who took less than 6 academic terms are assigned as "Early", while those who took more than 6 terms are assigned as "Late". Regarding the freshman students, those who took less than 12 terms are assigned as "Early" and those who took more than 12 are assigned as "Late".

<i>Early</i>	<i>Late</i>	<i>Early</i>	<i>Late</i>
3291	1357	5786	1100
0.708	0.292	0.840	0.160

The left table shows the percentage of transfer students' and the right table shows the percentage of freshman students'.

- time_to_degree



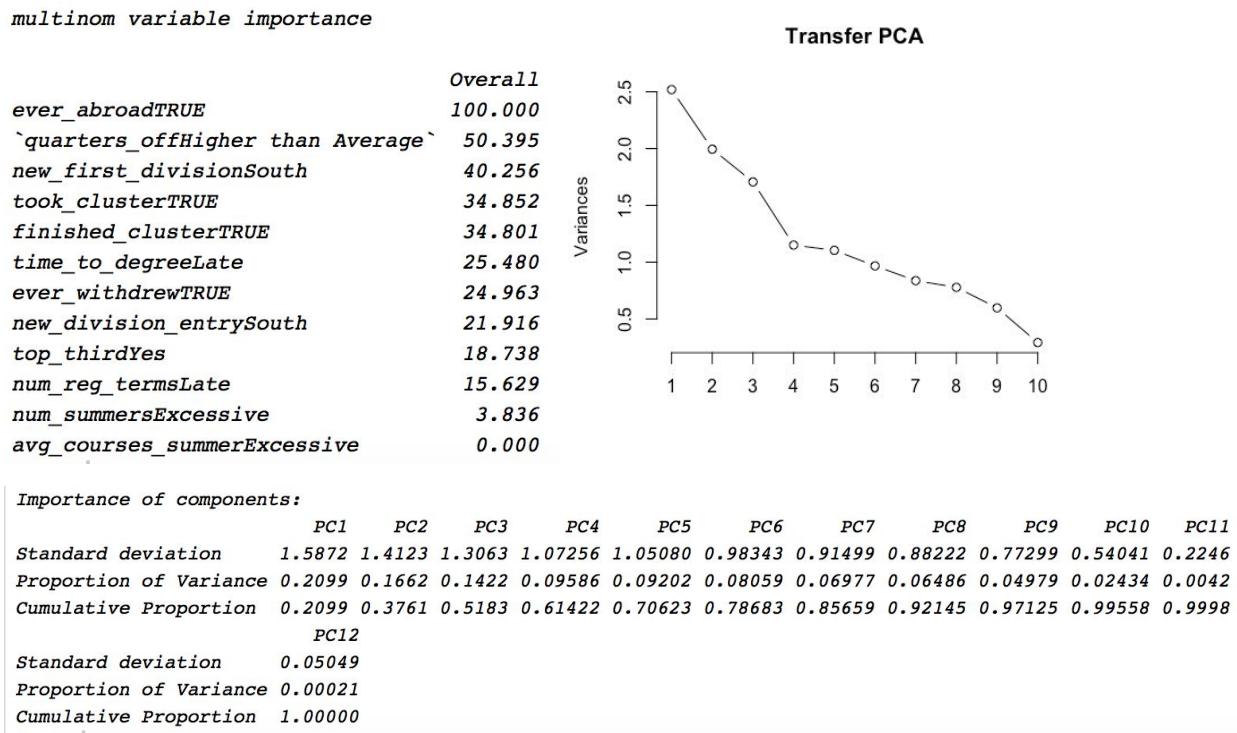
The variable time_to_degree indicates the similar tendency regarding the variable num_reg_terms. The median of transfer is 6; therefore, transfer students who took less than 6 are labeled as “Early” and those who took more than 6 are labeled as “Late”. On the other hand, the media of freshman is 12, which allows for me to group the students who took less than 12 are considered as “Early” group and the students who took more than 12 are considered as “Late” group.

<i>Early</i>	<i>Late</i>	<i>Early</i>	<i>Late</i>
3036	1612	5459	1427
0.653	0.347	0.793	0.207

The left table indicates the result of transfer students and the right table indicates the result of freshman students. As can be seen, the ideal graduation time period for transfer students is 6 academic terms, but approximately 35% of transfer students took more than 6 academic terms. Considering the information given including quarters off, GPA ratio, and average course taken per quarter, this might be an indication that transfer students have experienced hard time adjusting themselves at UCLA.

Multinomial Regression

Feature Selection for Transfer



In order to explain 90% of the variability, the first 8 variables will be selected.

Transfer Multinomial Regression Model

avg_courses_reg_term~ ever_abroad + quarters_off + new_first_division + took_cluster + finished_cluster + time_to_degree + ever_withdrew + new_division_entry

Feature Selection for Transfer

multinom variable importance

	<i>Overall</i>
<i>new_first_divisionSouth</i>	100.000
<i>ever_abroadTRUE</i>	81.737
<i>top_thirdYes</i>	80.939
<i>num_reg_termsLate</i>	79.171
<i>new_division_entrySouth</i>	47.701
<i>took_clusterTRUE</i>	37.351
<i>num_summersExcessive</i>	30.510
<i>finished_clusterTRUE</i>	15.890
<i>avg_courses_summerExcessive</i>	4.698
<i>`quarters_offHigher than Average`</i>	3.320
<i>ever_withdrewTRUE</i>	3.320
<i>time_to_degreeLate</i>	0.000

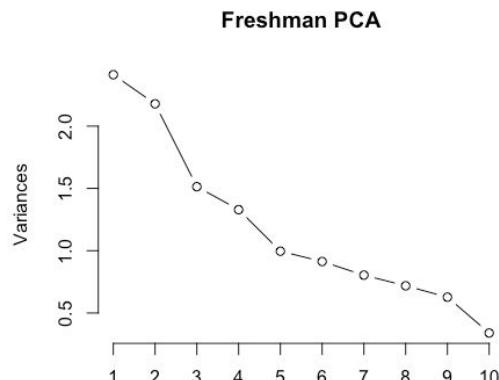
Importance of components:

	<i>PC1</i>	<i>PC2</i>	<i>PC3</i>	<i>PC4</i>	<i>PC5</i>	<i>PC6</i>	<i>PC7</i>	<i>PC8</i>	<i>PC9</i>	<i>PC10</i>	<i>PC11</i>
<i>Standard deviation</i>	1.5533	1.4761	1.2304	1.1531	0.9980	0.95554	0.89661	0.84752	0.79193	0.58257	0.40883
<i>Proportion of Variance</i>	0.2011	0.1816	0.1262	0.1108	0.0830	0.07609	0.06699	0.05986	0.05226	0.02828	0.01393
<i>Cumulative Proportion</i>	0.2011	0.3826	0.5088	0.6196	0.7026	0.77868	0.84567	0.90553	0.95779	0.98607	1.00000
	<i>PC12</i>										
<i>Standard deviation</i>	3.962e-15										
<i>Proportion of Variance</i>	0.000e+00										
<i>Cumulative Proportion</i>	1.000e+00										

In order to explain 90% of the variability, the first 8 variables will be selected.

Transfer Multinomial Regression Model

avg_courses_reg_term~ new_first_division + top_third + ever_abroad + time_to_degree + new_division_entry + took_cluster + finished_cluster + num_summers



Anova Tables

- Transfer

Analysis of Deviance Table (Type II tests)

```
Response: avg_courses_reg_term
          LR Chisq Df Pr(>Chisq)
ever_abroad      35.262  2  2.203e-08 ***
quarters_off     1.898  2   0.38722
new_first_division 8.014  2   0.01818 *
took_cluster     1.904  2   0.38597
finished_cluster 2.085  2   0.35260
time_to_degree   172.394  2 < 2.2e-16 ***
ever_withdrew    1.266  2   0.53089
new_division_entry 2.936  2   0.23035
---
Signif. codes:  0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1
```

It turns out that only three variables are statistically significant on average courses work taken for transfer students.

New Model Transfer

avg_courses_reg_term ~ ever_abroad + new_first_division + time_to_degree

Analysis of Deviance Table (Type II tests)

```
Response: avg_courses_reg_term
          LR Chisq Df Pr(>Chisq)
ever_abroad      34.607  2  3.057e-08 ***
new_first_division 17.392  2  0.0001672 ***
time_to_degree   157.793  2 < 2.2e-16 ***
---
Signif. codes:  0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1
```

- Freshman

Analysis of Deviance Table (Type II tests)

Response: avg_courses_reg_term

	<i>LR Chisq</i>	<i>Df</i>	<i>Pr(>Chisq)</i>	
<i>new_first_division</i>	164.185	2	< 2.2e-16	***
<i>top_third</i>	125.430	2	< 2.2e-16	***
<i>ever_abroad</i>	48.031	2	3.717e-11	***
<i>time_to_degree</i>	43.871	2	2.975e-10	***
<i>new_division_entry</i>	12.445	2	0.001984	**
<i>took_cluster</i>	8.684	2	0.013012	*
<i>finished_cluster</i>	2.603	2	0.272162	
<i>num_summers</i>	48.442	2	3.026e-11	***
<hr/>				

*Signif. codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

It turns out that the variable finished_cluster is not statistically significant on .

New Model Transfer

avg_courses_reg_term~ new_first_division + top_third + ever_abroad + time_to_degree + new_division_entry + took_cluster + num_summers

Analysis of Deviance Table (Type II tests)

Response: avg_courses_reg_term

	<i>LR Chisq</i>	<i>Df</i>	<i>Pr(>Chisq)</i>	
<i>new_first_division</i>	164.439	2	< 2.2e-16	***
<i>top_third</i>	124.215	2	< 2.2e-16	***
<i>ever_abroad</i>	48.444	2	3.024e-11	***
<i>time_to_degree</i>	43.509	2	3.565e-10	***
<i>new_division_entry</i>	12.462	2	0.001968	**
<i>took_cluster</i>	59.132	2	1.444e-13	***
<i>num_summers</i>	47.851	2	4.066e-11	***
<hr/>				

*Signif. codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 ' ' 1*

Interpret the odds

● Transfer

- For transfer students, taking “Minimal” courses on regular terms is defined as those who took 1 to 3.4 courses on average per quarter. “Average” is defined as those who took 3.4 to 4 courses on average per quarter, and “Excessive” is defined as those who took on average more than 4 courses per quarter.
- In terms of divisions, there are two groups, mainly divided based on the South and the North. The South includes Life Science, Physical Science, Engineering and Applied Science, and School of Nursing divisions. The North includes Humanities, General, International Institute, Social Science, School of Music, Arts and Architecture, and Theater, Film, and Television divisions.
- Regarding time_to_degree, the transfer students who took less than 6 academic terms are grouped as “Early” and those who took more than 6 academic terms are grouped as “Late”.

	(Intercept)	ever_abroadTRUE	new_first_divisionSouth	time_to_degreeLate
Excessive	0.3202032	0.213417	1.1240420	0.4071264
Minimal	1.5836302	2.829287	0.7869291	1.7407629

- The odds of taking the “Excessive” course work, compared to the “Average” course work, is approximately 80% lower for transfer students those who did study abroad.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is approximately 12% higher for transfer students those who got their degrees as the South campus divisions.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is approximately 60% lower for transfer students those who more than 6 academic terms to graduate.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is 2.83 times higher for transfer students those who participated study abroad program.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 22% lower for transfer students who got their degrees as the South campus divisions.

- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 1.74 times higher for transfer students who took more than 6 academic terms to graduate.

● Freshman

- For freshman students, taking “Minimal” courses on regular terms is defined as those who took less than 3.5 courses on average. “Average” is defined as taking 3.5 to 4 courses on average and “Excessive” is the group that freshman students who took more than 4 courses on average.
- Regarding time_to_degree, the freshman students who took 5 to 12 regular terms are considered as “Early” group and those who took more than 12 regular terms are considered as “Late” group.
- The variable num_summers are separated based on the amount of summer sessions they took. The students who took less than 2 summer sessions are considered as “Average” and those who took more than 2 are considered as “Excessive”.

	<i>(Intercept)</i>	<i>new_first_divisionSouth</i>	<i>top_thirdYes</i>	<i>ever_abroadTRUE</i>	<i>time_to_degreeLate</i>
<i>Excessive</i>	0.5525421	0.7559543	1.8284760	0.7356922	0.7399614
<i>Minimal</i>	2.6558467	0.4029787	0.7479842	1.6372727	1.3878828
	<i>new_division_entrySouth</i>	<i>took_clusterTRUE</i>	<i>num_summersExcessive</i>		
<i>Excessive</i>	0.7141672	0.6486168	1.145921		
<i>Minimal</i>	0.7837075	1.2057847	1.533165		

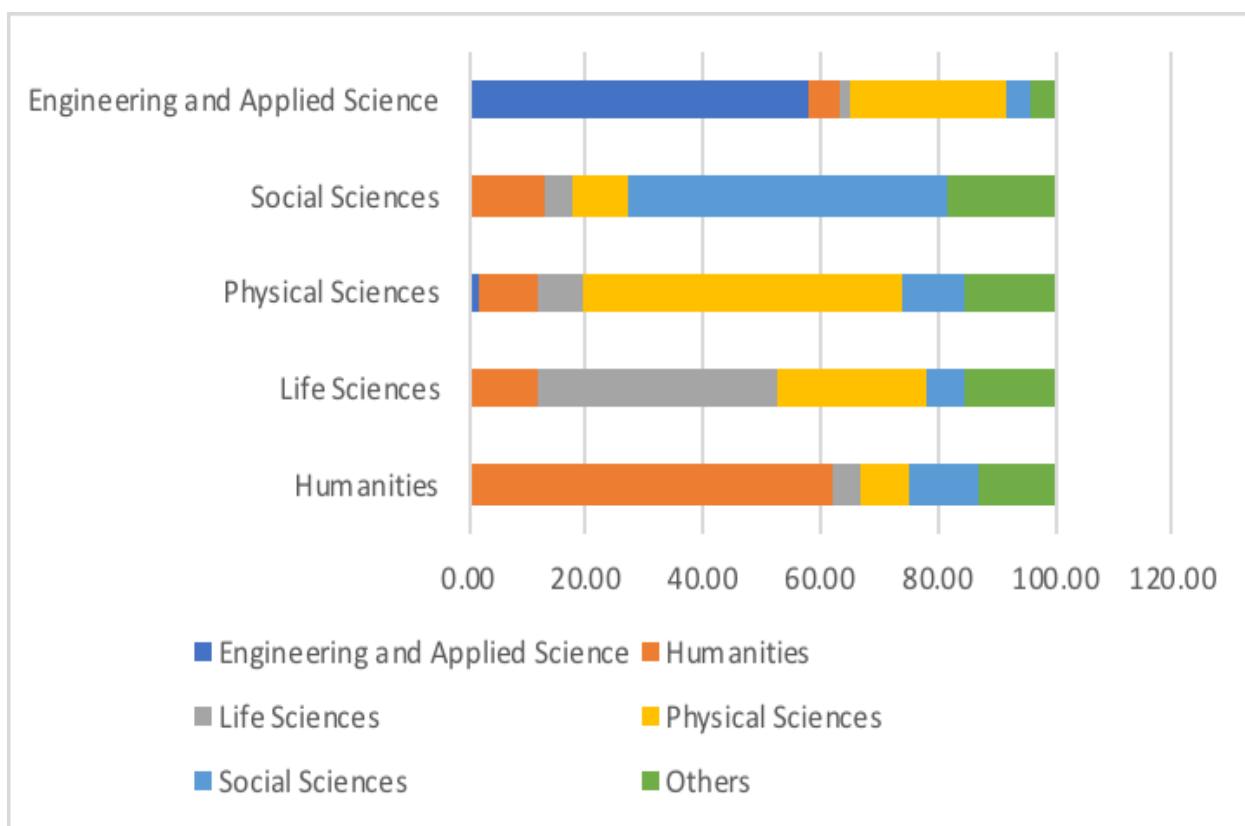
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is approximately 25% lower for freshman students who got their degrees as the South campus divisions.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is 1.82 times higher for freshman students whose GPA fall into the top third group.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is roughly 27% lower for freshman students who participated study abroad program.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is about 27% lower for the freshman students who took more than 12 academic terms in order to graduate.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is roughly 22% lower for the freshman students who got admitted as the South campus divisions.

- The odds of taking the “Excessive” course work, compared to the “Average” course work, is approximately 36% lower for the freshman students those who took cluster courses.
- The odds of taking the “Excessive” course work, compared to the “Average” course work, is about 1.14 times higher for the freshman students those who took more than 2 summer sessions.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is about 60% lower for the freshman students who got their degrees as the South campus divisions.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 26% lower for the freshman students whose GPA fall into the top third group.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is roughly 1.63 times higher for the freshman students who participated in study abroad program.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is roughly 1.39 times higher for the freshman students who took more than 12 academic terms in order to graduate.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 22% lower for the freshman students who got admitted as the South campus divisions.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 1.2 times higher for the freshman students who took cluster courses.
- The odds of taking the “Minimal” course work, compared to the “Average” course work, is approximately 1.53 times higher for the freshman students who took more than 2 summer sessions.

Cluster analysis

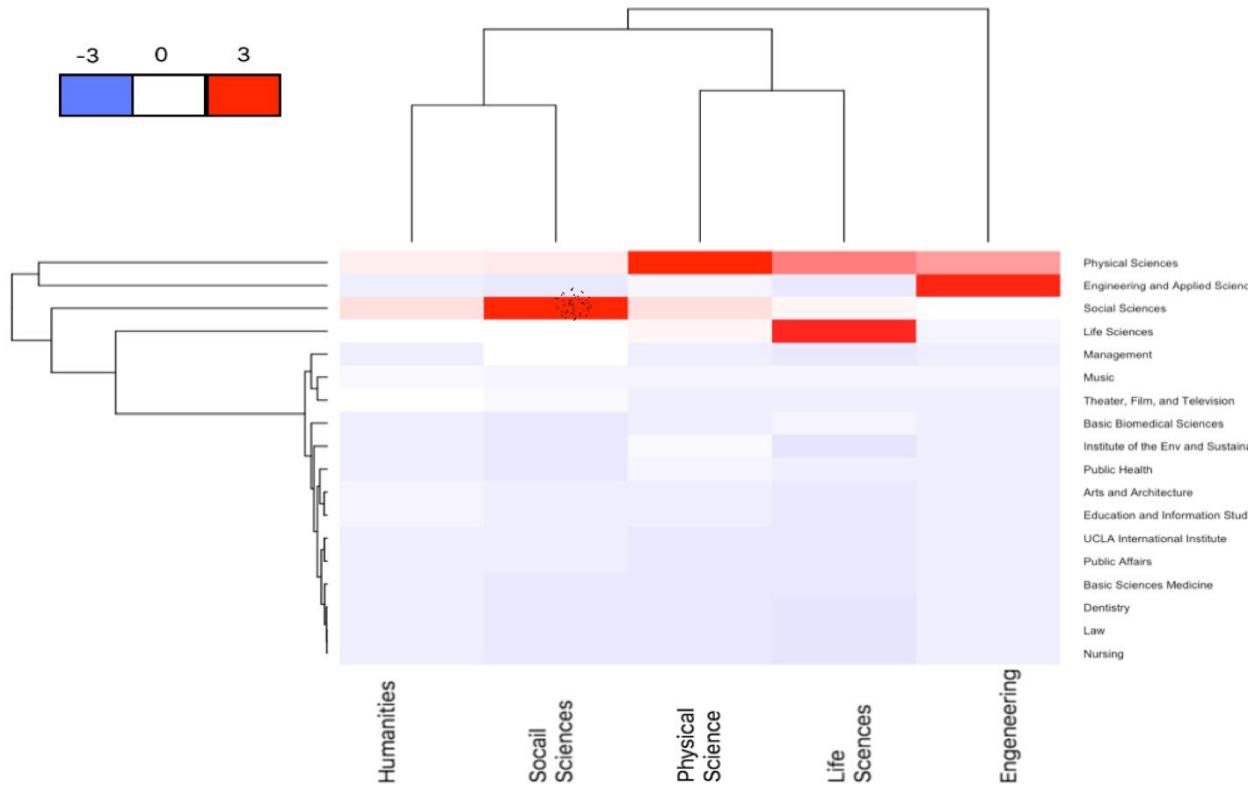
If we want to establish if there are particular patterns of study in disciplines are constant across completers within all schools/divisions versus patterns being unique to completers within particular schools/divisions, we should perform a cluster analysis. First of all, we constructed a matrix for students completers within different schools/divisions and computed frequencies of courses that were taken with in all schools/divisions.

From the figure below, we can see that student completers have different structures of classes taken among all divisions. Students graduated with degree in humanities more likely were taking classes within their division (more than 60%) comparing to other students. Engineering students also mostly were taking their classes within own division, thoses student were less likely studying subjects given in humanities division. However, students in life sciences more likely completed courses among various divisions.



Based on this pattern, we can establish students from what divisions have similar behaviour. For cluster analysis it is very important to standardize data before computing distances between variables. Heat maps allow us to simultaneously visualize clusters of samples and features. In the figure below a color scheme is applied for the visualization and the data matrix is displayed.

Visualizing the data matrix in this way can help to find the variables that appear to be characteristic for each sample cluster.



Students from humanities and social sciences have similar patterns in coursework among divisions, physical sciences and life sciences form another cluster, but students from engineering school have different structure of classes taken - classes in School of Engineering are restricted for students in other divisions - that might be a reason why Engineering school is separated from other divisions.

To visualize the data to assess whether they contains any meaningful clusters and as the data contain more than two variables, we need to reduce the dimensionality in order to plot a scatter plot. This can be done using principal component analysis (PCA) algorithm.

From the figure below it can be seen that the data set contains 3 real clusters. The separation between clusters could be explained on 74% (25.6+49) by two principal component that suggests a good separation between those three classes.

