
ISyE 2028 – Basic Statistical Methods - Fall 2015
 Bonus Project: “Big” Data Analytics
 Final Report

Majors and their study habits

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As an engineering student at Georgia Tech, I am quick to assume that the Liberal Arts and Business majors are doing less work and getting higher GPAs. After doing some research, I found an article on USA Today’s website called “Survey: Engineering seniors log the most study hours”, where author Mary Beth Marklein declares that “based on a spring survey of 416,000 freshmen and seniors at 673 colleges and universities worldwide” engineers study approximately 5 hours per week (on average) more than their business and social science counterparts. Based on my observations here at school, I wanted to prove that at our challenging engineering school requires even more from our students than the average university, and we have greater than five hours difference between the study time means of engineering students and business/liberal arts students.

First, I constructed an online survey, which asked the responder’s major, GPA, and amount of time studying per week. I then divided the responses (omitting some majors such as biology) into engineering and business/liberal arts. The results are shown below:

Major:	GPA:	SUM STUDY:
Engineering:	3.1	20
	3.44	18
	3	23
	3.5	13
	3.03	29
	3.71	13
	3.73	42
	3.53	20
	4	21
	2.6	30
	3.3	7

Major:	GPA:	SUM STUDY:
Business/Liberal Arts:	3.73	18
	4	5
	2.8	24
	3.75	12
	3	10
	3.12	16
	4	21
	3.8	6
	3.31	7
	3.8	6
	3.59	8

Engineering:	3.2	37
	3	25
	3.11	41
	2.9	33
	3.6	10
	3.27	20
	3.66	20
	3	28
	3.15	30
	3.5	34
	3.2	25
	3.87	26
	2.95	13
	3.9	11
	3.05	24
	4	5
	3.5	16
	3.96	20
	3.31	15
	3.64	16
	3.3	30
	3.81	14
	3.74	13
	3.36	15
	4	25
	2.5	32
	3.21	21
	2.56	25
	3.5	25
	3.32	15
	3.55	13
	3.5	35
Averages:	3.373488372	22.04651163

Business/Liberal Arts:	3.8	6
	3.59	8
	3.3	25
	3.8	5
	2.98	10
	4	18
	3.35	10
	3.54	20
	3.22	22
	3.3	10
Averages:	3.494210526	13.31578947

Using the data above, I performed a hypothesis test for two populations. My null hypothesis was that the difference between the mean time studying would be equal to 5 hours (as the survey on the website calculated), and my alternative hypothesis is that the difference in mean time studying would be greater than 5 hours. I used the formulas to solve for inference

difference in means of two normal distributions with unknown and unequal variances (found below).

If $H_0: \mu_1 - \mu_2 = \Delta_0$ is true, the statistic

$$T_0^* = \frac{\bar{X}_1 - \bar{X}_2 - \Delta_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad (10-15)$$

is distributed approximately as t with degrees of freedom given by

$$v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1 - 1} + \frac{(s_2^2/n_2)^2}{n_2 - 1}} \quad (10-16)$$

If v is not an integer, round down to the nearest integer.

Knowing the standard deviation of study times for engineering majors is 8.954789855 while the standard deviation for business/liberal arts majors was 6.831728524, I found the test statistic to be 4.1999 and the degrees of freedom to be 123. Since $t_{\alpha, N}$ (using $\alpha = .05$) = 1.657, the test statistic is greater and therefore we reject the null hypothesis and accept that the difference between the mean study times is greater than 5 hours.

This study shows that here at Tech, engineering students study a significant amount more per week than liberal arts and business students. Since I sent the survey to both genders and all age groups, the data is fairly representative of the population that I was trying to reach. Unfortunately, I mainly was only able to reach the Greek community, so it may be biased in that way, and the data is going to be a little inaccurate since most people could probably not give an exact number of hours they study each week. Also, I was very surprised by the difference in GPAs not being incredibly different. I was suspecting that business majors would have much higher GPAs; however, I was not taking into account if someone had recently switched their major, their year of school, etc. I probably needed to collect more data for that

study to be exactly accurate, since a student's GPA depends on many variables. If I could do this project again for the most accurate data, I would have a large population actually log their hours of studying, and I would also try to reach the non-Greek community to get a more broad population of the students at Georgia Tech.