Stat 21 Spring 2021 Syllabus

Professor: Suzanne Thornton, pronouns she/her or they/them.
You can refer to me as Prof. Suzanne (pronounced "soo-zan" rhymes with "van") or a nickname Prof. Sue, Suz, Suzy or Prof. Thornton.

E-mail: sthornt1@swarthmore.edu
Office Hours: M 7:30 – 8:30 pm EST (If neither of these times work for you please let me know ASAP!)
Th 2:00 – 3:00 pm EST
All students are expected to adhere to OH etiquette outlined here:
http://www.swarthmore.edu/NatSci/sthornt1/Stat021/OH-etiquette.pdf
Live Class Meeting Times: Tu/Th 9:45−11:00am or 11:45am−1:00pm EST

Course Description

Stat 21 is a second course in applied statistics that extends the methods taught in Stat 11. Topics for this semester include chi-squared models and tests, analysis of variance, multiple linear regression, and model building. Both sections of this class are intended to be identical and will be graded together. Note that no prior programming experience is required for this class although we will be using RStudio heavily.

Prerequisites: AP Stat, Stat 11, Stat 61, Econ 31, or Stat 1 with permission of the instructor

Useful Links

- Zoom
  For live class meetings times: https://swarthmore.zoom.us/j/88380280125?pwd=RHlHSjNFelhsdkZMNlNWSmFFOEQ4UT09
  For office hours: https://swarthmore.zoom.us/j/89144856251?pwd=UUhkSnhwZHV0RHRFNVRjSmlmbVZUdz09
  Password for both links: *statsisfun*
- Slack: http://stat021s2021.slack.com/
- Slides: http://www.swarthmore.edu/NatSci/sthornt1/Stat021/Stat21.html
- Course material: https://moodle.swarthmore.edu/ and http://www.swarthmore.edu/NatSci/sthornt1/Stat021/Stat21.html
- Homework/test submission: https://www.gradescope.com/courses/242492 (Entry code: *RW5KJ5*)
- RStudio: http://rstudio.swarthmore.edu/
- Swat VPN: https://kb.swarthmore.edu/display/PS/VPN+and+Off-Campus+Access (this is necessary to log in to the Swarthmore RStudio server)

Required Material

- The textbook is meant to be a supplementary resource in addition to lecture videos, notes, and in-class discussions. It is freely available online through Swarthmore's Tripod Library service. The book is *Introduction to Linear Regression Analysis, 5th Edition* by Montgomery, Peck, and Vining.
- Writing pad and stylus to use to write on Zoom whiteboards during class. (These can be purchased through the school's bookstore.)
- A laptop or computer with reliable internet access.
- A picture of your face only to share with the class in your Zoom and Slack profiles.
- Access to RStudio.

Course Format

The style of this class is similar to what is may be called a "flipped classroom". For our purpose, this means that you are expected to do some preparatory work before class and during class you will be working with your group to solve problems and engage in discussions about the material. At the beginning of each class, I will provide you with an agenda and with questions and assignments to complete with your group. Although class attendance is not mandatory, it is highly encouraged that you attend class, otherwise you will be responsible for practicing the material we cover on your own. Any lecture components from our live class sessions will be recorded but group discussions will not be recorded. If you are attending class live, please try to have your video on as this helps me feel like I'm not talking to myself!

You will be in the same pre-assigned group of no more than seven students for the entire semester. (If you encounter any trouble with your assigned group or have any concerns about who you are grouped with, please let me know *before the first test*.) The primary factor deciding groups is the time zone of the members.

Before the Tuesday class of each week, you are responsible for (1) watching that week's lecture videos, (2) taking that week's comprehension quiz, and (3) submitting any assigned homework to Gradescope.

Grading Policy

Your overall course grade will be determined by the following components.

- A cumulative participation grade worth up to 150 points;
- Nine homework assignments worth up to 20 points each;
- Three tests worth up to 100 points each;
- A final project worth up to 300 points.

Letter grades will be assigned based on the total number of points earned according to the following:

$\geq$ 900	A+
[851, 899]	A
[810, 850]	A-
[800, 809]	B+
[760, 799]	B
[720, 759]	B-
[700, 719]	C+
[650, 699]	C
[630, 649]	C-
[600, 629]	D+
[551, 599]	D
[501, 550]	D-
< 500	F

The instructor reserves the right to adjust which letter grades correspond to the number of points earned at any time throughout the semester. Such changes may include decreasing the lower bound necessary for a particular letter grade but will not include increasing the bounds.

Course Material

You can earn *participation points* by handing in group discussion material, answering questions in Slack, and by completing all of the comprehension quizzes before the final exam. Opportunities to earn more participation points may be presented throughout the semester. Comprehension quizzes are considered complete only if you have a score of 100%. You can re-take these quizzes as many times as you need but each new quiz is only available once you've reached a perfect score on the previous quiz.

Homework will be assigned almost every week. There will typically be 10 problems but only one (randomly chosen) problem will be graded for correctness. The remaining problems will be graded based on completion. The solutions for the homework problems will not be posted. If you have any questions on the homework you are expected to address them either with your group, in class, or during office hours. You are required to complete your homework assignments using R Markdown. R Markdown is a file format for making dynamic documents with R. An R Markdown document is written in markdown (an easy-to-write plain text format) and contains chunks of embedded R code. Once you have access to RStudio, it is easy to write and compile an R Markdown document since this is all built in to the interface. I will provide you with R markdown templates for your homework assignments.

The first and second *tests* will cover specific parts of the class material but the third test will be comprehensive. All tests will be open-book and open-"course material" but you may not use any other resources. You are required to complete your test solutions using R Markdown; again, I will provide you with templates to make writing up your solutions easier. No late tests will be accepted unless (a) there is an urgent, unexpected emergency or illness preventing you from completing the test on time or (b) you have made prior arrangements with me at least 10 days in advance of the day the test is released. I reserve the right to positively adjust test grades but this is not guaranteed to happen. If I do implement such an adjustment, the points added will not be announced until after you have submitted your final exam.

The *final project* will be completed throughout the second half of the semester. This will consist of an academic paper on a statistical topic of interest to you and a recorded presentation. You will be expected to give and receive peer feedback on your project as part of your grade.

Additional Resources

Getting Stats Help

There are several resources available to you if you need assistance in this class. The first resource you have is your *fellow classmates*! You can learn a lot by asking and attempting to answer questions on Slack and/or in study sessions with your assigned group outside of class. The next resource available to you is, of course, my *office hours*. These are times set aside

specifically for you so that I can offer you more individualized feedback on any questions you may have. Please use them!

The department also offers free (virtual) *Stat Clinics*. These are drop-in study sessions run by friendly and knowledgeable upperclassmen. Clinics are an opportunity for you to study, do homework, meet and work with classmates, and ask questions about statistics. Because clinics are drop-in, you are welcome to come and go as you please, but be sure to sign-in when you are there. To make the most of your time at the clinic, be sure to first try problems on your own, or bring questions you have from your text or lecture. You can find this semester's schedule for the Stat Clinics here. There will likely be other students at Clinic with questions for the Clinician, so do not count on getting individual attention the entire time you are at the clinic. Be open to working on other problems, thinking about and trying to work through the question you have for the Clinician, working with classmates, or doing other coursework while you wait to speak with the Clinician. For questions about Stat Clinics please visit the website here or contact Danielle Ledford, the *Academic Support Coordinator* for the Math/Stat Department, at dledfor1@swarthmore.edu. If you find that you are still needing statistics help after utilizing **all** of the resources mentioned above, you can request *tutoring* at no cost here.

Accessibility Accommodations

If you need formal accommodations for a physical or mental disability or a chronic medical condition, please contact Student Disability Services via e-mail at studentdisabilityservices@swarthmore.edu. As appropriate, the office will issue students with documented disabilities or medical conditions a formal accommodations letter. Since accommodations require early planning and are not retroactive, please contact Student Disability Services as soon as possible. For details about the accommodations process, visit the website here. Pictures are a very important part of the course material. *If you are unable to view digital images clearly or at all, please let me know ASAP so I can make arrangements*.

There are freely available mental health resources through Swarthmore that I encourage everyone to look into. It's really difficult to do math with an anxious mind! I have personally experienced the positive impact mental health care has on my own ability to do math and statistics; *there is no shame at all in seeking assistance with this and the rewards are great.* These school resources may still be available to you even if you are not currently residing on campus.

Academic Integrity and Responsibility

By remaining enrolled in this class, you are agreeing to the following pledge:
"I understand that everyone in this class has a different background and life experiences than me. I will respect my classmates' identities and contributions to be a supportive peer in this learning environment. So that the professor can get a realistic sense of what material I understand well and what material I am struggling with, I will not accept any input from other people (via internet or otherwise) on the tests in this class."

Stat 21 Spring 2021 Calendar

Statistical Methods II

Please note this calendar is tentative and subject to change.

Week	Dates	Topics	Due
1	Feb 11	RStudio	
2	Feb 16 and 18	Normal RVs; Student's t-distribution; CLT; Sampling distributions; Inference for means	HW 1
3	Feb 23 and 25	Binomial and Bernoulli RVs; Inference for proportions; Sums of squares; Chi square RVs	HW 2
4	Mar 2 and 4	Chi square procedures; conditional probability	HW 3
5	Mar 9 and 11	ANOVA	Test 1
6	Mar 16 and 18	ANOVA	HW 4
7	Mar 23	ANOVA	
8	Mar 30 and Apr 1	SLR	HW 5
9	Ap 6 and 8	SLR	HW 6, final project prep
10	Apr 13 and 15	MLR	Test 2
11	Apr 20 and 22	MLR	HW 7
12	Apr 27 and 29	MLR	HW 8, final project proposal
13	May 4 and 6	MLR	Final project recorded presentation and paper
May 13-20	May 13	Final Exam Week	Test 3 released
	May 15		Test 3 Due, peer feedback due