Syllabus
STAT7 - Winter 2022

1 General Information

1.1 Course contents and objectives

Case-study-based introduction to statistical methods as practiced in the biological, environmental, and health sciences. Descriptive methods, experimental design, probability, interval estimation, hypothesis testing, one- and two-sample problems, power and sample size calculations, simple correlation and simple linear regression, one-way analysis of variance, categorical data analysis..

1.2 Texbook (required)

Fundamentals of Statistics by Sullivan, 5th Edition. Publisher: Pearson.

1.3 Background

A basic knowledge in College Algebra will be useful but, more importantly, you will be expected to explain yourself in your answers so **good writing habits** will be needed.

1.4 Lectures

Update (January 6th): campus has decide to delay return to in-person teaching to the end of January. Plan to return to in-person on week 5.

As of December 28th, following campus leadership instructions (you can check for updates on the directives at https://slugstrong.ucsc.edu/news-and-updates/) for the first two weeks, lectures, discussion sections and office hours will be delivered via recurring zoom meetings. I am presuming that, if there is not word to the contrary, that turn to in-person teaching on the third week of the quarter.

Lectures will take place on Tuesdays and Thursdays at 5:20pm. We recommend you log in 5 minutes or so beforehand because once the lecture starts it might take a while until you are let in the meeting.

Here's the zoom link to the lecture meetings: https://ucsc.zoom.us/j/98789464625 (we do recommend starting the zoom app in your computer and join the meeting with ID 98789464625 instead of using the link, though). Make sure your zoom username contains your first and last names so that we can take attendance and it also makes it easier to spot zoom "bommbers". You will have to use your UCSC authentication to join and passcode: 007831.

This and other zoom links will be posted in the announcement section of canvas.

We recommend you close all windows in your computer and keep only a window for the zoom meeting and another for course website on canvas. If you have connection issues or other technological needs to be able to attend the lecture, please contact deanofstudents@ucsc.edu.

If the zoom lecture is cut or if we are victims of other interferences in the lecture (zoom "bombing", etc) the plan is for everyone to go to canvas and check for instructions. We will use the announcements on canvas to communicate with you and our intention will always to resume the lecture as soon as possible.

Again, according to instructions from campus leadership, on the third week of the quarter we go back to in-person teaching. Lectures will take place at Oakes Academy room 105.

1.5   Discussion sections

Jacobo Pereira-Pacheco (jpereir3@ucsc.edu), Wednesdays 09:20 am - 10:55 am and 02:40pm - 03:40 pm. Zoom Meeting ID: 920 0145 6369 Passcode: 732769.

Qi Wang (qwang113@ucsc.edu), Tuesdays 08:00 am - 09:35 am and Thursdays 08:00 am - 09:35 am. Zoom meeting ID862 503 5022 Passwd080463.

Seokjun Choi (schoi90@ucsc.edu), Mondays 05:20 pm - 06:55 pm and 07:10 pm - 08:45 pm. Zoom meeting ID: 429 914 1529 password: WGLvQ3.

1.6   Office hours

These times will be very important for your work, both because you have the opportunity to further discuss the ideas first presented in lecture and discuss the homework problems. These hours are also a wonderful opportunity to discuss previous homework problems and find out why you missed some of the points in the grading.

Tentative schedule. Please get in touch with us in case you cannot make any of the times below. Office hours are an important part of the learning process, and we want to make sure that everyone has access to at least one of the office hours sessions per week.

Bruno (mendes@soe.ucsc.edu): Mondays and Wednesdays 7:00-8:00pm. Zoom ID: 524 000 205 and passcode 155152.

TAs: Qi Wang, Tuesdays 8:00 AM - 9:00 AM and Thursdays: 8:00 AM - 9:00 AM. Zoom meeting ID862 503 5022 Passwd080463. Room for in person office hours to be announced.

Jacobo, TBA. Meeting ID: 920 0145 6369 Passcode: 732769. Room for in person office hours to be announced.

Seokjun, Mondays and Wednesdays 11:00 am - 12:00 pm. Zoom meeting ID: 429 914 1529 password: WGLvQ3. Room for in person office hours to be announced.

2   Assignments

2.1   Quizzes

This quarter there will be random quizzes or just taking plain attendance during lectures and discussion sections. If we don't give a specific quiz, then attendance according to the log in the zoom meeting will just earn you 100% in that lecture.

If there is a specific quiz with questions to be answered at all, the questions will be taken mostly from the list of homework problems assigned in previous weeks (so if you bring all your homework with you to lecture these quizzes will be super-easy). Some quizzes will be different from the homework questions, but we will always take into account if a quiz is harder than usual when we grade them. There will also be quiz questions/attendance in discussion sections.

The worst quiz score will be dropped from the calculation of the average quiz scores; this is an automated way to take care of those exceptional situations where you had to miss a lecture or discussion section.

There are no quiz re-takes; these are mostly very easy questions that work as a bonus for students who take the time and effort to attend lecture and section; if you don't attend lecture and/or sections you don't get that bonus (it's really a quid pro quo).

Dropping the worst quiz score is our way to help students who miss a lecture or a section because of illness or any other cause beyond their power to avoid (since these situations are taken care of automatically, at the end of the quarter, there is not need to contact us asking for quiz retakes).

Students who attend 5 MSI sessions or more get to drop the second worst quiz score from the final course score.

Quizzes will account for 10% of the final score for the course.

Any questions regarding quiz scores or their grading should be addressed to your own TA.

We recommend you check your quiz scores on a weekly basis on canvas. We do not have the ability to fix any issues with quiz scores after the last day of instruction of the quarter, so make sure you check and fix all issues on a week by week basis.

After the last day of instruction, all quiz scores will be final.

2.2 Homework

There will be a set of homework problems per week, due every Friday by 5pm that is not a holiday. If there's a holiday that falls on a Friday, the homework will typically be due on the last official day of instruction before that Friday (for example, in Thanksgiving holiday, the homework will be due Wednesday before 5pm). Pay attention to class announcements regarding this kind of exceptions.

Homework will have to be submitted on canvas. Check the announcement on the canvas website on how to upload work on canvas.

We strongly encourage you to work on the problems on your own, these will work very much like small weekly tests; we found that students do very well in the course if they work on these problems and bring their questions to us in office hours.

Pay close attention to how we solve the examples in lecture, because we expect students to go through the same explanations and steps as the ones we use in our examples.

The average of homework scores will account for 10% of your final score.

There are no homework re-dos; we simply do not have the person-power to grade late homework. We choose carefully the number of problems in each week so that the average student should be able to complete most of the work in 3 to 4 days, but we give everyone a full week to complete it.

Some students do have situations beyond their control that might keep them from completing the work for the week; do not worry, we take care of this by automatically dropping the worst homework score when we calculate your final homework score average at the end of the quarter. No need to ask us for extra time of re-take of a homework, your situation will be taken care of automatically at the end of the quarter.

Students who attend 5 MSI sessions or more get to drop the second worst homework score from the final course score.

Any questions regarding homework's scores or their grading should be addressed to your own TA.

We recommend you check your homework scores on a weekly basis. We do not have the ability to fix any issues with these scores after the last day of instruction of the quarter.

After the last day of instruction, all homework scores (except the last one which will be due right after the last lecture) will be final.

Homework is fundamental to help you learn all the concepts. Do not copy homework from other people. It's better to turn in incomplete but genuine work.

2.3 Midterm

This test is mostly a "reality-check" test; i.e. we/you use it to confirm whether you are understanding the concepts correctly; it will have a similar structure to what you will find later in the final exam

(although the final exam will cover more sophisticated problems).

Update. The midterm is an in-class test and it will take place on February 8th, in class.

The exam's score will contribute 30% to the final grade.

You are allowed only the following in the test: a simple calculator (it should only be able to do addition, subtraction, multiplication, division and square root), a pencil and an eraser. Please take this request seriously, because if you bring your TI calculator (for example) to the test, we will have to ask you to put it away.

The final will include problems of the same type as the ones in the midterm (*i.e.* the final will include all what was taught in the quarter), so make sure you learn as much as possible from the test once you get it back. We will be glad to go over the test with you during office hours.

2.4 Final exam

This is the most important item in your final grade, it will cover everything that was taught during the quarter. There is a minimum grade requirement, and contrary to all the other scores in this class, there is no possibility of curving to be applied to the scores.

The final will take place Wednesday, March 16 from 7:30 to 9:00 p.m. at the same room as the lecture: Oakes Academy room 105.

Double check day and time of test at `https://registrar.ucsc.edu/soc/final-examinations.html`.

This will be an in-class test. During this test you will only be allowed the same simple calculator described in the midterm test section above, a pencil and an eraser. **Notes are not allowed in the final exam**.

Once again, you should be prepared to stay in the room for the duration of the exam.

The exam's score will account for 50% of the final grade. Since the final exam is the only chance we have of testing you (individually) on your knowledge of the full content of the course, we require a minimum of 60% in the final exam in order to pass the class (regardless of your total final average score). You will see that this is not such a big hindrance to getting a good grade if you have worked a lot with us during the quarter.

The final exam is the last work you do for the class; we have no ability to give extra credit work for any student after the final exam.

We love helping students who are committed to the course and work hard so if you think you might need help, don't wait until after the final exam to ask for help; come over and work with us during the quarter.

3 Passing this course and letter grade

The final score is calculated with the following formula: 0.1*(average quiz scores) + 0.1*(average of homework scores) + 0.8(average of essay scores).

Your letter grade for the class is based on your total score as calculated using the formula above.

A+ : 97.5% and above

A : 94.5% to 97.49%

A- : 89.5% to 94.49%

B+ : 79.5% to 89.49%

B : 74.5% to 79.49%

B- : 69.5% to 74.49%

C : 60% to 69.49%

D : 50% to 60%

F : 50% and below or if student cheats.

Here are the rules regarding the grade of incomplete:

`http://registrar.ucsc.edu/navigator/section4/performance/incomplete%20.html`.

A student only qualifies for an incomplete if he or she cannot complete the coursework for reasons beyond their control (these only include very, very serious and confirmable situations) and their work, up until the time they have to stop working, has been of passing quality.

4 Students with disabilities

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, as soon as possible in the academic quarter, preferably within 1 week of the quarter beginning. I also am open to and want to encourage you to discuss with me ways I/we can ensure your full participation in this course. If you have not already done so, I encourage you to learn more about the many services offered by the DRC. You can visit their website (`http://drc.ucsc.edu/`), make an appointment, and meet in-person with a DRC staff member. The phone number is 831-459-2089 or email drc@ucsc.edu.

5 Anxiety and related issues

If any of you feels a bit overwhelmed (in any way) during the quarter, please be assured that there is someone you can talk to. Our campus has wonderful (free) services available to you. Check, for instance our Counseling and Psychological services at (`http://caps.ucsc.edu/`).

5.1 Academic misconduct

You are expected to do your own homework problems and not copy it from other students or other sources. The same applies to essays where we will be using software to detect plagiarism.

Notice that the grading will be very generous, so cheating will give you very little extra points at the possible expense of a fail. I don't think it is an intelligent thing to do.

Not complying with these rules will initiate a very unpleasant procedure for both the students and us, so please don't let yourself get to the point where illegal collaboration becomes an option. Start working from the first day of class and stay engaged with us in sections, office hours and tutoring sessions (if they are available). Arrange specific times and days of the week where you work exclusively on Stats. All of this will help you stay in control of how the course develops and very likely result in a grade that you will feel proud of.

Cheating will not be tolerated under any circumstances. Any student caught cheating will be reported for academic misconduct (`https://www.ue.ucsc.edu/academic_misconduct`) to their college provost. The academic penalty is always an automatic fail.

Cheating includes, but is not limited to: opying a fellow student's work during exam conditions (quiz, homework, tests or essays). Copying from internet sources, or any other source that it is your own genuine effort.

Notice that when one student copies the work of another, campus rules on academic miscconduct considers both parties culpable and both students are treated as having violated the code of conduct (`http://deanofstudents.ucsc.edu/student-conduct/`) of UCSC students.

6   Tentative course schedule

Here's a rough outline of what we plan to cover on each lecture (with a reference to the part of the book were the material is covered).

This schedule is tentative because, many times, we have to slow down to help students when we are going over more complex ideas, other times we might go faster because students do better than expected in a particular section of the material.

For Winter 2022 quarter, I expect the lectures to go slower than usual because the online format affects very much the way we interact during teaching.

Week 1

Jan 4

Introduction to STAT7.

1.1. Introduction.

Jan 6

1.2. Observational studies vs designed experiments.

1.3. Simple random sampling.

1.4. Other sampling methods. (reading assignment)

1.5. Bias in sampling.

1.6. The design of experiments (reading assignment).

2.1. Qualitative data.

2.2. Quantitative data.

2.3. Misrepresentation of data (reading assignment).

Week 2

Jan 11

3.1. Measures of central tendency.

3.2. Measures of dispersion.

3.3. Measures for grouped data (reading assignment).

3.4. Measures of position and outliers.

Jan 13

3.5. Boxplots.

4.1. Correlation.

Week 3

Jan 18

4.2. Regression.

4.3. The coefficient of determination.

Jan 20

4.4. Contingency tables.

5.1. Probability rules.

Week 4

Jan 25

5.2. Addition rule and complements.

5.3. Independence and the multiplication rule.

Jan 27

    5.4. Conditional probability.

    5.6. Which method do I use? (reading assigment)

    7.1. Normal distribution.

Week 5

Feb 1

    7.2. Applications of the normal distribution.

    7.3. Assessing normality.

Feb 4

    8.1. Distribution of the sample mean.

    8.2. Distribution of the sample proportion.

    9.1. Estimating a population proportion.

Week 6

Feb 8

Midterm.

Feb 10

    9.2. Estimating a population mean.

    9.3. Putting it together (reading assignment).

Week 7

Feb 15

    10.1. The language of hypothesis testing.

    10.2. Hypothesis tests for proportions.

Feb 17

    10.3. Hypothesis tests for means.

    10.4. Putting it together (reading assignment).

Week 8

Feb 22

    11.1. Inference about two proportions.

    11.3. Inference about two means: independent samples.

Feb 24

    11.2 Inference about two means: dependent samples.

    11.4. Putting it together (reading assignment).

Week 9

Mar 1

    12.1. Goodness-of-fit test.

Mar 3

    12.2. Tests for independence and homogeneity of proportions.

Week 10

Mar 8

    B.6. One-way -Analysis of Variance (ANOVA).

Mar 10

    B.6. One-way -Analysis of Variance (ANOVA)(cont)