CSSS/SOC/STAT 221 A: Statistical Concepts and Methods for the Social Sciences

Autumn 2021

MEETING DAYS, TIMES, AND LOCATIONS

- UW Autumn 2021 quarter dates of instruction: Wednesday 29 September - Friday 10 December
- Finals Week: 11-17 December 2021
- University holidays (no lecture, quiz section meetings, or office hours):
  - Thursday 11 November 2021 - Veterans Day
  - Thursday - Friday 25-26 November 2021 - Thanksgiving break
- Lectures: Mondays, Wednesdays, and Fridays 11:30 am -12:20 pm

Locations

MWF Lecture Meetings: Bagley Hall 131

Quiz sections

- AA and AE (8:30-9:20 am)
  - in person: Thomson Hall 334 (Matthew Toro)
  - online: Zoom (click here) (Sauharda Rai)
- AB and AF (9:30-10:20 am)
  - in person: Thomson Hall 235 (Matthew Toro)
  - online: Zoom (click here) (Sauharda Rai)
- AC and AG (8:30-9:20 am)
  - in person: Thomson Hall 235 (Erin Lipman)
  - online: Zoom (click here) (Jess Phillips)
- AD and AH (9:30-10:20 am)
  - in person: Thomson Hall 335 (Erin Lipman)
  - online: Zoom (click here) (Jess Phillips)

All lectures will be recorded using Panopto. These recordings will be made available shortly after they have been recorded. While I encourage students to attend lecture meetings in real time, I understand that many members of the UW community continue to be concerned with maintaining social distance during the COVID-19 pandemic. Consequently, those who would prefer to watch lecture recordings are allowed to do so.
TEACHING TEAM

Instructor: William A. Brown, PhD (preferred name: Will or Dr. Brown)

- Pronouns: he/him/his
- Email: brownw@uw.edu
- Office hours: Tuesdays and Thursdays 3:30-4:30 pm, or by appointment
- Office hour link: Zoom (see Zoom link for access)

TA: Matthew Eissa Toro (preferred name: Matthew or Mr. Toro)

- Pronouns: he/him/his
- Email: mtoro@uw.edu
- Office hours:
  - Monday 1:30-2:30 pm
  - Thursday 1:30-2:30 pm
- Office hour location: Savery 250

TA: Sauharda Rai (preferred name: Sauharda)

- Pronouns: he/him/his
- Email: sauharda@uw.edu
- Office hours:
  - Monday 10:30-11:30 am, or by appointment
- Office hour location: Zoom (see Zoom link for access)

TA: Erin Lipman (preferred name: Erin)

- Pronouns: she/her/hers
- Email: erlipman@uw.edu
- Office hours:
  - Tuesday 4:00-5:00 pm
  - Thursday 10:30-11:30 am
- Office hour location: Statistics Tutoring Center (Communications B023)

TA: Jessica E. Phillips (preferred name: Jess)

- Pronouns: she/her/hers
- Email: jephill@uw.edu
- Office hours:
  - Monday 2:30-3:30 pm
  - Tuesday 2:30-3:30 pm
- Office hour location: Zoom (see Zoom tab for access)
COURSE OVERVIEW

Course description

The goal of this course is to develop statistical literacy—the ability to comprehend and critically evaluate the results of statistical data analysis—especially in social science publications. As a discipline, statistics focuses on describing and modeling variability in our world. It includes a wide assortment of theories and methods for summarizing variability in all kinds of data, as well as exploring relationships that exist between variables, for example:

- crime rates by neighborhood, city, or state;
- incidence and prevalence of different diseases between different communities;
- age at first consumption of alcohol;
- life expectancy and fertility rates by county, state, or country;
- differences in the age, sex, gender, and ethnic composition of different communities or populations;
- variability in unemployment rates over time;
- number of motorists on the roadway at different hours of the day;
- birth rates by date and day of the week;
- differences in educational outcomes based on access to different resources, class size, or attendance at different schools;
- different carbon emission levels by country relative to population size or GDP.

As voters and members of multiple communities, organizations, and institutions, we make decisions with important consequences based on our understanding of information like these, so it is important that we understand the objectives, built-in assumptions, results, and limitations of statistical methods used by social scientists to collect and thoughtfully explore such data. It is also also important to understand the pitfalls that arise when these methods have been applied incorrectly. This course will prepare you to be a more critical consumer of the statistical analyses that you might encounter in popular media as well as in professional and academic publications. While you will learn a bit about how to apply statistical methods, the emphasis will be on cultivating your understanding of the logic underlying these methods, the "why" rather than the "how."

Course objectives

By the end of this course, you should be able to

- Distinguish between nominal, ordinal, and numerical variables;
- Distinguish between sample statistics and population parameters;
- Identify the strengths and limitations of different strategies that researchers use to collect data, as well as how these relate to research questions and goals;
- Evaluate the ability of different statistics to summarize different kinds of data, both numerically and graphically;
Use the rules of probability theory to explore relationships between variables in different ways;
Identify parametric probability distributions that we can use as models of different patterns of variability;
Understand how statisticians use sampling distributions to calculate interval estimates of or perform statistical hypothesis tests about unknown population parameters;
Understand the results of regression analyses exploring relationships between two numerical variables.

ACADEMIC CONDUCT

Collaborative learning and diversity statement

Acquiring new knowledge in a structured social setting is a very different experience from independent, self-guided learning. Interacting with your teaching team and with your peers presents a unique opportunity for knowledge acquisition, but to enjoy the full rewards of collaborative learning and the free exchange of ideas, mutual respect is indispensable between all parties involved. Your teaching team is committed to encouraging and valuing diverse student perspectives, showing every student our utmost respect, and investing ourselves in cultivating your mastery of the course content. We also expect that you will show each other and the teaching team a similarly high and sustained level of respect. We understand that diversity is integral to academic excellence and strive to create welcoming and respectful learning environments, promoting equal access and opportunity for everyone enrolled in the course. Actions on the part of students that contradict these goals are expressly in violation of the University of Washington’s Student Conduct Code and are not tolerated. As a condition of enrollment, all students assume responsibility to observe high standards of conduct that will contribute to their own and their peers’ academic goals, as well as to the welfare of the academic community more generally. For more information on this and other policies related to diversity, please visit the following website: http://www.washington.edu/diversity/

Academic integrity statement

Collaborative study is not only accepted but encouraged, if you find cooperation beneficial to your learning. However, for submitted course assignments (problem sets), one unique submission per student is required, written in your own words. If you have worked on submitted assignments with other students in the class, be sure to note this collaboration on your work, including your collaborators’ names. You cannot collaborate in any way with your peers or anyone else while completing the reading quizzes and exams. All submitted coursework should adhere to the University of Washington’s Student Conduct Code. Plagiarism is not tolerated. Plagiarism includes but is not limited to copying phrases, sentences, or paragraphs without proper citation; paraphrasing another person’s ideas or words without attribution; etc. Sharing answers to questions on quizzes and exams with your peers is also not tolerated. Academic
misconduct of any kind is grounds for failure in the class and removal from the University of Washington. Lack of familiarity with the rules of academic conduct does not excuse misconduct. For more information please visit the following websites:


EQUAL ACCESS, ACCOMMODATIONS, AND OTHER USEFUL RESOURCES

All lectures will be recorded via Panopto. Attending lectures in real time allows students to ask questions of the instructor. If you are not able to attend, you are still expected to watch the recorded lecture once it becomes available via Panopto on the course website, available approximately 10-15 minutes after each lecture has concluded.

In the case of unexpected family, health, or other emergencies that interfere with your ability to complete assigned coursework on time, notification of absence at your earliest convenience is expected. Documentation to validate your absence may be requested by your instructor.

For students who have established accommodations with Disability Resources for Students (DRS, http://depts.washington.edu/uwdrs/), please communicate your approved accommodations to your instructor (William Brown) at your earliest convenience so we can discuss your needs in this course. For students who have not yet established accommodations through DRS but have a temporary health condition or permanent disability that requires accommodations, you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability@uw.edu. Such conditions include but are not limited to mental health, attention-related, learning, vision, hearing, physical or health impacts. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s), and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW’s policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).

For facts and resources about the COVID-19 pandemic, see the University of Washington's page here: https://www.washington.edu/coronavirus/
For resources and points of contact to promote a safer UW community, see https://www.washington.edu/safecampus/

REQUIRED MATERIALS


Note: you are strongly encouraged to read the chapter assigned for every lecture unit before that unit has begun. We will focus on the readings. You might find the exercises at the end of every section and chapter useful, but these will not be used for assigned coursework.

A simple calculator capable of addition, subtract, multiplication, division, squaring, and taking square roots. (Graphing calculators and calculator apps on electronic devices with access to the internet such as smartphones, laptops, and tablets do not qualify as "simple calculators.")

ASSIGNMENTS AND ASSESSMENT (GRADING)

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<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tr>
<td>Eight reading quizzes</td>
<td>12.5%</td>
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<tr>
<td>Five participation reports</td>
<td>12.5%</td>
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<td>Six problem sets</td>
<td>50%</td>
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<tr>
<td>Two non-cumulative exams</td>
<td>25%</td>
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Reading quizzes (QZ1 through QZ8): The reading quizzes are intended to motivate students to keep up on assigned reading, as well as to evaluate your comprehension of the material presented in the textbook. Quizzes will be 5 questions long, completed online. All quizzes will be open-book, but do not collaborate with any of your classmates to complete them.

Participation reports (PR1 through PR5): The five participation reports will require you to reflect on what you learn during some in-class discussion exercises. These will consist of brief, relatively low-stakes summaries of these exercises, focusing on the take-home points of each exercise.

Problem sets (PS1 through PS6): There will be six problem sets throughout the quarter. These are intended to give you an opportunity to practice the statistical concepts and methods you learn about in your reading, lectures, and quiz sections. The problems sets will be assigned and submitted electronically. Some of these assignments will involve doing simple calculations, so you are encouraged to show your work, e.g. as scanned pdf documents or high-quality
photographs. The first assignment will be participation in an anonymous online survey, to generate data that we can use throughout the quarter.

**Exams (EX1 through EX2):** Two non-cumulative exams will be given throughout the quarter, the first covering Chapters 1-4 of the textbook, the second covering Chapters 5-8. These are high-stakes assessments, intended to evaluate your acquisition of knowledge about statistical concepts and methods covered in lecture, readings, and quiz section exercises.

**Late work policy:** Due dates for all graded assignments are clearly posted on the course website, so there are few good reasons not to submit them on time. As a matter of fairness to your fellow students and to the graders, late work will be accepted but reduced by 25% of the original assignment point value for each full or partial day beyond the due date that the assignment is submitted. Exceptions to this policy may be considered in the case of documented emergencies or other extenuating circumstances, but you must communicate with your instructor (Will Brown) if you believe such exceptions are warranted.

**Percent grade to grade point translation:** The table below identifies the grade points corresponding with every tenth percent grade. Your grades will be posted to the grade book on the course website.

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<thead>
<tr>
<th>Percentage</th>
<th>Grade point</th>
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<tbody>
<tr>
<td>10%</td>
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<tr>
<td>20%</td>
<td>0.8</td>
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<tr>
<td>30%</td>
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<tr>
<td>40%</td>
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<tr>
<td>80%</td>
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<tr>
<td>90%</td>
<td>3.6</td>
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<tr>
<td>&gt;98%</td>
<td>4.0</td>
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**EMAIL POLICY**

When you contact any member of the teaching team by email, please present yourself in a professional manner. **Be sure to do the following:**

- You are strongly encouraged to use your UW email accounts rather than personal email accounts when emailing the teaching team. Alternatively, you are strongly encouraged to use the Canvas email function.
- Address your instructor or TA by their preferred names and titles.
- Include a subject with "CSSS 221", "SOC 221", or "STAT 221" somewhere in the title.
• Be sure to write a clear email, identifying the questions or topics for which you wish a response.
• If your question cannot be easily answered in a short email, consider meeting us during our office hours instead or requesting a one-on-one appointment.
• Don't forget to sign off with your name as you would prefer to be addressed.
• Be sure to acknowledge our response if appropriate, for example by responding to any follow-up questions we may have for you.
• Please allow up to 48 hours for a response.
• If you disagree with the interpretation of any scored assignment, please submit a request for a re-evaluation to your instructor (Will Brown) via email. You must submit this request **within one week of receiving the grade** and include a written explanation of your case. Note that not all re-evaluations will result in a changed grade or may even result in a reduced grade if (and only if) further problems are identified upon review, but I will respond to your request in either case.
• The teaching team will not accept any graded coursework submitted via email.

**COURSE SCHEDULE**

**Week 1**

Wednesday 29 Sept: Course overview

Thursday 30 Sept: **NO QUIZ SECTIONS**

Friday 1 Oct: Introduction to data and variables

**Week 2**

Monday 4 Oct: Continuing discussion of variables; research problems, questions, and data collection

Tuesday 5 Oct: An overview of big concepts in statistics

Wednesday 6 Oct: Resources for UW statistics and social science students; the research process and data collection (continued); different kinds of relationships between variables; **Reading Quiz 1 due**

Thursday 7 Oct: Research ethics in the social sciences

Friday 8 Oct: Chapter 1, conclusion; Chapter 2
Week 3

Monday 11 Oct: Chapter 2

Tuesday 12 Oct: WEIRD samples, convenience, and over-generalization in the social sciences

Wednesday 13 Oct: Chapter 2; Problem Set 1 due; Reading Quiz 2 due

Thursday 14 Oct: Drug epidemiology from the perspective of municipal wastewater

Friday 15 Oct: Chapter 2

Week 4

Monday 18 Oct: Chapter 3

Tuesday 19 Oct: Cleaning and summarizing data

Wednesday 20 Oct: Chapter 3; Participation Report 1 due; Reading Quiz 3 due

Thursday 21 Oct: Probability experiments with dice; Participation Report 2 completed as a part of the quiz section exercise

Friday 22 Oct: Chapter 3

Week 5

Monday 25 Oct: Chapter 3, concluded; Chapter 4

Tuesday 26 Oct: Thinking about false-positive and false-negative clinical tests; Problem Set 2 due [REVISED DATE]

Wednesday 27 Oct: Chapter 4; Reading Quiz 4 due

Thursday 28 Oct: NO QUIZ SECTIONS

Friday 29 Oct: Chapter 4; Participation Report 3 due

Week 6
Monday 1 Nov: Chapter 4

Tuesday 2 Nov: Exam study session; **Problem Set 3 due [REVISED DATE]**

Wednesday 3 Nov: **Midterm exam**

Thursday 4 Nov: Building intuitions about sampling distributions

Friday 5 Nov: Chapter 5

**Week 7**

Monday 8 Nov: Chapter 5

Tuesday 9 Nov: Confidence intervals for one proportion

Wednesday 10 Nov: Chapter 5; **Reading Quiz 5 due**

Thursday 11 Nov: Veterans Day; no class

Friday 12 Nov: Chapter 5, concluded; Chapter 6

**Week 8**

Monday 15 Nov: Chapter 6

Tuesday 16 Nov: Hypothesis tests for one proportion

Wednesday 17 Nov: Chapter 6; **Reading Quiz 6 due**

Thursday 18 Nov: Hypothesis tests comparing proportions between two groups/levels

Friday 19 Nov: Chapter 6

**Week 9**

Monday 22 Nov: Chapter 7

Tuesday 23 Nov: Hypothesis tests comparing proportions between multiple groups/levels
Wednesday 24 Nov: Chapter 7; Reading Quiz 7 due

Thursday 25 Nov: No class; Thanksgiving holiday weekend

Friday 26 Nov: No class; Thanksgiving holiday weekend

**Week 10**

Monday 29 Nov: Chapter 7

Tuesday 30 Nov: Hypothesis tests for one mean; Participation Report 4 due

Wednesday 1 Dec: Chapter 7, concluded; Chapter 8

Thursday 2 Dec: Hypothesis tests comparing means between two groups/levels; Problem Set 4 due

Friday 3 Dec: Chapter 8; Reading Quiz 8 due

**Week 11**

Monday 6 Dec: Chapter 8; Participation Report 5 due

Tuesday 7 Dec: linear regression using historical Swiss fertility and mortality data

Wednesday 8 Dec: Chapter 8; Problem Set 5 due

Thursday 9 Dec: Exam study session

Friday 10 Dec: A preview of Chapter 9

**Finals week**

Monday 13 Dec: (No class); Problem Set 6 due

Wed 15 Dec: Final exam