# Sociology 3811/5811
# Basic/Intermediate Social Statistics
# Fall 2020

*WHEN/WHERE*   (1) Use this Zoom link  to join class Tuesdays/Thursdays 9:45am to 11:00am
(2) For lecture materials, assignments, and many other resources see www.rob-warren.com/3811
(3) Turn in assignments and view scores and grades on Canvas

*INSTRUCTOR*   **Rob Warren** (he/him/his) | warre046@umn.edu
Office Hours: Tuesdays 11:00am-12:00pm and Fridays 1:30pm-2:30pm — Use this Zoom link
(If these two drop-in times do not work for you, please email me to arrange a time to meet.)

*TA's*   **De Andre Beadle** (he/him/his) | beadl030@umn.edu
Section 2 (Tue @ 12:20pm) — use this Zoom link for lab
Section 5 (Wed @ 10:10am) use this Zoom link for lab
Office Hours: Mondays 9:00am-12:00pm or by appointment — Use this Zoom link
**Corey Culver** (he/him/his) | culve051@umn.edu
Section 3 (Tue @ 2:30pm) — use this Zoom link for lab
Section 7 (Wed @ 2:30pm) — use this Zoom link for lab
Office Hours: Tuesdays and Wednesday 1:00pm-2:00pm or by appointment — Use this Zoom link
**Jingkai Huang** (he/him/his) | huan1946@umn.edu
Section 4 (Wed @ 8:00am) — use this Zoom link for lab
Section 6 (Wed @ 12:20pm) — use this Zoom link for lab
Office Hours: Fridays 9:00am-12:00pm or by appointment — Use this Zoom link
**Neeraj Rajasekar** (he/him/his) | rajas011@umn.edu
Section 8 (Wed @ 4:15pm) — use this Zoom link for lab
Section 9 (Thu @ 8:00am) — use this Zoom link for lab
Office Hours: Mondays 1:30pm-3:30pm or by appointment — Use this Zoom link

## HOW WILL THIS COURSE WORK?

**Lectures**
1. Watch video lectures before the scheduled class time (9:45am Tuesdays and Thursdays); links to them will be posted on the course web site.
2. Participate in exercises and small group activities during class time via Zoom. Recordings of these sessions will be posted afterward on the course web site if you cannot attend live.
3. Complete a lecture worksheet after each synchronous class session. Worksheets will be available on the course web site, and should be turned in by noon Friday each week via Canvas.

**Lab**
1. Participate in your lab synchronously via Zoom. See above for the link corresponding to your lab section. Recordings will be posted afterward on the course web site.

**Assignments**
1. Get exams and assignments from the course web page.
2. Turn them in via Canvas.

# WHAT IS THE COURSE ABOUT?

Sociology 3811/5811 is designed to familiarize you with the basic concepts and techniques of statistics. Because this is a sociology course, most of the examples and demonstrations will be drawn from the social sciences; however, the concepts and techniques presented in the course apply much more broadly to other disciplines and to other areas of life. In 3811, you are not expected to become an expert statistician, but you are expected to gain an understanding of how statistics can be used to answer social science and other kinds of questions. Most importantly, you will become a knowledgeable and critical consumer of statistical information that appears in the media, in business, in politics, and elsewhere. In 5811, you are also expected to move closer to being a professional who produces, critiques, reads, and/or engages with statistical analyses. In both 3811 and 5811, you will gain basic familiarity with a statistical software package (called Stata).

**If you are afraid of math—or think you are bad at it—please relax!** Although there are elegant and complex mathematics behind most of the concepts we will cover, you can succeed in this class and learn a great deal if you are able to do basic algebra. If you need a refresher on basic algebra, the course web site has resources for you.

SOC 3811 meets the University of Minnesota's Council on Liberal Education requirements for the Mathematical Thinking core. We explore the dual nature of social statistics as a body of knowledge with its own logic and way of thinking and as a powerful tool for understanding and describing social reality. The course covers a wide range of statistical concepts from univariate distributions to bivariate relationships to probability theory to hypothesis testing to multivariate relationships. Each concept is founded on core mathematical bodies of knowledge. In the course, you are exposed to the mathematic knowledge that underlies each concept, but you are also shown how each concept applies to real world issues and debates. You are asked to demonstrate your mastery of the mathematical concept and its practical application in a variety of contexts (including in-class exercises, problem sets, and exam questions). For instance, you are taught the mathematical foundations of probability and sampling theory; you are taught about sampling distributions; and you are shown the real-world implications of these ideas for how social science knowledge is gained through surveys of randomly sampled observations.

The College of Liberal Arts' ten Core Career Competencies represent the essence of a liberal arts education and create the foundation for a productive and successful future in today's dynamic world. The Core Career Competencies that this course will help you develop are: "Analytical & Critical Thinking," "Applied Problem Solving," "Digital Literacy," and "Oral & Written Communication." These competencies are embedded into the problem sets and the assignments that require you to use the statistical software Stata.

# A FLIPPED CLASSROOM: PHILOSOPHY AND STRUCTURE

**Purpose of Lectures**

In a traditionally structured statistics course, I would lecture during class time; you would listen, take notes, and maybe ask questions; and then I would test your comprehension of what I said in my lectures by requiring you to complete problem sets and answer exam questions. In my course, the classroom is "flipped." My lectures are video recorded and posted on the class website ahead of time, and you can view them any time you want—as long as you do so before the scheduled class time. Then, during the scheduled class time, we will do more engaging (and hopefully more interesting) interactive activities and exercises that apply the concepts I introduced in the video lecture. *To make sure you come to class having viewed the video lecture for that day, I will track viewership*.

You will learn MUCH more if you attend class synchronously and engage in the activities and exercises. However, the synchronous class sessions will also be recorded; after each synchronous class session I will post the recorded class session to the course website. This means that it is possible to do the lecture portion of this course entirely asynchronously: You could watch the video lectures ahead of class time, and then watch the recording of in-class activities after the class session ends. To ensure that you either attend the class session synchronously or watch videos of them afterward, I will ask you to turn in worksheets for each lecture by Friday at noon every week.

The philosophy behind pre-recording my lectures is to allow you to watch the lectures the way that works best for you. If you have already mastered the material, you can watch once and be done. On the other hand, if you find the material to be more challenging, you can watch and it at your own speed and re-watch portions of the lecture as needed. The philosophy behind using scheduled class time to engage in activities and exercises instead of lecturing is to spend our time together in interactive exercises that should help you better and more deeply comprehend the concepts we will cover. However, we all need as many people as possible to attend class synchronously; otherwise, we cannot do the exercises or learn from one another.

**Purpose of STATA and Labs**

In lectures, you will learn to compute all statistics by hand. However, in real-life settings you will find that scientists, journalists, businesspeople, political operatives, and others use computers to analyze data and produce statistics. So, while you will better understand statistics by computing them by hand, in this course you will also get practical experience—and marketable skills—using the software Stata to analyze data.

Your lab section has two primary goals. The first is to teach you the skills you need to use Stata to perform statistical analyses. The second is to give you another opportunity to ask questions about course material—in this case, of your teaching assistant. You will also get a chance to review for exams. All labs will be conducted synchronously, on the days and at the times for which they are scheduled. However, the lab sections will be recorded and posted to the course website so that you may review them later.

**Purpose of Problem Sets and Exams**

I very much want you to learn the material I will cover in this course. I have found that most people learn statistics by doing—by performing statistical analyses (either by hand or using computers)—rather than by just listening. Thus, the goal of the problem sets in this course is to give you a chance to show me that you are making a serious effort to learn the material. As you will see below, the grading criteria for problem sets rewards effort as much as accuracy.

In the end, I need to assess whether you have learned what I have taught you. My exams are designed to do that. Please know, however, that I have no interest in testing your ability to memorize or to work under pressure. For this reason, you will have access to all course materials as you take my exams. And, you will have more than a reasonable amount of time to complete your exams. I care about whether you have learned the concepts I am trying to teach you, not about whether you can memorize formulas or work under pressure.

# GRADING AND EVALUATION

## 1. Syllabus Comprehension (Total of 30 points)

By 9:45am CT on Tuesday, September 15 please complete this "Syllabus Comprehension Quiz"

## 2. Exams (Total of 500 Points)

Exam #1    Thu 10/1 - Sat 10/3 @ noon    Material Covered: 9/8-9/24    Points: 100
Exam #2    Thu 10/22 - Sat 10/24 @ noon    Material Covered: 9/29-10/15    Points: 150
Exam #3    Thu 11/12 – Sat 11/14 @ noon    Material Covered: 10/27-11/5    Points: 150
Exam #4    Tue 12/15 – Mo 12/21 @ noon    Material Covered: 11/17-12/10    Points: 100

Exams will consist of short-answer questions and problems, although I may mix in a few multiple-choice questions. You will need a calculator or computer to complete each examination. You can use any notes, problem sets, lecture materials, etc. to complete the exam. **However, you may not work with or get help from other people**. Exams will be available on the course website on the first of the two dates noted above; they are due via Canvas at noon on the second of the dates above. Exams turned in late will receive 10 fewer points per hour they are late. Exams must be taken over the scheduled days unless: (1) you provide documentary evidence of some serious, unforeseen emergency (e.g., family tragedy, car accident); (2) you arrange with me – not your TA – to take the examination early; or (3) you notify me – not your TA – in advance of some religious observance or University sponsored event that precludes your taking the exam over those days. In the latter case, you must arrange with me – not your TA – to schedule an alternative exam schedule.

## 3. Problem Sets (Total of 180 Points)

Problem Set #1        Due: Fri 9/25 @ noon    Material Covered: 9/8 – 9/22    Points: 20
Problem Set #2        Due: Fri 10/2 @ noon    Material Covered: 9/24 – 9/29    Points: 20
Problem Set #3        Due: Fri 10/9 @ noon    Material Covered: 10/1 – 10/6    Points: 20
Problem Set #4        Due: Fri 10/16 @ noon    Material Covered: 10/8 – 10/13    Points: 20
Problem Set #5        Due: Fri 10/23 @ noon    Material Covered: 10/15    Points: 20
Problem Set #6        Due: Fri 11/6 @ noon    Material Covered: 10/27 – 11/3    Points: 20
Problem Set #7        Due: Fri 11/13 @ noon    Material Covered: 11/5    Points: 20
Problem Set #8        Due: Fri 12/4 @ noon    Material Covered: 11/17 – 12/1    Points: 20
Problem Set #9        Due: Fri 12/11 @ noon    Material Covered: 12/3 – 12/8    Points: 20

Problem sets will be posted on the course website and should be turned in via Canvas. Problem sets turned between 1 minute and 24 hours late will receive no more than 50% credit. Those turned in more than 24 hours late will be reviewed and corrected but will not receive credit. All problem sets must be turned in via Canvas; TAs will only accept emailed problem sets under extraordinary circumstances that are approved in advance. Problem sets will be scored according to the criteria described below; in short, scores are based on the accuracy and completeness of answers and on your demonstrated effort and understanding of the material. You may not work together on Problem Sets. **What you turn in must be your own work**.

## 4. STATA (Statistical Software) Exercises (Total of 80 Points)

STATA Assignment #1        Due: Fri 9/25 @ noon        Points: 20
STATA Assignment #2        Due: Fri 10/23 @ noon        Points: 20
STATA Assignment #3        Due: Fri 11/13 @ noon        Points: 20
STATA Assignment #4        Due: Fri 12/4 @ noon        Points: 20

STATA Exercises will be posted on the course web site and should be turned in via Canvas. Exercises turned between 1 minute and 24 hours late will receive no more than 50% credit. Those turned in more than 24 hours late will be reviewed and corrected but will not receive credit. All STATA assignments must be turned in via Canvas; TAs will only accept emailed problem sets under extraordinary circumstances that are approved in

advance. STATA assignments will be scored according to the criteria described below; in short, scores are based on the accuracy and completeness of answers and on your demonstrated effort and understanding of the material. You may not work together on STATA Assignments. **What you turn in must be your own work.**

## 5. Lecture Engagement (5.5 points each, for a total of 110 Points)

To get credit for engaging in a lecture, you need to do both of two things: (1) Watch the recorded video lecture by the time class is scheduled to start and (2) by Friday at noon, turn in a post-lecture worksheet. I will know automatically who watches the recorded video lecture. The course website will include a worksheet associated with every lecture. Turn in worksheets via Canvas by Friday at noon; they will be graded on a pass/fail basis. To get credit for engaging in the lecture, you must watch the video lecture by the time class starts and successfully complete the worksheet by Friday at noon.

There will be no video lecture or worksheet on days when there is no class session (11/26), when class consists of an exam review (10/20, 11/10, & 12/15), or when there are extended office hours (10/22, 11/12, 11/24). That means there are 22 class days when you are required to watch video lectures and complete worksheets. You may miss two class days and still receive full credit for this requirement; if you engage in more than the required 20 class days, you can earn extra credit (up to a total of 11 extra points).

## 6. Lab Engagement (10 points each lab, for a total of 100 Points)

In lab sessions, you will review material from lecture in a different way; go over answers to problem sets and exams; have the opportunity to ask questions and discuss material in a smaller group setting; and prepare for assignments that require using STATA. There are 15 weeks of the semester, but labs will not meet the week of Thanksgiving (11/24 through 11/26) or the last week of classes (12/15 through 12/17). Thus, TAs will evaluate your engagement in the remaining 13 lab sessions on a pass/fail basis. To get credit for engaging in a lab, you will need to respond to a poll during the synchronous lab session. You may miss 3 of the 13 lab sessions and still receive full credit for this requirement; if you engage in more than the required 10 lab sessions you can earn extra credit (up to a total of 10 extra points).

## 7. How I Will Assign Grades

This course is designed to allow distinctly different types of students to succeed. As described above, there are 1,000 total points in the course (not counting extra credit). I will calculate your course grade using each of three different formulas (described below) and then give you the *highest* of the three grades.

Formula #1: 75% Exams, 25% Everything Else (For people who say, "I've taken stats before, I am good at math, and I'm pretty sure this class is going to be easy for me.")

$$\text{Your percentage} = \frac{(0.75 \times \text{Exam Scores}) + (0.25 \times \text{Everything Else}) + \text{Extra Credit}}{500} \times 100\%$$

Formula #2: 25% Exams, 75% Everything Else (For people who say, "I'm being forced to take this class, I'm not very good at math, but I'm willing to work pretty hard.")

$$\text{Your percentage} = \frac{(0.25 \times \text{Exam Scores}) + (0.75 \times \text{Everything Else}) + \text{Extra Credit}}{500} \times 100\%$$

<u>Formula #3</u>: 50% Exams, 50% Everything Else (For people who say, "I'm OK at math but I have a lot going on this semester.")

$$\text{Your percentage} = \frac{(0.50 \times \text{Exam Scores}) + (0.50 \times \text{Everything Else}) + \text{Extra Credit}}{500} \times 100\%$$

I will compute your percentages using all three formulas above, I will keep only the highest percentage, and then I will assign a letter grade as per the rubric below.

| Grade | Percentage | Grade | Percentage | Grade | Percentage |
|---|---|---|---|---|---|
| A | 93.0% to 100.0% | B- | 80.0% to 82.9% | D+ | 67.0% to 69.9% |
| A- | 90.0% to 92.9% | C+ | 77.0% to 79.9% | D | 63.0% to 66.9% |
| B+ | 87.0% to 89.9% | C | 73.0% to 76.9% | F | lee than 63.0% |
| B | 83.0% to 86.9% | C- | 70.0% to 72.9% | | |

Below are three example students and how I would assign grades for them.

<u>Student A</u>: Did great on the exams (490 out of 500 points), got most of the credit for the problem sets and STATA assignments (200 out of 260 points), got no credit for any other assignments (0 out of 240 points), and did no extra credit.

<u>Student B</u>: Did poorly on exams (250 out of 500 points), got nearly full credit on problem sets and STATA assignments (240 out of 260 points), always attended and participated in lecture and labs (240 out of 240), and got 10 extra credit points.

<u>Student C</u>: Did so-so on exams (350 out of 500 points), got most of the credit for problem sets and STATA assignments (190 out of 260 points), usually attended and participated in lecture and labs (190 out of 240), and got 10 extra credit points.

| | Formula 1 | Formula 2 | Formula 3 | Grade |
|---|---|---|---|---|
| Student A | 84% | 55% | 69% | 84% = B |
| Student B | 64% | 87% | 75% | 87% = B+ |
| Student C | 74% | 77% | 75% | 77% = C |

# OTHER INFORMATION

## 1. Is There a Required Textbook?

There is no required (physical, paper) textbook for this course.  This is because there are plenty of online resources that are just about as good … and that cost $0.  Some good examples:

1. http://onlinestatbook.com/2/index.html
2. https://openstax.org/details/books/introductory-statistics
3. https://saylordotorg.github.io/text_introductory-statistics/
4. http://davidmlane.com/hyperstat/
5. http://vassarstats.net/textbook/
6. http://www.jerrydallal.com/LHSP/LHSP.htm
7. http://www.sportsci.org/resource/stats/

## 2. Do I Need a Calculator?

Unless you are very good at using Excel or other programs, you will need a calculator for this class. It should be able to take square roots and natural logs (ln$x$). It does not need to be fancier than that and it should not cost more than about $35.

## 3. Can I Get Your Lecture Notes?

Of course! Recordings of all lecture notes and any PowerPoints I use in those lectures will be available on the course web site as part of the recorded video lecture at least a few days prior to each scheduled class session. Beyond this, lecture worksheets contain a page of notes about what I think are each lecture's key points.

## 4. What if I Am Bad at Math?

First, you are not bad at math! You may have been *told* by others that you are bad at math (especially if you identify as female). You may not have taken a math class for a long time. You may have had bad experiences in previous math-oriented classes. But you *can* do the math required for this class. If you can handle (or are willing to learn to handle) basic algebra you will be fine in this class.

Second, the course website offers some resources for brushing up on or learning the basic math and algebra that you will need in the course. Take some time to explore those resources. If you are still concerned, please come talk with me. Even if math is not your "thing" I want you to get a lot out of this class.

## 5. Respect for Others

Everyone in the class must treat everyone else in the class with unfailing respect. We are here to learn from one another, and we can learn the most from people who do not think like us or have the same perspectives or experiences as us. This means it is crucial that everyone feel free to voice their opinions, knowledge, and perspectives—even if others have different opinions or perspectives. In my experience, people can only effectively communicate and learn when they feel they are being treated well.

Remember, also, to be respectful to your teaching assistants and instructor. Like you, they are busy, sometimes make mistakes, and respond better when treated well. In particular: Keep in mind that they have a right to wait to respond to emails or other interactions until normal business hours. Your question may be urgent, but they may have even more urgent things to attend to in their lives.

## 6. Contesting Grading Decisions

Your TA's and I might sometimes make grading mistakes—it happens. But we want you to get the grade you deserve. To contest a grade on an assignment: First, *wait 24 hours* after you receive the grade. Are you *sure* the grade was unfair? Then, if you still want to contest the grade, email *me* a list of your reasons for your dissatisfaction with the grade.

## 7. Incompletes

According to university policy, a course grade of "Incomplete" is only given when (1) you are making good progress throughout <u>most</u> of a course and then (2) some unexpected event or circumstance temporarily prevents you from completing the course assignments on time. I will only agree to give an "Incomplete" when

*both* conditions are met. Also, I will only give an "Incomplete" once you and I have met to sign the required university paperwork and have agreed about how and by what date all course assignments will be completed.

## 8. Learning Styles, Abilities, and Accommodations

If you are overwhelmed or feel like you could use some help catching up in the course, one good first step is to visit with me or your TA. In most cases we can help you get back on track, especially if you talk to us early.

Like the University of Minnesota as a whole, I view disability as an important aspect of diversity. Everyone learns in different ways. If, for any reason, you become concerned about your ability to fully participate in this course due to the structure of activities or assignments please talk to me about it. I am committed to providing equitable access to learning opportunities for all students.

The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office (612.626.1333 or drc@umn.edu) to arrange a confidential discussion regarding equitable access and reasonable accommodations.  If you have a short-term disability, such as a broken arm, the DRC can often work with instructors like me to minimize classroom barriers. In situations where additional assistance is needed, you should contact the DRC as noted above. If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact your me early in the semester to review how the accommodations will be applied in this course. Additional information is available on the DRC website: https://diversity.umn.edu/disability/.

BOTTOM LINE: If you have a *documented* disability that may impact your learning and /or participation in this course, please talk with me early in the semester so we can develop a plan to effectively support your learning and participation. If you have an *undocumented* disability you would like me to know about, or are opting not to register your disability with the university, or just want to talk about learning to learn, please set up a conversation with me so we can plan for ways you might collaborate with me, peers, others on campus, and family members to maximize your learning.

## 9. Sexual Misconduct

As an instructor, one of my responsibilities is to help create a safe learning environment. I also have a reporting responsibility related to my role: I am *required* to share information regarding sexual misconduct or information about a crime of sexual misconduct with the Office for Equal Opportunity & Affirmative Action (EOAA) at diversity.umn.edu/eoaa/home. For victims of sexual assault: The Aurora Center provides free and confidential support and academic advocacy via their 24-hour help line (612-626-9111) and by email (aurora.umn.edu).

## 10. Academic Misconduct

I strongly encourage you to collaborate and brainstorm with your classmates and to review and critique one another's work, both in and out of class. However, individual assignments and exams should represent your own ideas and be your own work. Taking credit for work that is not your own constitutes scholastic dishonesty. I am a "zero tolerance" professor when it comes to scholastic dishonesty. The university makes it easy for me to report it, too. I fill out one short report via a very nice web interface—I can do it from my phone—and they take it from there. If I ever think you engaged in scholastic dishonesty, I will discuss it with you first. After that, if I still think you engaged in scholastic dishonesty, I will give you a zero on the relevant assignment and report the incident to the university. Not sure what scholastic dishonesty is? Read about it in the "Scholastic Dishonesty" section of the Student Conduct Code.

# COURSE SCHEDULE

## WEEK 1

Tuesday - September 8 — Course Introduction; Data and Data Analysis — Worksheet #1

Labs This Week — Introductions; Review of Basic Algebra

Thursday - September 10 — Graphical Representations of Distributions — Worksheet #2

**Due Friday at Noon:** Worksheets #1 and #2

## WEEK 2

Tuesday - September 15 — Numeric Representations of Distributions — Worksheet #3

Labs This Week — Review Material from 9/10 and 9/15

Thursday - September 17 — Introduction to STATA; Summarizing Distributions in STATA — Worksheet #4

**Due Friday at Noon:** Worksheets #3 and #4

## WEEK 3

Tuesday - September 22 — Percentiles; Standardized Scores; Summarizing Distributions — Worksheet #5

Labs This Week — Review Material from 9/22; STATA introduction and Activities; Prepare for STATA Assignment #1

Thursday - September 24 — Sampling; Probability — Worksheet #6

**Due Friday at Noon:** Worksheets #5 and #6; Problem Set #1; STATA Assignment #1

## WEEK 4

Tuesday - September 29 — Discrete Random Variable — Worksheet #7

Labs This Week — Review Material from 9/24; Prepare for Exam 1

Thursday - October 1 (IAPHS) — Continuous Random Variables — Worksheet #8

**Due Friday at Noon:** Worksheets #7 and #8; Problem Set #2
**Due Saturday at Noon:** Exam #1 (Covers Material from 9/8 through 9/24)

## WEEK 5

Tuesday - October 6 — Sampling Distributions — Worksheet #9

Labs This Week — Review Material from 9/29, 10/1, & 10/6

Thursday - October 8 — Confidence Intervals — Worksheet #10

**Due Friday at Noon:** Worksheets #9 and #10; Problem Set #3

## WEEK 6

Tuesday - October 13 — Hypothesis Testing — Worksheet #11

Labs This Week — Review Material from 10/8 & 10/13; Prepare for STATA Assignment #2

Thursday - October 15 — Hypothesis Testing — Worksheet #12

**Due Friday at Noon:** Worksheets #11 and #12; Problem Set #4

## WEEK 7

Tuesday - October 20 — In-Class Exercise and Review

Labs This Week — Review Material from 10/15; Prepare for STATA Assignment #2; Prepare for Exam 2

Thursday - October 22 — Extended Office Hours — To talk with the instructor, use Google Calendar to sign up for an appointment slot. Then, use this Zoom link.  Or, connect with your TA via the usual means.

**Due Friday at Noon:** Problem Set #5; STATA Assignment #2
**Due Saturday at Noon:** Exam #2 (Covers Material from 9/29 through 10/15)

## WEEK 8

Tuesday - October 27 — Analysis of Variance — Worksheet #13

Labs This Week — Review Material from 10/27

Thursday - October 29 — Associations between Categorical Variables — Worksheet #14

**Due Friday at Noon:** Worksheets #13 and #14

## WEEK 9

Tuesday - November 3 — Associations Between Continuous Variables — Worksheet #15

Labs This Week — Review Material from 10/29 & 11/3; Prepare for STATA Assignment #3

Thursday - November 5 — Associations Between Continuous Variables — Worksheet #16

**Due Friday at Noon:** Worksheets #15 and #16; Problem Set #6

## WEEK 10

Tuesday - November 10 — In-Class Exercise and Review

Labs This Week — Review Material from 11/5; Prepare for STATA Assignment #3; Prepare for Exam 3

Thursday - November 12 – Extended Office Hours — To talk with the instructor, use Google Calendar to sign up for an appointment slot. Then, use this Zoom link.  Or, connect with your TA via the usual means.

**Due Friday at Noon:** Problem Set #7; STATA Assignment #3
**Due Saturday at Noon:** Exam #3 (Covers Material from 10/27 through 11/5)

## WEEK 11

Tuesday - November 17 — Causal Inference and Observational Data — Worksheet #17

Labs This Week — Review Material from 11/17; Prepare for STATA Assignment #4

Thursday - November 19 — Two-Way ANOVA and Three-Variable Relationships — Worksheet #18

**Due Friday at Noon:** Worksheets #17 and #18

## WEEK 12

Tuesday - November 24 – Extended Office Hours — To talk with the instructor, use Google Calendar to sign up for an appointment slot. Then, use this Zoom link.  Or, connect with your TA via the usual means.

Labs This Week — No Labs (Thanksgiving)

Thursday - November 26 — No Class (Thanksgiving)

**Due Friday at Noon:** Nothing

## WEEK 13

Tuesday - December 1 — Three Variable Relationships and Multiple Regression — Worksheet #19

Labs This Week — Review Material from 11/19 & 12/1; Prepare for STATA Assignment #4

Thursday - December 3 — Multiple Regression — Worksheet #20

**Due Friday at Noon:** Worksheets #19 and #20; Problem Set #8; STATA Assignment #4

## WEEK 14

Tuesday - December 8 — Multiple Regression Assumptions; Regression Diagnostics — Worksheet #21

Labs This Week — Review Material from 12/3 & 12/8

Thursday - December 10 — Reading Regression Results — Worksheet #22

**Due Friday at Noon:** Worksheets #21 and #22; Problem Set #9

## WEEK 15

Tuesday - December 15 – In-Class Exercise and Review

**Due Monday 12/21 at Noon:** Exam #4 (Covers Material from 11/17 through 12/10)

# ALL THE FORMULAS YOU NEED FOR SOC 3811

1. **Mean**

$$\bar{x} = \frac{\sum x_i}{n}$$

2. **Variance**

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

3. **Standard Deviation**

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

4. **Conservative Margin of Error**

$$Margin\ of\ error = \frac{1}{\sqrt{n}}$$

5. ***z*-Score**

$$z = \frac{x - \bar{x}}{s_x}$$

6. **Index of Qualitative Variation (IQV)**

$$IQV = \frac{K}{K-1}(D) \quad \text{where} \quad D = 1 - \sum_{i=1}^{K} p_i^2$$

7. **Expected Value of a Discrete Random Variable**

$$E(X) = \mu = \sum x_k\, p_k$$

8. **Standard Deviation of a Discrete Random Variable**

$$\sqrt{V(X)} = \sigma = \sqrt{\sum (x_i - \mu)^2\, p_i}$$

9. **Probabilities for Binomial Random Variables**

$$P(X = k) = \frac{n!}{k!\,(n-k)!}\, p^k (1 - p)^{n-k}$$

10. **Expected Value of a Binomial Random Variable**

$$E(X) = \mu = np$$

11. **Standard Deviation of a Binomial Random Variable**

$$\sigma = \sqrt{\sigma^2} = \sqrt{np(1 - p)}$$

**12. Standard Error for the Sampling Distribution of *p*-Hat**

$$s.e.(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

**13. Standard Error for the Sampling Distribution of *x*-Bar**

$$s.e.(\bar{x}) = \frac{s}{\sqrt{n}}$$

**14. Standard Error for the Sampling Distribution of *p*-Hat₁ - *p*-Hat₂**

$$s.e.(\hat{p}_1 - \hat{p}_2) = \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

**15. Standard Error for the Sampling Distribution of *x*-Bar₁ - *x*-Bar₂**

$$s.e.(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

**16. Confidence Interval for Proportions**

$$\hat{p} \pm z^* \times \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

**17. Confidence Interval for Means**

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}}$$

**18. Confidence Interval for Differences in Proportions**

$$\hat{p}_1 - \hat{p}_2 \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

**19. Confidence Interval for Differences in Means**

$$\bar{x}_1 - \bar{x}_2 \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

**20. Test Statistic for Hypothesis Tests about Proportions**

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

**21. Test Statistic for Hypothesis Tests about Means**

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

**22. Test Statistic for Hypothesis Tests about Differences In Proportions**

$$z = \frac{\hat{p}_1 - \hat{p}_2 - 0}{\sqrt{\dfrac{\hat{p}(1-\hat{p})}{n_1} + \dfrac{\hat{p}(1-\hat{p})}{n_2}}}$$

where...

$$\hat{p} = \frac{n_1\hat{p}_1 + n_2\hat{p}_2}{n_1 + n_2}$$

**23. Test Statistic for Hypothesis Tests about Differences in Means**

$$t = \frac{\bar{x}_1 - \bar{x}_2 - 0}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$$

**24. Test Statistic for Hypothesis Tests about Multiple Group Means**

$$F = \frac{MS\ Groups}{MSE}$$

where...

$$MS\ Groups = \frac{SS\ Groups}{k-1} \quad (\text{and } SS\ Groups = n_1(\bar{y}_1 - \bar{y})^2 + n_2(\bar{y}_2 - \bar{y})^2 + ... + n_k(\bar{y}_k - \bar{y})^2)$$

and...

$$MSE = \frac{SS\ Error}{N-k} \quad (\text{and } SS\ Error = (n_1 - 1)s_1^2 + (n_2 - 1)s_2^2 + ... + (n_k - 1)s_k^2)$$

**25. Chi-Squared ($\chi^2$)**

$$\chi^2 = \sum \frac{(observed - expected)^2}{expected}$$

$$Expected\ Value = \frac{row\ total \times column\ total}{total\ number\ of\ cases\ in\ table}$$

**26. Correlation**

$$r = \frac{1}{n-1}\sum_i \left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$$

**27. Regression**

$$Regression\ Line: \hat{y} = b_0 + b_1 x$$

$$b_1 = r\left(\frac{s_y}{s_x}\right)$$

$$b_0 = \bar{y} - b_1\bar{x}$$

**28. Standard Deviation for Regression**

$$s = \sqrt{\frac{SSE}{n-2}} = \sqrt{\frac{\sum(y_i - \hat{y}_i\ )^2}{n-2}}$$

**29. Standard Error for Regression Slope**

$$s.e.(b_1) = \frac{s}{\sqrt{\sum(x_i - \bar{x})^2}}$$

**30. Confidence Interval for Regression Slope**

$$b_1 \pm t * s.e.(b_1)$$

**31. Test Statistic for Hypothesis Tests about Regression Slope**

$$t = \frac{sample\ statistic\ -\ null\ value}{standard\ error} = \frac{b_1 - 0}{s.e.(b_1)}$$

**32. Standard Error of Predicted Values**

$$s.e.(fit) = s\sqrt{\frac{1}{n} + \frac{(x - \bar{x})^2}{\sum(x_i - \bar{x})^2}}$$

**33. Confidence Interval for Individual Predicted Values**

$$\hat{y} \pm t * \sqrt{s^2 + [s.e.(fit)]^2}$$

**34. Confidence Interval for the Mean of *y* at a Given *x***

$$\hat{y} \pm t * \times s.e.(fit)$$

# GRADING RUBRIC FOR PROBLEM SETS AND STATA ASSIGNMENTS

Each problem set or assignment that is turned in on time is worth 20 points.  Your score on each problem set or assignment will be a function of ① the effort you demonstrate in attempting to answer the questions (regardless of your understanding of the material or the accuracy of your answers); ② your demonstrated understanding of the materials covered by the questions (regardless of the effort you put forth or the accuracy of your answers); and ③ the completeness and accuracy of your answers (regardless of the effort you put forth or how well you understand the material).  Specifically, scores will be assigned as follows:

## Demonstrated Effort (Anywhere from 0 to 5 points may be awarded)

| | | |
|---|---|---|
| 5.00 Points | = | You made a serious effort to answer every problem |
| 3.75 Points | = | You made a serious effort to answer most of the problems, but you made less of an effort to answer a few of them |
| 2.50 Points | = | You made a good effort to answer several problems, but you made much less of an effort on several others |
| 1.25 Points | = | You made a good effort to answer a few of the problems, but you made little or no effort to answer most others |
| 0.00 Points | = | You made little or no effort to answer the assigned problems |

## Demonstrated Understanding of Material (Anywhere from 0 to 5 points may be awarded)

*Based on your answers to the problems…*

| | | |
|---|---|---|
| 5.00 Points | = | …you clearly understand nearly all of the material covered (regardless of whether the answers are correct) |
| 3.75 Points | = | …you understand most of the material covered, but it is clear that there are some important things that you do not understand |
| 2.50 Points | = | …you understand some of the material covered, but there is just about as much that you do not understand |
| 1.25 Points | = | …you understand a few important parts of the material covered, but you do not understand most of the rest of the material |
| 0.00 Points | = | …you understand very little of the material covered |

# GRADING RUBRIC FOR PROBLEM SETS AND STATA ASSIGNMENTS (CONTINUED)

**Completeness of Answers** (Anywhere from 0 to 5 points may be awarded)

| | | |
|---|---|---|
| 5.00 Points | = | You completely and clearly addressed each part of every problem |
| 3.75 Points | = | You completely and clearly addressed most of the problems, but in a few cases it is not clear how you arrived at your answer; you provide some answer to every part of every problem |
| 2.50 Points | = | Your answers are sometimes fairly complete and clear, but about as often it is not obvious how you came to your answer; on some occasions you may not have even addressed parts of problems |
| 1.25 Points | = | Your answers to a few problems are complete and clear, but in most cases it is not obvious how you arrived at your answer; you may not have even addressed some problems |
| 0.00 Points | = | Answers to problems, if provided at all, are usually so incomplete that it is difficult to evaluate their accuracy |

Be sure to ask (preferably in lecture or in lab) how to answer particular problems "completely" (that is, how much work to show, how many steps of the mathematical procedures to show, whether you should provide the formulas you use, etc.).

**Accuracy of Answers** (Anywhere from 0 to 5 points may be awarded)

| | | |
|---|---|---|
| 5.00 Points | = | With the exception of a few minor errors (e.g., a syntax typo or an arithmetic mistake), your answers are nearly all correct |
| 3.75 Points | = | Most of your answers are correct, but some are incorrect (beyond typos or arithmetic errors); or, your answers were mostly correct except that you made several typos or arithmetic errors |
| 2.50 Points | = | Many of your answers are correct, but about an equal number are incorrect |
| 1.25 Points | = | Some of your answers are correct, but most are incorrect |
| 0.00 Points | = | Very few, if any, of your answers are correct |

Answer keys to problem sets will be distributed when problem sets are returned to you so that you can compare your answers to mine. In most cases, you will know whether or not your STATA syntax is correct based on whether it generates errors and based on whether it produces sensible results. We will, however, make notes on your problem sets and STATA assignments to indicate which answers are incorrect and where in your answer your reasoning or your mathematics (or whatever) appears to have gone wrong.

# COLLEGE OF LIBERAL ARTS POLICIES

**GRADES:** University academic achievement is graded under two systems: A-F (with pluses and minuses) and S-N. Choice of grading system and course level (1xxx/3xxx/4xxx) is indicated on the registration website; changes in grade scale may not be made after the second week of the semester. Some courses may be taken under only one system; limitations are identified in the course listings. The Department of Sociology requires A-F registration in courses required for the major/minor. University regulations prescribe the grades that will be reported on your transcript.

A   Represents achievement that is outstanding relative to the level necessary to meet course requirements (4.00 grade points)
A-  3.67 grade points
B+  3.33 grade points
B   Achievement significantly above the level necessary to meet course requirements (3.00 grade points)
B-  2.67 grade points
C+  2.33 grade points
C   Achievement that meets the basic course requirements in every respect (2.00 grade points)
C-  1.67 grade points
D+  1.33 grade points
D   Achievement worthy of credit even though it fails to meet fully the course requirements (1.00 grade point)
F   Performance that fails to meet the basic course requirements (0 grade points)
S   Represents achievement that is satisfactory, which is equivalent to a C- or better.
N   No credit. Its use is now restricted to students not earning an S on the S-N grade base
I   Incomplete, a temporary symbol assigned when the instructor has a "reasonable expectation" that you 1) can successfully complete unfinished work on your own no later than one year from the last day of classes and 2) believes that legitimate reasons exist to justify extending the deadline for course completion. The instructor may set date conditions for make-up work. If a course is not completed as prescribed or not made up as agreed within the year, the I will lapse to an F if registered on the A-F grade base or an N if registered on the S-N grade base.
W   Official withdrawal from a course after the end of the second week of the semester. You must file a course cancellation request before the end of the sixth week of the semester to ensure that the W, rather than the F, will be formerly entered on your record.

**FINAL EXAMINATIONS** (see schedule on the Calendar web site at https://onestop.umn.edu/academics/final-exam-times): You are required to take final examinations at the scheduled times. Under certain circumstances, however, you may request final examination schedule adjustment in your college office. Instructors are obligated to schedule make-up examinations within the final examination period for students who have three final examinations within a 16-hour period. Instructors also are encouraged to reschedule examinations for students with religious objections to taking an examination on a given day. You must submit your request for an adjustment in your schedule at least two weeks before the examination period begins. For assistance in resolving conflicts, call the CLA Student Information Office at 625-2020. If you miss a final, an F or N is recorded. You must obtain the instructor's permission to make up the examination. Final examinations may be rescheduled by the instructor only through the official procedure for that purpose (as noted on the above web page). Final examinations may not be scheduled for the last day of class or earlier or for Study Day. If an examination is rescheduled at the instructor's request, and you have an examination conflict because of it, you are entitled to be given the final examination at an alternative time within the regularly scheduled examination period for that semester.

**CLASS ATTENDANCE:** As a student, you are responsible for attending class and for ascertaining the particular attendance requirements for each class or department. You should also learn each instructor's policies concerning make-up of work for absences. Instructors and students may consult the CLA Classroom, Grading, and Examination Procedures Handbook for more information on these policies (https://policy.umn.edu/education/makeupwork).

**COURSE PERFORMANCE AND GRADING:** Instructors establish ground rules for their courses in conformity with their department policies and are expected to explain them at the first course meeting. This includes announcement of office hours and location, the kind of help to be expected from the instructor and teaching assistants, and tutorial services, if available. The instructor also describes the general nature of the course, the work expected, dates for examinations and paper submissions, and expectations for classroom participation and attendance. Instructors determine the standards for grading in their classes and will describe expectations, methods of evaluation, and factors that enter into grade determination. The special conditions under which an incomplete (I) might be awarded also should be established. The college does not permit you to submit extra work to raise your grade unless all students in the class are afforded the same opportunity.

**CLASSROOM BEHAVIOR:** You are entitled to a good learning environment in the classroom. Students whose behavior is disruptive either to the instructor or to other students will be asked to leave (the policies regarding student conduct are outlined on-line at https://communitystandards.umn.edu/know-code/consequences.

**ELECTRONIC DEVICES:** University instructors may restrict or prohibit the use of personal electronic devices in his or her classroom, lab, or any other instructional setting. For the complete policy, visit: http://policy.umn.edu/education/studentresp

**SCHOLASTIC CONDUCT:** The University Student Conduct Code defines scholastic dishonesty as follows:
Scholastic Dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. **Students cannot evade (intentionally or unintentionally) a grade sanction by withdrawing from a course before or after the misconduct charge is reported. This also applies to late withdrawals, including discretionary late cancellation (also known as the "one-time-only drop").** For the complete policy, visit: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf

**STUDENT MENTAL HEALTH AND STRESS MANAGEMENT:** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu/.

# A REMINDER OF RELEVANT POLICIES AND PROCEDURES
## * SOCIOLOGY DEPARTMENT POLICIES *

**GRADE INFORMATION**:  Grades are due in the Office the Registrar within 3 business days after the final examination. No information regarding grades will be released by the department office staff to anyone except designated personnel in Records and college offices.  Students may access their own grades through the MyU Portal.

**INCOMPLETES**:  It is the instructor's responsibility to specify conditions under which an Incomplete (I) grade is assigned.  Students should refer to the course syllabus and talk with the instructor as early as possible if they anticipate not completing the course work.  Coursework submitted after the final examination will generally be evaluated down <u>unless</u> prior arrangements are made <u>in writing</u> by the instructor.  University policy states that if completion of the work requires the student to attend class in substantial part a second time, assigning an "I" grade is NOT appropriate.  Incompletes are appropriate only if the student can make up the coursework independently with the same professor.  Students need to have completed a substantial portion of the course in order to be even considered for an Incomplete.

**MAKE-UP EXAMINATIONS**: Arrangements for special examinations must be made directly with the instructor who taught the course and who is responsible for approving and supervising the examination or making individual arrangements.  Circumstances for missing an exam include, but are not necessarily limited to: verified illness, participation in athletic events or other group activities sponsored by the University, serious family emergencies, subpoenas, jury duty, military service, and religious observances. It is the responsibility of the student to notify faculty members of such circumstances as far in advance as possible.

**GRADE CHANGES**:  Grades properly arrived at are not subject to renegotiation unless all students in the class have similar opportunities.  Students have the right to check for possible clerical errors in the assignment of grades by checking with the instructor and/or teaching assistant.

Students with justifiable complaints about grades or classroom procedures have recourse through well-established grievance procedures.  You are expected to confer first with the course instructor.  If no satisfactory solution is reached, the complaint should be presented in writing to the department Director of Undergraduate Studies or the Coordinator of Undergraduate Advising (909 Soc Sci).  If these informal processes fail to reach a satisfactory resolution, other formal procedures for hearing and appeal can be invoked.  See the departmental advisor in 923 Social Sciences to explore options.

**DISABILITY SERVICES:** Students with disabilities that affect their ability to participate fully in class or to meet all course requirements are encouraged to bring this to the attention of the instructor so that appropriate accommodations can be arranged. For more info contact Disability Resource Center in 180 McNamara.

**SEXUAL HARASSMENT:** "Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Faculty, Graduate Students, and full time Staff are Mandated Reporters for prohibited conduct. Such behavior is not acceptable in the University setting. If you have experienced sexual misconduct, discrimination, harassment, or related retaliation; or if you have questions about any EOAA-related issue, please contact Equal Opportunity and Affirmative Action (EOAA) at (612) 624-9547 or eoaa@umn.edu For the complete policy, visit
https://regents.umn.edu/sites/regents.umn.edu/files/policies/Sexual_Harassment_Sexual_Assault_Stalking_Relationship_Violence.pdf.

**SOCIOLOGY PROGRAMS INFORMATION**:  The Sociology Department offers two options for the Bachelor of Arts degree and a Bachelor of Science degree.  Students interested in majoring in Sociology should view the online-information session about the major.  Further information can be obtained from the following persons and offices or online at http://cla.umn.edu/sociology
      General information, Sociology Department, 909 Social Sciences - 624-4300
      Coordinator of Undergraduate Advising, Bobby Bryant, 923 Social Sciences – 624-4300
      Director of Undergraduate Studies, Prof. Kathy Hull, 1131 Social Sciences – 612-624-4339
      Soc Honors Faculty Representative, Prof. Kathy Hull, 1131 Social Sciences – 612-625-4339
      Director of Graduate Studies, Professor Joe Gerteis, 1125 Social Sciences - 624-1615 and/or
      Graduate Program Associate, Becky Drasin, 927 Social Sciences - 624-2093

Undergraduate jobs, internships, volunteer and research opportunities, scholarships, and much more can be found in the Undergraduate Resources site - https://sociologyundergrad.wordpress.com/