

Sociology 321: Introduction to Quantitative Techniques I (Spring 2016, 4 credits)
Tues/Thurs, 10:35-11:50 AM (Todd Hall 411) & Friday Computer Lab (Wilson-Short 231)

Instructor: Professor Thomas Rotolo
Office: Wilson Hall, Room 252

T.A./ Lab: Michael Lengefeld
Office hours: Tues & Thur, 9-10 AM

E-mail address: rotolo@wsu.edu (write *Sociology 321* in subject line)
TA email address: m.lengefeld@wsu.edu
Course web site: Blackboard at learn.wsu.edu

Objectives

The primary goal of this course is to introduce you to some basic statistical concepts and techniques. The material we cover will prepare you for more advanced statistical courses. We explore a variety of topics, including graphical and numerical univariate statistics, graphical and numerical bivariate statistics, probability, sampling distributions, and statistical inference. Along the way, this course meets several WSU learning goals:

1. You will develop and refine creative and critical thinking skills.
 - A. Define, analyze, and solve problems.
 - B. Integrate and synthesize knowledge from multiple sources.
 - C. Assess the accuracy and validity of findings and conclusions.

2. You will learn various skills related to quantitative reasoning.
 - A. Explain information presented in mathematical forms (e.g., equations, graphs, tables, and words).
 - B. Convert relevant information into various mathematical forms (e.g., graphs, tables, and words).
 - C. Understand and apply quantitative principles and methods in the solution of problems

3. You will gain experience related to Scientific Literacy, Information Literacy, and Communication.
 - A. Evaluate the quality of information on the basis of its source and the methods used to generate it.
 - B. Assess credibility and applicability of information sources.
 - C. Express concepts, propositions, and beliefs in coherent, concise and technically correct form.
 - D. Follow social norms for individual and small group interactions, including active listening.

Required Materials

Straightforward Statistics (Bowen, 2016) is the required textbook for this course. It is published by Sage, ISBN: 9781483358918. The textbook is required – no exceptions. The course is organized around an

active learning approach. This approach has two basic requirements: 1) You must attend class and do the assignments; and 2) You must bring your textbook to class every day.

You will also need a scientific calculator capable of performing the following operations: Addition, subtraction, multiplication, division, squaring, square roots and a 'memory' function. Your cell phone is NOT an acceptable substitute for a calculator.

Grading

Your final grade will be based on your scores on in-class exams administered in the Friday lab section. There is an in-class participation component that will allow you to increase your final grade with an extra credit bonus. Note: if you fail to earn at least 70% of the participation points, the extra credit will not be applied to your final average.

The extra credit bonus is treated as a weighted addition to your final average. The size of the addition depends on the difference between your exam average and your total participation score at the end of the semester. I will provide you with more details about the mathematical computations behind this weighting scheme upon request. For the syllabus, the grading formula is simpler to understand in words: If you score very poorly on the exams but you perfectly complete all the participation assignments, your grade will increase significantly. For instance, if you average 60% on your tests and earn full 100% credit on the in-class assignments, your final computed average will be 72%, or a C-.

If your exam performance approximately matches your in-class participation score, then your final grade bonus will be very low because your engagement level in the class matches your performance on the exams. If your average score on the exams is lower than your in-class participation grade, then you will not receive any extra credit.

Exams: A total of seven exams, including the final, will be administered. The final exam will count as a regular exam based on material covered in the last week of class ("dead week"). The final exam is Tuesday, May 3 from 10:10-1:00 PM. The exams are cumulative; material covered in early sections of the course will sometimes be necessary to understand later material. The final exam will include some of the most complex topics covered in the course. I advise you to take advantage of the earlier, easy material.

Final grade: The average on your SIX highest exam scores will be used to compute your final grade. Your lowest exam score will be dropped. You may use the final exam as the dropped exam. I will round up to the next highest integer from any decimal (e.g., 95.2 becomes 96). I will not alter the grading scale in response to any individual student's request because it is unfair to the rest of the class. I will not respond to individual requests to change your grade (email requests like this will be ignored).

Make-up exams will be allowed only for university sanctioned excuses. All make-up exams will be administered on Thursday morning at 8:00 AM, through the Department of Sociology, within one week of the missed exam. In some cases, make-up exams might be administered through Blackboard. You must contact the TA for this class at least 48 hours before the exam time to schedule the exam. No make-up exams will be allowed for the final exam.

In-Class Participation bonus: On many class days, there will be an in-class assignment. The philosophy behind the class activity assignments will be discussed on the first day. The activities will be an easy

opportunity for you to earn many points that will increase your overall final grade. For most in-class activities, I provide you with all the answers BEFORE you begin work on the assignment. If you show up to class and complete the assignment, you are almost guaranteed a perfect score on that day's assignment. In class activities are worth 5 points each. Other days, the class will be primarily lecture and discussion oriented, with no in-class assignment. Attendance will be taken on some days and count toward your participation grade. Attendance on Tuesday and Thursday class days is worth 2 points for each day it is recorded. Lab attendance will be recorded but it will not count toward your participation grade.

On some assignments, you will be able to work with a partner, although you will always have the choice to work alone. Again, **you must bring your textbook to class every day**. If you don't have your own textbook, you will not receive credit for the activity, unless the assignment allows you to work with a partner. You might need a calculator to complete some of the assignments. If you show up to class and complete the assignment then you will very likely receive full credit for the assignment, or close to it.

Friday Computer Lab Section: A computer lab section, run by the teaching assistant, will be held on Friday. In this lab section, class activity assignments will count toward your participation grade. The activity assignments in the lab will be different from the assignments because they may require the use of a computer and a statistical software package (Excel or Stata). The first six exams will be in the Friday lab, unless an on-line exam is announced in lecture.

Missed assignments: Over the semester, you can make-up your first two missed assignments (in-class or lab) for full credit. These two make-up assignments do not require any approved excuses or additional warnings to the instructor. After two class activity assignments are missed, additional make-up assignments will be accepted however an automatic point reduction will be applied unless unusual circumstances arise and prior instructor approval is granted. Make up assignments must be submitted in full as listed on the Blackboard course web site. The deadline for the submission will be 48 hours after the end of the missed class. The submission site will be closed after 48 hours and you will receive a score of zero for the missed assignment. Exceptions to these missed assignment submission rules must be approved by the instructor.

Missed attendance: You will be allowed to miss two Tues/Thur. classes without a university sanctioned excuse.

In addition to the extra credit bonus, there are several incentives to attend class regularly. I will not provide you with the answers beforehand if you miss an assignment. Further, the make-up assignments will usually include more work than the in-class assignments. The activities are intended to encourage in-class learning and good study habits. Missing class defeats the purpose of the in-class activities and is consistent with poor study habits. I assign more work in the make-up assignments in order to "make-up" for the missed class time. The activities make exams much easier, because you already have practice with the material in class. The activities can contribute a significant amount to your final grade.

If I must miss class for some reason, I will send out an email message using zzusis. You are responsible for updating your email in zzusis. In most cases, the email message will let you know if Blackboard has an assignment for the day and it will give a submission deadline. I will attempt to provide at least 24 hours' notice – and usually more – if we will not meet in class.

Grading Scale:

A:	93-100%	C+:	77-79%	F:	59% and below
A-:	90-92%	C:	74-76%		
B+:	87-89%	C-:	70-73%		
B:	84-86%	D+:	67-69%		
B-:	80-83%	D:	60-66%		

The percentages needed to earn an A will remain as listed above, however I reserve the right to widen the other grade ranges in your favor depending on overall class performance.

Course Schedule

Exam Dates (First six exams always in Friday lab session):

Exam #1: January 29

Exam #2: February 12

Exam #3: February 26

Exam #4: March 11

Exam #5: April 8

Exam #6: April 22

Exam #7: Tuesday, May 3 10:10 AM – 1:00 PM in CUE 207

Creating a detailed course schedule for a statistics class before the semester begins is a recipe for disaster because different classes proceed at slightly different paces. Then, the exam material does not match the syllabus schedule. Below is a listing of the chapter sections that we will probably cover in this class. We will move sequentially through the book, until later in the semester. The order of topics may change.

Topics

CHAPTER 1. INTRODUCTION TO STATISTICS

What Is Statistics?

Population versus Sample

Descriptive Statistics and Inferential Statistics

Sampling a Population

Random Sampling Methods

Simple Random Sampling

Systematic Sampling

Stratified Sampling

Cluster Sampling

Scales of Measurement

Nominal Scale

Ordinal Scale

Interval Scale

Ratio Scale

Variable Classifications

Discrete Versus Continuous Variables

Independent Variables versus Dependent Variables

Required Mathematical Skills for this Course

Statistical Notation

CHAPTER 2. SUMMARIZING AND ORGANIZING DATA

Frequency Distribution Table

Organizing and Summarizing Categorical Variables

Organizing and Summarizing Numerical Variables

Graphs

Bar Graphs and Histograms

Pie Charts

Common Distribution Shapes

Uniform Distribution

Normal Distribution

Skewed Distribution

EXCEL Step-by-Step Instruction for Calculating

$\sum X$ from Frequency Table and Constructing a Bar Graph

CHAPTER 3. DESCRIPTIVE STATISTICS

Measures of Central Tendency

Mode

Median

Mean

Estimating Mean Using Frequency Table with Equal Intervals

Weighted Mean

Locations of Mean, Median, and Mode in Different Shapes of Distribution

Measures of Variability

Range

Variance and Standard Deviation for a Population

Variance and Standard Deviation for a Sample

Boxplot: Five-Number Summary

CHAPTER 4. STANDARD Z SCORES

Standard Z Scores

 Z Scores for a Population

 Z Scores for a Sample

 Empirical Rule for Variables with Normal Distribution

CHAPTER 5. BASIC PRINCIPLES OF PROBABILITY

Basic Terms and Mathematical Operations in Probability

 Basic Terms in Probability

 Mathematical Operations for Probabilities

 Binomial Probability Distribution

Practical Probability Application: Winning the Mega-Million Lottery

 The Dice Game

Linkage Between Probability and Z Score in Normal Distribution

Probabilities, Z Scores, and Raw Scores

CHAPTER 6. THE CENTRAL LIMIT THEOREM

Sampling Error

Sampling Distribution of Means and the Central Limit Theorem

The Law of Large Numbers

Relationships between Sample Means and the Population Mean

CHAPTER 7. HYPOTHESIS TESTING

Type I Error and Type II Error

The Four-Step Process to Conduct a Hypothesis Test

 Step 1: Explicitly State the Pair of Hypotheses

 Step 2: Identify the Rejection Zone for the Hypothesis Test

 Step 3: Calculate the Test Statistic

 Step 4: Make the Correct Conclusion

Examples of the Four-Step Hypothesis Test in Action

Directional versus Non-Directional Hypothesis Testing

CHAPTER 8. ONE-SAMPLE t TEST WHEN σ IS UNKNOWN

The Unknown σ and Conducting the One-Sample t -Test

The t -Distribution, a Specific Curve for Every Degree of Freedom

Confidence Intervals

Point Estimate

Interval Estimate

CHAPTER 11. CORRELATION

Pearson's Correlation

Pearson's Correlation Formulas

Describing and Interpreting Pearson's r

The Shape of the Relationship: Linear or Curvilinear?

The Direction of the Relationship: Positive (+) or Negative (-)

The Strength of the Relationship

The Presence of Outliers

Showing the Pearson's Correlation in Action

Hypothesis Testing for the Pearson's Correlation

Interpretations and Assumptions of the Pearson's Correlation

Interpretations of Pearson's Correlation

Assumptions of Pearson's Correlation

Special Types of Correlation

Spearman's Rank Correlation

Partial Correlation Formula

Point Bi-Serial Correlation

EXCEL Step-by-Step Instruction for Constructing a Scatterplot

EXCEL Step-by-Step Instruction on Calculating Pearson's r

CHAPTER 12. SIMPLE REGRESSION

Y-Intercept and Slope

Hypothesis Testing with Simple Regression

Standard Error of the Estimate

The Mathematical Relationship between Pearson's r and the Regression Slope, b

Assumptions for Simple Regression

ACADEMIC INTEGRITY

There is no excuse for using another student's work or ideas and turning them in as your own. Students who cheat on any exam will receive a failing grade for the exam. If you look on someone else's exam, then you are cheating. If you use materials other than a calculator or other approved materials while taking a quiz or exam, then you are cheating. You may consult with other students about any of the suggested in-class activities only when collaboration is allowed. Make-up activities must be completed on your own.

Any student caught cheating on any assignment or exam will be given an F grade for the exam or assignment and will be reported to the WSU Office Student Standards and Accountability. Information about student conduct standards and accountability can be found at conduct.wsu.edu. You are responsible for following the WSU conduct standards.

Email: I might make course announcements and updates via email. You are responsible for any information presented in email, so please make sure your email address is up-to-date on zzusis.

Recording prohibited: You may not record lectures or course material with any visual or auditory device (see disability statement below for exceptions).

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved through the Access Center.

Safety information: Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.