Math 211 (Winter 2022)
Statistical Concepts and Methods

Instructor: Dr. Dominic Klyve
Class hours: 10:00-10:50 Monday - Friday
Location: Monday – Wednesday & Friday, Samuelson 102; Tuesday (lab), Samuelson 138
Office: Samuelson 218F
E-mail: klyved@cwu.edu
Webpage: https://sites.google.com/site/profklyve/
Office Hours: Monday and Thursday 1:00 – 2:00, Friday 11:00 – 12:00.
(If you'd like, you can also make an appointment, and we'll find a time that works for both of us. This could involve meeting virtually.)

Course Description

This course will introduce you to the basic ideas of the science and art of statistics. Statistics is a large and important field, and the people who apply it well have become rich, saved lives, and quite literally changed the world. This course aims especially to make you a more intelligent consumer and evaluator of statistics. The course outcomes are designed to help you *understand and apply* (not just memorize) statistical principles and concepts, and to help you think in an analytical and critical way about statistics. Nevertheless, we will spend a lot of time generating our own statistics as well. Topics include, but are not limited to: descriptive statistics, regression, inference, and analysis of two-way tables.

Goals and Objectives

Our primary objective is to practice and become proficient in the following:
1) The analysis and interpretation of data
2) The choice and application of appropriate methods
3) The communication of the results to others

Required Text
Diez, Barr, and Çetinkaya-Rundel, *OpenIntro Statistics* (fourth edition). The book can be downloaded for free at https://www.openintro.org/book/os/ , or ordered very inexpensively on Amazon.

Calculator
Though not required, you may find it useful to have a calculator that performs at least the standard scientific functions.

Teaching Philosophy and Course Expectations

New learning occurs most effectively when it is based on what students *already know*, when students actually '*do*' real science, and when they become aware of *how* they learn, not just *what* they learn (Donovan, 2005). Learning is a deliberate and conscious decision, one that involves breaking established neural patterns and creating new ones. To best facilitate growth, my expectations are for you to:

- Think critically. This course will require critical thinking. People that analyze, infer, evaluate, and make reasoned judgments do better in college, make better daily decisions, and have greater professional success. Developing critical thinking should be a key goal of every student.

- Apply yourself. This course will take a lot of time and energy. If you have high learning expectations, that is what you will achieve. Success in this course will require significant effort (several hours of study time for each hour of class). Depending on your mathematical background, you may need to spend more or less study time. Attend class regularly, be on time, and budget your time to accommodate the workload.
- Ask questions. Statistics is fascinating, but it can be confusing, too. Ask questions. If you aren't clear on something, there are likely others who are equally unclear on the topic.
- Be informed. People sometimes use information to manipulate others' behaviors and decision-making in ways not always to your benefit. If you don't understand the mathematical basis of a claim about data, you can't make an informed decision about it. Be curious; try and found out all you can about a topic before you make a decision that may profoundly affect your life.
- Be respectful. We will discuss some sensitive and controversial issues in this course. Everyone will respect others' right to express their opinions even if you disagree. Respectful discourse is a minimal expectation of every student.
- Communicate clearly. Effective written and oral communication indicates an intelligent mind. Clarity, proper format, spelling, and grammar are expected of every student.
- Use common sense. Cheating on assignments or exams, plagiarizing others' work, and turning in late assignments is unacceptable. Any infractions may result in a zero for the assignment, a failing course grade, and the possibility of disciplinary action by the university. I won't accept *anything* late unless you have written documentation from an appropriate source or have made prior arrangements with me. If you have a problem that prohibits you from turning something in on time, let me know ahead of time. In all instances, communicate with me so we can prevent problems.

Evaluation and Grading

People learn differently; some people excel at taking lecture exams while others do better with written projects or group work. To accommodate different learning styles, your performance in this course will be evaluated using: 1) individual exam scores, 2) laboratory performance, 3) group quizzes, and 4) written projects, as follows:

Assessment Method	Value
Weekly quizzes:	10%
Labs:	20%
Case studies (2)	10% each
P-value project	10%
Mid-term exam	10%
Final Exam	20%
Homework	10%

Final grades will be assigned according to the following scale:

	A 100-93%	**A-** 92.9-90%
B+ 89.9-87%	**B** 86.9-83%	**B-** 82.9-80%
C+ 79.9-77%	**C** 76.9-73%	**C-** 72.9-70%
D+ 69.9-67%	**D** 66.9-63%	**D-** 62.9-60%
F 59.9% and below		

Explanation of Assignments and Activities

Quizzes: Quizzes will be given every Friday at the beginning of class, with the exception of exam weeks. Quizzes include material covered through Wednesday of that week. No make-up quizzes will be given, but to allow for unavoidable absences the lowest quiz score will be dropped. If you must miss a Friday class due to a school activity (e.g., a class field trip or university-sponsored athletic event), that quiz can be excused if this is requested *in advance*. Quizzes will be excused only for school-related activities.

In general, quizzes will be taken in groups of three people. Quiz group assignments will be randomly chosen just before the quiz. At times individual quizzes may be offered.

Labs: Labs are opportunities to learn and practice the mechanics of performing statistics on a computer. The lab each Tuesday will include questions to be answered, including relevant statistical analyses. Your answers to these questions (which should include both statistical output and written English sentences) should be handed in during next Tuesday's lab. **NO credit will be given for late work.** Your solutions should be typed, written in complete sentences, and follow the general guidelines for written work given above.

Exams: Exams will consist of a combination of multiple choice, short answer, and essay questions. Any changes to the tentative exam dates will be announced ahead of time in class. Make-up exams must be arranged ahead of time unless you can document an unexpected circumstance beyond your control that prevented you from taking the exam. For instance, in the case of illness, a doctor's note will be required. All make-up exams must be requested as early as possible. Exams requested more than 24 hours after the scheduled exam will be given only in extreme extenuating circumstances (e.g. hospitalization, jail, etc.)

 The final exam is cumulative, and must be taken at the designated time. Our final exam period is Tuesday, March 15, 8:00-10:00.

Case Studies: Two times during the quarter, you will work with a group on a significant, open-ended case study in which you will choose an aspect of our class dataset to study, and perform careful analysis, inference, and evaluation of the results. Each case study will culminate in a written report. Additionally, after one of your case studies, your group will give a 5-10 minute oral report on your work to the class.

P-value project: We will complete a project in which we examine p-values from a variety of perspectives. This work will be a combination of individual, group, and full-class work, and each student is expected to submit a final report.

Final Project: The final case student will be a significant, culminating, experience in this course. The final project will consist of a series of statistical analyses of a large data set (to be distributed in the second week of class)

Homework: Homework will be assigned the end of most classes. It is expected that you will do the homework problems. Questions about the previous day's homework will be taken at the beginning of class each day. Of course, I will happily take any and all homework questions during office hours. Keeping up with the homework is one of the best things you can do to help yourself succeed in this course!

General Course Policies

Daily attendance is expected and considered necessary for success. If you need to miss class for some reason, try to contact your professor in advance. It is your responsibility to find out what was covered on days you were absent, either from a classmate or from your professor. You are responsible for any announcements made in class regarding homework, exams, and quizzes, whether or not you are present. Please bring your calculator to each class meeting.

Please note that Tuesdays are "lab days", on which class will meet in the computer lab. You will have activities to do on these days using statistical software and write-ups based on these to hand in; see below.

All work handed in for the course must be written neatly, legibly, clearly, using correct mathematical notation, and with sufficient explanation. A good rule of thumb is to write your solution so that a classmate who knows roughly what's going on in the course but doesn't know how to do this particular problem can understand your solution. As a side benefit, this makes it much more likely that you will be able to understand your solution when you go back to study for exams or the final! The bottom line: for any written work handed in for the course, including lab write-ups, exams, and quizzes, **you must show your work**.

Part of this class involves the writing of weekly lab reports on your computer-based statistics work. These must always represent your own work. The taking of work from other sources, including your classmates, is plagiarism, and is strictly prohibited by the university's conduct code. If you commit plagiarism on a lab assignment once, you will receive a "0" for that assignment, and a note will be sent to the department chair. If you commit plagiarism a second time, you will automatically fail the course.

Disability Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning, discuss your concerns with the instructor. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations. Student Disability Services is located in Hogue 126. Call (509) 963-2214 or email ds@cwu.edu for more information.

Policy on Diversity

University-level education is about broadening horizons and looking at academic issues from a variety of perspectives. With this in mind, the participants in this class are encouraged to bring their own life experiences and viewpoints to bear on classroom discussions and assignments. Along with the freedom to express one's own views comes the responsibility to respect the views of others. No student will be discriminated against on the basis of race, ethnicity, age, creed, religion, gender, sexual orientation, marital-status, or political ideology.