

Math 410A, Fall 2022
Advanced Statistical Methods (part 1)

Instructor: Dr. Dominic Klyve

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Office Hours: Monday - Wednesday 9:00 – 9:50, Thursday 11:00 – 11:50, and by appointment

Meeting times:

Tuesday, Wednesday, 10:00 – 10:50 in Samuelson 117

Monday, Thursday, 10:00 – 10:50 in Samuelson 138 Computer Lab (unless otherwise announced)

Course Goals and Description: This course is the first of a two-part sequence designed to cover the most common statistical methods in use today. We will learn the theory behind the models and methods we use, and we will spend a lot of time using them to answer questions about real-world data. Topics in the first quarter will likely include linear regression, multiple regression, logistic regression, inference from regression, interaction terms, linear discriminant analysis, variable selection methods, and one- and two-way ANOVA.

The second half (410B) will include many details about ANOVA, non-parametric statistics, permutation and bootstrap methods, ridge regression, the lasso, time series analysis, cluster analysis, and Principal Component Analysis. This part of the course will also include a significant component on presenting statistics in public.

Students completing both parts A and B of MATH 410 have seen almost all the material on the Society of Actuaries' *Statistics for Risk Modeling* exam.

Required Text: Gareth James, et al. *An Introduction to Statistical Learning with Applications in R*, Springer.

(Note that this text is freely available for download at [https://www.statlearning.com/.](https://www.statlearning.com/))

Evaluation and Grading: Grades will consist of four components: (roughly) weekly labs (20%), homework (10%), two midterm exams (20% each), and a large quarter-long project (30%) in which you will complete and write about a significant statistical analysis of your own or with your team. This may serve as a prelude to a larger project you will complete in Math 410B.

Grades will be assigned according to the following scale:

	A	93-100%	A-	90-92.99%	
B+	87-89.99%	B	83-86.99%	B-	80-82.99%
C+	77-79.99%	C	73-76.99%	C-	70-72.99%
D+	67-69.99%	D	63-66.99%	D-	60-62.99%
	F	59.99% and below			

Details concerning course components

“R skills” labs

The course will feature two or three labs which introduce you to, and let you practice, sets of specific advanced skills in R.

Each of these labs will contain a short introduction, a reference to one or more resources for mastering the technique, and a set of challenges for you to complete.

Homework

A small amount of homework will be assigned from the book most weeks. These are designed to let you practice the basics of the new statistics we are covering, and the corresponding techniques in R. Homework will generally not be collected.

Midterm Exams

There will be two take-home mid-term exams, given roughly during Week 5 and Week 9. During this time you may use any sources you like except for other people.

General Course Policies: Come to class. Do your own work. Work really hard; parts of this class are likely to be quite difficult, but you will leave it with a useful set of skills, and a better understanding of what you are getting yourself into professionally!

Documentation: Most assignments will require some form of documentation or “showing work;” this will be specified with the assignment. Any handwritten work must be written neatly, legibly, clearly, with correct mathematical notation, and with sufficient explanation. For all assignments, keep in mind that you want to write for someone who isn’t necessarily familiar with the project but may need to use or modify your work.

Masks: Masks are welcome and encouraged at all course activities, and I will likely be masking throughout the quarter. Please note that I am *requiring* masks for in-person meetings in my office, since it’s a small space. If you would prefer not to wear a mask, I would be happy to set up a Zoom appointment with you.

COVID Vaccinations: In accordance with Proclamation 21.14.1, CWU requires COVID vaccination for all current employees and students. Medical and/or religious accommodation requests will be considered. All employees and students are strongly encouraged to receive whatever boosters they are eligible for. There will be vaccination and booster clinics on Friday, Sept. 23 from 9AM - 1PM and Friday, Oct. 21 from 11AM - 3PM, both in SURC 137 A/B.

Late Work: Assignments can be submitted late with a 20% penalty per 24-hour period, up until the time that graded assignments are returned to the rest of the class. Assignments submitted after graded work is returned to the rest of the class will not receive credit, however, one Excel lab and one homework assignment (corresponding to about a week’s worth of work) will be dropped. Please note that I tend to grade assignments shortly after they are submitted and almost always within a few days.

Submitting Work Electronically: All work for this course will be submitted electronically through Canvas.

- The required file type or types will be specified with the assignment.
- Handwritten work will generally be required to be submitted as a PDF. To create a PDF, you have a few options:
 - You can scan it to a PDF document using a cell phone camera. Some apps that do this (there are many others if you don’t like these): Adobe (free) or CamScanner (free version) for Android phones; the Notes App (built-in) or CamScanner (free version) for iPhone.
 - You can take a well-lit, easy-to-read photograph, insert it into a Microsoft Word or OpenOffice Writer document, make sure that the photo is oriented correctly and easy to read, and then save the document as a .pdf file for upload to Canvas.
 - If your work is multiple pages, please upload it as a SINGLE file.

Whichever method you choose, please double-check that your image is oriented correctly. Images not oriented correctly or images that are not easy to read will lead to the assignment being returned without being graded.

Contingency Planning: In the event that we are unable to meet in person (this could be due to the university shifting entirely to remote coursework, inclement weather or wildfire smoke closures, or because one of us needs to isolate), this course will convert for the necessary time period to a *synchronous* online course using Zoom. This means that you will be expected to continue attending class at the scheduled times, but we will meet using Zoom rather than in-person. In the event that a period of remote learning includes a course assessment, we may change the format of the assessment if necessary.

Illness: If you are feeling unwell for any reason, *please, please, please stay home*. Being vigilant about this will help prevent the spread of COVID-19 (and other bugs!) and allow us to continue in-person classes.

Academic Honesty: Consult university policies (CWUP 5-90-040(22), CWUR 2-90-040(22), and WAC 106-125-020) for student conduct, cheating, plagiarism, and other academic expectations. CWU's policies and recommendations for academic misconduct will be followed, leading to disciplinary action up to and including failing the course.

Inclusivity Statement: As a member of a peer learning community, a high degree of professionalism is necessary. **CWU expects every member of the university community to contribute to an inclusive and respectful classroom culture.**

Classroom Conduct: Students in this class are expected to interact with students and the professor professionally. Instances of disruptive conduct, obstructive conduct, or harassment (see definitions below from the Washington Administrative Code: WAC 106-125-020) will be referred to the Dean of Student Success.

Disability Support Services: Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations: Hogue Hall 126, 509.963.2214, DS@cwu.edu

Is my absence excused? Excused absences will not lower your overall grade in this class and are determined on a case-by-case basis. Excused absences include illness, bereavement, and school-related activities. With the exception of illness, documentation is required. Excused absences do not include travel for holiday breaks, work, or non-emergency travel delays.

In compliance with RCW 28B.137.010, Central Washington University makes every effort to deal reasonably and fairly with students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Students must present written notice to their instructor within the first two weeks of class listing the specific dates on which accommodations are required. Contact the Dean of Student Success at (509) 963-1515 for further information or questions.

Communication: While we all hope for a smooth quarter, we know that best-laid plans can go awry! Some of us may need to quarantine or isolate in the middle of the quarter. We all may need to shift entirely remote on short notice (and it may be worth thinking in advance about how you would make that work, both in terms of technology and in terms of being able to attend class and complete work remotely). In all things, communication is going to be key. If you have something going on, please let me know (no details you don't feel comfortable sharing, of course, just a general heads-up). As things need to change during the quarter, we will do our best to let you know as soon as we can. In all things, please extend grace to your instructor and your classmates, and we will do our best to do the same.

We reserve the right to change the policies contained in this syllabus as dictated by developments during the quarter.