Syllabus

This syllabus is subject to change! All changes will be announced in class.

Course Information

Instructor: Bryan Martin (https://bryandmartin.github.io) (bmartin6 at uw dot edu)
Class Times: Mondays & Wednesdays, 1:10–2:50pm, remote
Office Hours: TBD, remote

Note: When emailing either the instructor or grader, please include "[STAT 302]" at the beginning of the email header! It will help us respond to you faster.

Overview and Course Philosophy

Computational and data analysis skills are beneficial in any field where data exists (basically all of them!), and are absolutely essential to modern statistics. This course aims to help you build a foundation for these skills and develop them to a level that allows you to use them in practice. This can be challenging because real world data are usually not as straightforward as what we see in classrooms. Properly tackling analyses of such data often requires that we develop and build our own tools, and do so in a way that others are able to use and even extend our methods. The ability to properly understand, summarize, visualize, model, and analyze complex data, and to do so in a reproducible way, is fundamental in the toolbox of statisticians and data scientists. These are the skills you will gain throughout this course.

Students are assumed to have an introductory knowledge of statistics, but no formal computational training. All material is taught using the R statistical programming language. This course emphasizes:

- **Application over theory**: There is a plethora of great courses at UW that will teach you statistical theory; this course is not among them. We will briefly touch on and review statistical concepts to the extent that they are needed, but it is important to be able to transition from the classroom to the workplace. This course aims to help you do that by moving from statistical theory to statistical practice. It’s been a long time since anyone was paid to look up a p-value in a table in the back of a book!

- **Coding best practices**: Whenever you code, whether it be for a class, job, or anything else, you will save yourself a lot of time and trouble by learning and using modern best practices from the beginning. If anyone else ever interacts with your code, you will save them a lot of pain as well. We will dedicate a substantial amount of course time to concepts such as commenting, style, documentation, version control, and more. These skills might seem tedious at first, but it is much, much easier to learn them straightaway rather than build a habit of doing things the quick and easy way and then having to change your habits later!

- **"Real world" experience**: Of course, this a class, and you will be in a classroom, so we cannot possibly replicate all aspects of data analysis in the “real world”. However, we will practice working with messy data, debugging, and collaboration. The course projects will emphasize taking the tools we learn and develop throughout the course and applying them to realistic data scenarios. A well-designed and well-implemented project is something that boost a resume and demonstrate to potential employers that you have practical experience and training. You can see this small example (images/projectresume.png) from my own undergraduate resume as an example.

Learning Objectives:

In this course, we will learn fundamental concepts related to programming, statistical computing, and data analysis. Points of emphasis include:
Course Structure

Typically, each 80 minute class session will be broken up into a 45 minute lecture, 5 minute break, and 30 minute lab. Lab time is an opportunity for you to regularly practice your coding, work on assignments collaboratively, and get help from me.

- **Short Labs:** On most Mondays, you will be assigned Short Labs. These are designed for you to be able to complete, or nearly complete, during class hours. They will be due at the start of the next class and will be graded on the following 2 point scale:
  - 0: indicates incomplete or unacceptable work
  - 1: indicates a good faith effort towards completing >75% of the assignment
  - 2: indicates a good faith effort towards completing the entire assignment.

At the end of the quarter, your lowest Short Lab grade will be dropped.

- **Labs:** On most Wednesdays, you will be assigned Labs. These are more involved assignments that you likely will not be able to complete during class hours. They will be due at the start of the next class.

- **Projects:** Instead of exams, you will be assigned two projects throughout the course. Both projects will include at least two lab sessions.
  - **Project 1** focuses on data manipulation and visualization. You will be given 1 week to complete this project.
  - **Project 2** focuses on a statistical application to reinforce real-world data analysis skills. You will be given 1 week to complete this project.
  - **Project 3** focuses on version control, data analysis pipelines, and a cumulative application of course material. You will be given 2 weeks to complete this project.

- **Late Work:** Any assignment that is received late but less than 24 hours late will receive a grade penalty of 25%. Any assignment that is received 24–48 hours late will receive a grade penalty of 50%. Assignments will not be accepted more than 48 hours late.

- **Laptop:** This class requires a laptop, like all courses these days! If you do not have a laptop, you can borrow one for free from UW through the Student Technology Loan Program (https://stlp.uw.edu).

Classroom Environment

*I am absolutely committed to fostering a friendly and inclusive classroom environment in which all students have an equal opportunity to learn and succeed.*

- **Names & Pronouns:** Everyone deserves to be addressed respectfully and correctly. You are welcome to send me your preferred name and correct gender pronouns at any time.

- **Expectations this quarter:** You are taking this course during an unprecedented time. This time is difficult for all of us, including myself. Your number one priority should be taking care of yourself. I promise to you to do what I can to facilitate this. In return, my expectation for you is that you:

  
  *put into this course the time, effort, and energy that your circumstances reasonably allow.*

Those circumstances are going to be unique to each of you, and they might change throughout the quarter. That is okay. For some of you, your circumstances will allow you to put in a lot of effort. That is fantastic; please recognize the
privilege that this represents. For others, your circumstances won’t allow you to put in as much effort as you otherwise would like to for a college course. That is perfectly fine too.

You **never** need to apologize to me for:
- Anything pandemic or COVID related
- Making a mistake or not knowing something
- being absent or late
- wi-fi, connectivity, or technology issues
- childcare or other home responsibilities
- taking care of yourself
- normal, everyday stuff

Instead, explain your situation and, if necessary, say "thank you for understanding".

- **Extraordinary Circumstances Quarter:** As you may or may not know, Summer 2021 is has been deemed an "extraordinary circumstances quarter" by UW ([details here](https://registrar.washington.edu/students/ec-grading-change-request/)). Thus, you can decide to switch to S/NS grading without fee until the deadline. After the deadline, and through the point that your degree is posted, you may still change to S/NS grading for a $20 fee using the Extraordinary Circumstances Quarter Late Grade Option Change form. You will receive an S (Satisfactory) if you receive a 2.0 or higher, and this grade will count towards graduation/major requirements. I am not able to see whether or not you opt in to S/NS grading. This is a university policy I wholeheartedly support, and so I would like to be explicit about sufficient conditions for you to receive a 2.0:

  **If you obtain a 60% in the course, you are guaranteed to receive a minimum grade of 2.0.**

Note that this is a sufficient condition, not a necessary condition. Thus, it is possible for you to receive a grade of 2.0 or higher even without a grade of 60% or higher, as grades may be curved. As mentioned in the grading policy, I will only ever curve grades to help you, not to hurt you! Consistent and excellent work will always be rewarded with an excellent grade, regardless of the performance of the rest of the class.

- **Feedback:** I encourage and appreciate your feedback throughout the quarter. You are welcome to provide feedback on any aspect of the course at any time via email or in person. If you would prefer to do so confidentially, you can do so through the link I will provide on the Canvas page.

- **Collaboration:** On most assignments, collaboration is allowed and encouraged. You may discuss problems, approaches, and solutions with your classmates. Acceptable collaboration is limited to your classmates, and **you must clearly include on any collaborative work the name(s) of anyone with whom you collaborated!** Additionally, all submitted work must be your own. This means no copying code or written answers from any resource including your classmates. Plagiarism and cheating is easy for us to detect and will have serious negative consequences for you (see Academic Integrity below). If you have any questions regarding this policy, please ask for clarification.

- **Piazza Discussion:** You are encouraged to participate on the Piazza discussion forum. You are welcome to post questions about assignments, as well as to answer questions from other students. Posts may not include substantial amounts of code that can be used for a solution to any problem, but may include code snippets within reason. **Participation, both in the form of questions and answers, will allow you to earn up to 2% extra credit for your final grade!** Posts will be evaluated based on how substantive and helpful they are to the class.

- **Diversity:** Diverse backgrounds, embodiments, and experiences are essential to the critical thinking endeavor at the heart of university education. Therefore, I expect you to follow the UW Student Conduct Code in your interactions with your colleagues and me in this course by respecting the many social and cultural differences among us, which may include, but are not limited to: age, cultural background, disability, ethnicity, family status, gender identity and presentation, citizenship and immigration status, national origin, race, religious and political beliefs, sex, sexual orientation, socioeconomic status, and veteran status.

- **Accessibility & Accommodations:** Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924, uwdrs@uw.edu, or through their website ([https://depts.washington.edu/uwdrs/](https://depts.washington.edu/uwdrs/)).
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.

- **Academic Integrity:** Academic integrity is essential to this course and to your learning. On certain assignments, collaboration is allowed and encouraged when following the collaboration policy outlined above. Violations of the academic integrity policy include but are not limited to: copying from a peer, collaborating where it is not allowed, copying from an online resource, using a solutions manual, and using resources from a previous iteration of the course. Anything found in violation of this policy will be automatically given a score of 0 with no exceptions. If the situation merits, it will also be reported to the UW Student Conduct Office (https://www.washington.edu/cssc/), at which point it is out of my hands. If you have any questions about this policy, please do not hesitate to reach out and ask.

- **Religious Accommodations:** 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/).

### Grading

Your final grade will be calculated as follows:

- 15%: Short Labs
- 25%: Labs
- 10%: Minimum grade from Project 1 and Project 2
- 20%: Maximum grade from Project 1 and Project 2
- 30%: Project 3
- 2% (extra credit): Canvas discussion participation. Both questions and answers will be considered, so long as they are substantive and helpful.

The final grades will be curved, but only to help you! Consistent and excellent work will always be rewarded with an excellent grade, regardless of the performance of the rest of the class.

### Prerequisites

The prerequisite for this course is any one of the following:

- STAT 311: Elements of Statistical Methods,
- STAT 390: Statistical Methods in Engineering and Science,
- QSCI 381: Introduction to Probability and Statistics.

### Course Links

- Course Syllabus (syllabus.html)
- Canvas Page (https://canvas.uw.edu/courses/1358011)
- Download R (https://cran.r-project.org/)
- Download RStudio (https://rstudio.com/products/rstudio/download/#download)
- Download R Markdown (https://bookdown.org/yihui/rmarkdowninstallation.html#installation)
- RStudio Cheat Sheets (https://rstudio.com/resources/cheatsheets/