Advanced Topics in Quantitative Methods – R Programming

PSY4960 | Fall 2022

Contact Information:

Dr. Amanda Woodward | Pronouns: She/Her/Hers | Email: woodw284@umn.edu

Drop-in Hours: Tuesday and Thursday at 11-12pm or By Appointment*

Office Location: Elliott Hall S246

Zoom Drop-in Hours: By Appointment* | my office hour zoom room

Note: I am so excited to work with you this semester! Drop-in hours (office hours) are times that I have set aside during the week specifically to meet with students in PSY4960 (you do not need an appointment, and you are not bothering me). These are times that work for my schedule, but I recognize they may not work for you because of other obligations (other classes, caregiving, work). If this is true for you, we can find another time to meet that works for both of us. If you'd like to meet, but can't come to drop-in hours, please email me so we can set up another appointment time.

Course Description:

Conducting psychological research involves collecting data, but what happens next? Completing research projects involves more than just analyzing data! In this course, we will learn about the research process and how to incorporate Open Science practices to generate reproducible and transparent analyses. Specifically, students will learn both basic and advanced R programming to carry out data cleaning, analyses, and visualization. Finally, students will learn how to share their code and data via GitHub. A large component of this course will involve hands-on programming that will culminate in an independent final project. It is strongly suggested that students take PSY3801: Introduction to Psychological Measurement and Data Analysis prior to taking this course, but it is not required.

Course Objectives:

By the end of this course, students will be able to:

- Comprehend code written in R
- Use R programming to create data visualizations and analyze data
- Create an efficient workflow including using R and R Studio
- Interpret and solve coding errors
- Use GitHub and OSF to incorporate open science principles in your workflow

Course Information:

Lecture Information:

Dr. Amanda Woodward

When: Tuesday/Thursday: 9:45am – 11:00 am ***Location:*** Bruininks Hall 530A

Course Materials:

In this course, we will be using several types of open-source materials.

R/R Studio/R Cloud: R and R Studio are free, open-source statistical programs. We will be using them in discussion and in class to more easily compute our statistics. You can download R and R Studio from https://rstudio.com. You will need to download both versions. If you would prefer, you can also access R Studio through the cloud website: https://rstudio.cloud. You will need to make an account, and the free version should be sufficient for this class. You can access R Studio Cloud on your mobile device, if necessary. Please note there is a limited number of files you can make with a free account on the website version. ***It is your responsibility to download these materials, and to tell the instructor if you have any issues accessing R or R Studio.***

Optional Texts and Resources:

Though not required, some students find textbooks and online resources helpful for this course. Danielle Navarro has a free, online text that students may find to be a helpful supplement for this course:

Navarro, D. (2018). *Learning Statistics with R: A tutorial for psychology students and other beginners*. https://open.umn.edu/opentextbooks/textbooks/559 (FREE)

Additional resources will be posted on our Canvas page in a “Resources Module”.

TO PARTICIPATE FULLY IN THE COURSE, YOU’LL NEED:

Our course will be using a Canvas site as well as taking advantage of Github, which should provide you access to all materials you will need for the class. These technical requirements will allow you to access the Canvas site, send/receive online communications, complete assignments, and view media content.

- A U of M internet ID (your official U of M email address)
- Reliable, high-speed Internet access
- A supported Web browser (Google Chrome or Mozilla Firefox are strongly recommended)
- Laptop, desktop or tablet
- A GitHub account (can be created for free at Github.com AND using your umn email)

Grading Scheme:

The table to the left displays the letter grade associated with the grade you **earn** in this class. I do **NOT** round grades – a 79.9% is a C+, not a B-. Your **earned** grade will be based on the following categories:

Letter Grade	% range
A+	**98 – 100 %**
A	**94 – 97.9 %**
A-	**90 – 93.9 %**
B+	**87 – 89.9 %**
B	**84- 86.9 %**
B-	**80 – 83.9 %**
C+	**77 – 79.9 %**
C	**74 – 76.9 %**
C-	**70 – 73.9 %**
D+	**67 – 69.9 %**
D	**64 – 66.9 %**
D-	**60 – 63.9 %**
F	**0 – 59.9 %**

Assignment	% of Grade
Introduction Activities and Reflections	5%
Class Participation	5%
Weekly Assignments	25%
Quizzes	25%
Peer Review	10%
Final Project	30%

Course Requirements:

Assignments in this course are meant to build on each other to help ensure that you learn the material. The most effective way for students to learn is repeated exposure and repeated attempts. For this reason, students will complete several types of assignments to help them learn the concepts.

Introduction and Reflection Materials:

Introduction activities are important for helping us get to know each other and to ensure that students know what is expected of them. In this course, you receive credit for completing these activities.

Reflection is an important aspect of learning. Throughout the semester, you will have brief assignments to think about where you're starting, how you're doing, and where you will go.

Class Participation:

Participating in lecture is essential for student learning. If you are healthy, you are expected to attend lecture in person. Attendance will be marked by answering questions, working on in class problems, or other methods that will be announced. These assignments are graded based on completion.

If you are sick or must otherwise miss a class meeting (because life happens!), you have the ability to make up missed points by submitting one-page (front and back) handwritten or 1-2 pages of typed notes from the course. These should be submitted as a word document or pdf on this google form.

You will not receive partial credit for made up attendance, and you will not receive points for handing in annotated power points or notes from another lecture. Makeup notes must be handed in within two weeks of the missed class meeting. Please note that this opportunity will not have a due date on Canvas. However, it will still be open. It is your responsibility to be aware of this and to ask questions if you have them.

Weekly Assignments:

There will be weekly assignments to assess your knowledge of that week's materials. All assignments will be posted at the beginning of the week and will be due by Friday at 11:59pm. This is intended to give me time to grade assignments and allow you to ask questions in the subsequent class.

Weekly assignments will be graded based on both good faith effort and accuracy.

Quizzes:

In addition to weekly assignments, there will be several larger homework assignments. These assignments will include information from prior weeks and will assess your programming ability. These are open note/ open internet and will undergo peer review.

Peer Review:

Part of learning how to code is learning how to interact with the code programmed by your peers. In this class, you will be responsible for completing a peer review for three of your peers' assignments (2 quizzes and Step E of your final projects). Your peer review will be graded based on thoughtfulness, respectfulness, and your use of constructive feedback. We will discuss how to complete a peer review in class.

Final Project:

The final project for this course involves cleaning, analyzing, and visualizing data in an .Rmd file. We will discuss the exact framework for this project in class. You can expect that this project will involve analyzing a preexisting data set, formulating a preregistration, sharing your materials publicly through GitHub or OSF, and presenting your work in class. You can find more information about the final project in this guidebook.

Course and University Policies:

Late Work/ Extensions:

Life happens. If you require an extension for an assignment, you are responsible for completing the Extension Request Form. Please note that asking for an extension does not guarantee you will receive full credit for work. If you do not have a legitimate absence (as defined by the university), you may still turn in late work for partial credit. You must contact me to let me know that you plan to turn in late work- or you will not receive credit. ***With the exception of attendance points, late assignments will lose 10% of the grade for each business day late.*** However, if you hand an assignment due on Friday in by Sunday at 11:59pm, then you will receive full credit (because Saturday and Sunday are not business days).

Please remember that legitimate absences (e.g., religious observance, intercollegiate athletics, ROTC, National Guard service, subpoenas, University band, University student government, a death in the family, jury duty, or a confirmed medical illness) can lead to an extension. If we have not heard from you within 48 hours of the due date, you forfeit any right to an extension for any reason.

While I am happy to talk to you in person, written documentation (via email) is necessary.

Incompletes:

Incompletes will only be granted in the case of medical or personal emergencies. Incompletes can only be given if you are receiving a grade of "C-" or higher on work already completed and you must have completed at least half of the work in the course, preferably at least 75% of the work in the course. Let me know as soon as possible if suspect you might need to take an incomplete in the course. Please note that to receive an incomplete you must sign a written agreement stating your timeline for completing missed work.

Student Conduct Code:

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected to adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see: https://regents.umn.edu/sites/regents.u

mn.edu/files/2019-09/policy_student_conduct_code.pdf

Disability Accommodations:

In compliance with the Americans with Disabilities Act (1990) and the University of Minnesota policy, students with any documented disabilities are eligible for reasonable and appropriate accommodations in this class. A number of accommodations can be made in class if this applies to you. Please contact us and the Disability Resource Center as soon as possible if you need special accommodation for this course.

Electronic Devices:

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. In this class, we will be using computers to calculate statistics and for class participation. I expect that you will be on task and that you will not distract students around you.

Use of Course Materials:

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: *https://policy.umn.edu/education/studentresp*

Academic Integrity:

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. 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. (Student Conduct Code: https://regents.umn.edu/sites/regents.umn.edu/files/2019-09/policy_student_conduct_code.pdf)

If it is determined that a student has cheated, the student may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please

see: *https://policy.umn.edu/education/instructorresp*.

The Office for Community Standards has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: https://communitystandards.umn.edu/avoid-violations/avoiding-scholastic-dishonesty

Sexual Misconduct:

The University prohibits sexual misconduct and encourages anyone experiencing sexual misconduct to access resources for personal support and reporting. If you want to speak confidentially with someone about an experience of sexual misconduct, please contact your campus resources including the Aurora Center, Boynton Mental Health or Student Counseling Services (https://eoaa.umn.edu/report-misconduct). If you want to report sexual misconduct or have questions about the University's policies and procedures related to sexual misconduct, please contact your campus Title IX office or relevant policy contacts.

Instructors are required to share information they learn about possible sexual misconduct with the campus Title IX office that addresses these concerns. This allows a Title IX staff member to reach out to those who have experienced sexual misconduct to provide information about personal support resources and options for investigation. You may talk to instructors about concerns related to sexual misconduct, and they will provide support and keep the information you share private to the extent possible given their University role.

Duo Security:

If you use Duo Security to sign into University applications, YOU ARE STRONGLY ENCOURAGED to set up back-up devices in Duo Security so that you are prepared in the event that your primary Duo device is unavailable (e.g., you forgot it, it was stolen, it is broken, the battery is dead).

As a Duo user, it is your responsibility to be prepared to sign into applications necessary for class activities, including exams and quizzes. If you are unable to sign in, you might lose points for the class activity. Failure to have your Duo device or a back-up is not an excused absence or a valid reason for make-up work.

Definition of grades and academic workload policy:

According to the University Senate policy, the course syllabus must include a definition of grades. The University of Minnesota has adopted the following definition for letter grades:

A Achievement that is outstanding relative to the level necessary to meet course requirements.
B Achievement that is significantly above the level necessary to meet course requirements.
C Achievement that meets the course requirements in every respect.

D Achievement that is worthy of credit even though it fails to meet fully the course requirements.
F Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.
I Assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., hospitalization) a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

Workload:

"For undergraduate courses, one credit is defined as equivalent to an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course. For example, a student taking a three credit course that meets for three hours a week should expect to spend an additional six hours a week on coursework outside of the classroom."

This is a 3-credit course, you should expect to spend an additional six hours a week outside of lecture and lab on class material to earn a C (i.e., average grade) in this course. To earn a grade higher than a C, expect to spend more than eight hours a week on readings, studying for quizzes and exams, and completing assignments.

Modality Transparency:

This course is scheduled as an in-person course. I intend to hold all class sessions in-person except if situational factors arise, such as personal illness of the instructor, when the class may be held synchronously via Zoom or recorded for later viewing.

COVID-19 Symptoms, Vaccination, Excused Absences, and Face Coverings

You should stay at home if you experience any signs of illness or have a positive COVID-19 test result. If this occurs, please consult with your healthcare provider about an appropriate course of action. I will follow these same protocols and will let you know if the delivery of this course has to be temporarily changed as the result of my own circumstances. Absences related to illness, including COVID-19 symptoms, for yourself or your dependents, are **legitimate "excused" absences**

Vaccines: COVID-19 Vaccinations (or approved exemptions) are required for all students and employees. Learn about vaccine and booster appointments on campus by visiting the FAQ on Get the Vax page.

Face coverings: Up-to-date policy information is available on the Safe Campus page. The University expects all community members to respect those who choose to wear a mask, as well as those who choose not to wear one.

I intend to wear a mask in class myself, and I fully support your individual choices around masking.

Indoor masking continues to be an important tool in high-risk situations. High-quality masks (N-95 or certified KN-95) will be available to students Fall 2022. Check the Safe Campus website for information on the location(s) for each campus.

Testing: Information on *When*, *Where*, and *What if* for testing is available on MTest webpage.

The above policies and guidelines are subject to change. The University regularly updates **pandemic guidelines** in response to guidance from health professionals and in relation to the prevalence of the virus and its variants in our community.

Expectations:

Attendance:

I expect that you will attend lectures and discussion sections when you are able. If you are unable to attend the class, I expect you to complete class activities and email me, your peers, or attend drop-in hours if you have questions. You are ultimately responsible for the material you miss and completing any assignments.

Grade Disputes:

I will do my best to ensure that the gradebook is up to date. If you receive a grade that you believe does not reflect your work, you will have one week after the grade is released to request a formal regrade. To request a regrade, you must email me with 1) the assignment in question, 2) what you think is incorrect about the grade, and 3) any supporting evidence for your request. Please note that a regrade does not guarantee a higher grade and can result in a lower grade. The regrade is final, and I will not use the original grade, regardless of which is higher.

Self-Care:

Life happens. I expect you to prioritize your health and wellness and that of your loved ones. In these cases, I expect you to practice self-care and focus on taking care of yourself. If you require additional resources, please see the following:

http://www.mentalhealth.umn.edu

http://www.mentalhealth.umn.edu/stressmgmt/index.html

Class Expectations:

During the first class, we will discuss expectations of our class and how to interact. Generally, I expect that the classroom will be a place where you should feel comfortable. I expect you all to act civilly and professionally. If I ever do something that makes you feel excluded from the classroom, and you feel comfortable, please let me know.

Classroom Etiquette:

Lectures will be held in person. This is a time of transition for all of us. Please make sure to follow all university guidance regarding face masks and safety protocols.

Have a Question?

- Check the course website and all course information
- Post your question on the class discussion board (chances are that others have the same question!)
- Email me and include "PSY 4960" in the subject line. Do not expect replies after 5pm or on weekends

Come Prepared:

Learning R is important but can be challenging. Make sure to stay up to date on all assignments and on all readings. This will allow you to engage with the material better and ask questions.

Email:

Primary course communication will occur via email. Please check your UMN email frequently and let us know if you have questions. You should also check your Canvas email and announcements regularly for course updates. When emailing me, you should include "PSY4960" in the subject line.

I will do my best to respond to email with 24 – 48 hours (and will often respond faster). Please note that I typically sign off around 5 pm and emails sent late at night may not be answered until the following morning. For this reason, I recommend looking at assignments ahead of time.

Time Management:

This document contains every assignment that will be due in this course. Due dates are both in this syllabus and on the course website, and I expect you to manage your time appropriately. Semesters go by fast, so please do not wait until the end to submit your work. If you have any questions about ways to manage time or keep track of assignments, please see the following for some applicable strategies or feel free to come to drop-in hours to discuss other strategies:

- Student Academic Services Self-Help Resources
- Effective U Time Management Tutorial
- Managing Time More Effectively TED Talk
- Free Time and Time Management TED Talk

Be curious:

Ask questions! Explore on your own and share. Make connections between your own life/ TV/ the real world in class. These techniques help solidify course concepts, and I hope that you share these thoughts with me, on discussion boards, and with your peers.

Course Schedule:

This is a tentative course schedule. Any changes to this document will be emailed and posted on the course website. ***It is your responsibility to check the materials posted online.***

Week	Day	Date	Question	Topic	Assignment (s)*
1	Tues	9/6	What are we doing?	Introduction to the Course	Welcome Survey Syllabus Activity Introduction Discussion Board
	Thurs	9/8	Why R? (and Why Open Science?)	Contextualizing the use of R	Reflection activity (due before class)
2	Tues	9/13	How do we organize our work?	Introduction to Workflows	Weekly Assignment #1
	Thurs	9/15			
3	Tues	9/20	What is GitHub? (and why do we care?)	A(brief) Introduction to GitHub	Step A Weekly Assignment #2
	Thurs	9/22			
4	Tues	9/27	How do we get started with programming?	Introduction to Programming in R Base R	Weekly Assignment #3
	Thurs	9/29			
5	Tues	10/4	How do we get started with programming?	Base R	Step B Weekly Assignment #4
	Thurs	10/6			
6	Tues	10/11	How do we make and edit data frames?	Dataset Manipulation	Weekly Assignment #5 Quiz 1 (Base R)
	Thurs	10/13			
7	Tues	10/18	How do we visualize data?	Using ggplot	Step C Peer Review #1 (Quiz 1)
	Thurs	10/20	How do we visualize data (virtual class)?	Using ggplot (recording)	Weekly Assignment #6 Quiz 2(Data Manipulation)
8	Tues	10/25			

	Thurs	10/27	How do we visualize data (advanced)?	Modifying ggplot, shiny, and other	Weekly Assignment #7 Quiz 3 (ggplot2)
9	Tues	11/1	How do we analyze data?	Preregistration and Statistics in R	Weekly Assignments #8
	Thurs	11/3			Peer Review #2 (Quiz 3)
10	Tues	11/8	How do we analyze data?	Statistics in R	Weekly Assignment #9
	Thurs	11/10			Quiz #4 (Statistics in R)
11	Tues	11/15	How do we pull the pieces together?	Reproducible Analyses	Step D (Due 11/15)
	Thurs	11/17			Weekly Assignment #10 Quiz #5 (Analyses)
12	Tues	11/22	Project Work	Work on Projects	Step E (due before class 11/22) Peer Review #3 (Final Project Step E) Due 11/23
	Thurs	11/24	No Class- Thanksgiving		
13	Tues	11/29	What do you want to know about?	Advanced R	Step F
	Thurs	12/1			Weekly Assignment #11
14	Tues	12/6	What do you want to know about?	Advanced R	Step G (Due 12/6)
	Thurs	12/8	What did we do this semester?	Project Presentations	Step H (Due 12/8) Step I (Due 12/8 before class)
15	Tues	12/13	What did we do this semester?	Project Presentations	Step J (Due 12/14)
	Thurs	12/15	No Class- Study Day		

* unless otherwise noted on Canvas, assignments are due on Friday

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