

Research Methods in Biology II

BIO 5202
Spring 2025

Schedule Tu/Th 12:30-1:45, BSB D105

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Course Objectives

To gain understanding of tools, principles, and techniques that support reproducible analyses, including introductory programming, management of data and workflows, visualization, exploratory analysis, accessing and reviewing literature, communication of technical information, collaboration in teams, FAIR data principles, and data policies.

Texts (these are free online)

1. R for Data Science. Wickham and Golemund. 2023 <https://r4ds.hadley.nz/>
2. Fundamentals of Data Visualization. Wilke. 2019 <https://clauswilke.com/dataviz/>
3. Occasional supporting articles to be discussed in class

Course Structure

The success of this course depends on **student participation** in discussions of methodological issues related to scientific investigation and graduate/post-graduate education.

Classroom activities will frequently include computer exercises to be performed using R, a powerful and widely used open source computer application (www.r-project.org). We will run R using R Studio (<https://www.rstudio.com/products/rstudio/>), which helps organize code, graphs, etc. Other classroom activities will involve group discussions and break-out sessions. Students will need to bring their own machine each day and will be expected to have done the readings for each week prior to class time. We will frequently work with files shared in the course's Github repository.

Grading

Students are graded based on **problem sets, presentations, and participation in class discussions. Attendance will be taken and only one unexcused absence will be allowed without penalty.**

Problem Sets #1 and #2

Two problem sets will be distributed over the semester- one near the middle and one near the end- to be worked on outside of class time. Problem sets will be largely based on in-class exercises and content, but you should be prepared to use critical thinking to apply learned tools, principles, and techniques to an unfamiliar problem. These are "open everything" take-home assignments and it is acceptable to work with each other on them, but all answers must be in your own words. Take note that multiple versions of each problem set will be distributed.

Analysis Tutorial

Develop and present to the class a 10-12 minute **analysis tutorial** that addresses a stated research question with functional code, non-sensitive data, results, slides, and a succinct readme file shared in a public repository, preferably on Github. If you choose, it is acceptable to pre-record your tutorial presentation as a video to be watched by the class. A portion of your Analysis Tutorial grade will be based on a short write-up of your initial project idea and a short presentation about it (~5 minutes) earlier in the semester. You may develop your tutorial individually or with a partner.

Total course grade

Problem Set 1	25%
Problem Set 2	25%
Analysis Tutorial	25%
Participation	25%

Attendance: The Baylor attendance policy will be enforced.

Academic integrity

You are encouraged to become familiar with the University's Policy of Academic dishonesty found in the Student Handbook. The content of the Handbook applies to this course. Academic dishonesty is grounds for removal from the course and receiving a grade of "F."

Baylor University Title IX

Sexual and Gender-Based Harassment and Interpersonal Violence Policy

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