

# Course overview

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1. **Online video lectures.** Available through YouTube for you to watch asynchronously (about 2 hours per week)
2. **Live Sessions.** Synchronous meetings to work together on practical coding exercises (about 2 hours per week)
3. (Optional) **Live Office Hours.** Synchronous meetings to ask questions about course material, homework, etc. (about 3 hours per week)

# Where to find what you need

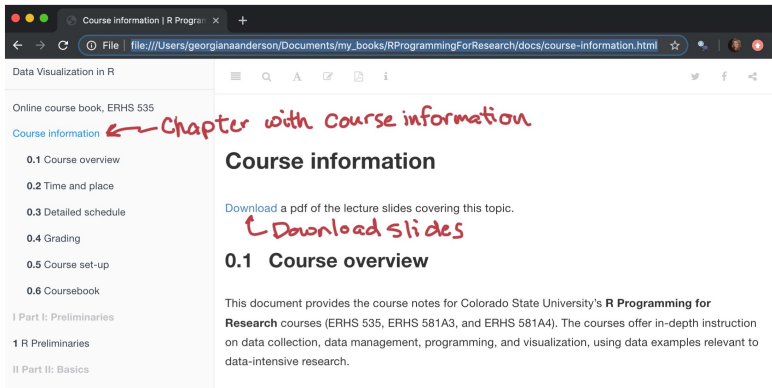
Online coursebook:

<https://geanders.github.io/RProgrammingForResearch/>

- Embedded video lectures
- Links to YouTube playlists of lectures
- PDF downloads of lecture slides
- In-class exercise prompts
- Homework assignments
- Quiz vocabulary
- Course information, including detailed schedule

# Where to find what you need

- In person
  - Regularly scheduled meetings
  - Announcements at start of session
  - Breakout groups to do coding exercises in small groups
  - In-course quizzes through link (Google Forms)
  - Optional office hours
  - Group work for final project
- Email
  - Reminder of assignment of video lectures to watch before live meetings
  - Repeat of major announcements
  - Homework submission, grades, and feedback
  - Quiz grades and feedback



The screenshot shows a web browser window with the address bar displaying a file path: `file:///Users/georgianaanderson/Documents/my_books/RProgrammingForResearch/docs/course-information.html`. The page title is "Data Visualization in R". The main content area is titled "Online course book, ERHS 535". A sidebar on the left lists the course structure, with "Course information" highlighted. Handwritten red text "Chapter with course information" with an arrow points to the "Course information" link. The main content area has a heading "Course information" and a link "Download" followed by the text "a pdf of the lecture slides covering this topic." Handwritten red text "Download slides" with an arrow points to the "Download" link. Below this is a section titled "0.1 Course overview" with a paragraph of text.

Course information | R Program

File | `file:///Users/georgianaanderson/Documents/my_books/RProgrammingForResearch/docs/course-information.html`

Data Visualization in R

Online course book, ERHS 535

Course information ← Chapter with course information

- 0.1 Course overview
- 0.2 Time and place
- 0.3 Detailed schedule
- 0.4 Grading
- 0.5 Course set-up
- 0.6 Coursebook

I Part I: Preliminaries

1 R Preliminaries

II Part II: Basics

## Course information

[Download](#) a pdf of the lecture slides covering this topic.  
↳ Download slides

### 0.1 Course overview

This document provides the course notes for Colorado State University's **R Programming for Research** courses (ERHS 535, ERHS 581A3, and ERHS 581A4). The courses offer in-depth instruction on data collection, data management, programming, and visualization, using data examples relevant to data-intensive research.

# Time and place

- Time: Mondays and Wednesdays 10:00 am–11:00 am
- Exceptions:
  - There will be no meeting on Labor Day.
  - There are no course meetings the week of Thanksgiving.
- Place: Microbiology B120
  - In person for exercises, online through YouTube for lectures, and online coursebook

# Office hours

Option #1: - Time: Mondays and Wednesdays 11:00am–noon (except Labor Day and the week of Thanksgiving) - Place: Microbiology B120

Option #2: Coding Club - Time: Fridays 12pm-1pm - Place: AZE 210  
- Contact: David King ([david.king@colostate.edu](mailto:david.king@colostate.edu))

# Laptops

- Please plan to bring a personal laptop to all classes.
- If you do not have access to a laptop you can bring to class, talk to me and we can try to figure something out.
- In this course we will be working with some large datasets. Please talk to me before the fifth week of class if you have limited space on your laptop.



We will cover four large themes in this course:

- Entering and cleaning data
- Exploring data
- Reporting data results
- Reproducible research

The first week covers preliminaries, and after that there will be “cycles” of covering these topics:

- **Preliminaries** Week 1
- **Basic** Weeks 2–5
- **Intermediate** Weeks 6–9
- **Advanced** Weeks 10–15
- **Final** Week 16

A detailed course schedule is available in the online course book.

Your grade will be determined based on the following components:

Assessment component	Percent of grade
Final group project	30
Weekly in-class quizzes, weeks 2–10	25
Homeworks 1–6	25
Attendance and class participation	10
Weekly in-course group exercises	10

## Attendance and class participation

You will meet twice each week in a live session.

On Mondays and Wednesdays, everyone will meet from **10:00 AM–11:00 AM**.

Optional live office hours will be from 11:00 AM–noon.

# Attendance and class participation

Because so much of the learning for this class is through interactive work in class, it is critical that you come to class.

On days that you have a quiz, the quiz will also be used to assess attendance. On other days, you will fill out an “Exit Ticket” when you leave the class.

Lectures will be shared through YouTube. They are embedded in the online course book within each chapter. At the start of each chapter, you can also find a link to a YouTube playlist with all videos for the chapter.

# Attendance and class participation

## 1.2 R and R Studio

Free and open-source software

What is R?

Watch later Share 1/10

A basic sketch of how software can be "free":

```
graph LR; A[Software source code] --> B[Software binary code]; B --> C[Working program on your computer]; D[If you have access to this, the software is "free as in speech"] --> A; E[If you get this for free, the software is "free as in beer"] --> B;
```

- **Gratis:** Free as in beer
- **Libre:** Free as in speech

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[Download](#) a pdf of the lecture slides for this video.

## Chapter 1 R Preliminaries

The video lectures for this chapter are embedded at relevant places in the text, with links to download a pdf of the associated slides for each video. You can also access [a full playlist for the videos for this chapter](#).

# Attendance and class participation

The screenshot shows a YouTube browser interface. The address bar displays the URL: `youtube.com/playlist?list=PLUGPtWgRXxqK1d-3V2MKCad24h-v75k8P`. The left sidebar contains navigation links: Home, Trending, Subscriptions, Library, History, Your videos, Watch later, Week 1 of R Program... (selected), and Liked videos. Below these are subscription categories: Music, Sports, and Gaming.

The main content area features a video player with a thumbnail showing a flowchart of software development. Below the player, the title 'Chapter 1 of R Programming for Research' is displayed, along with '10 videos • Updated today' and 'Public' visibility. A description states: 'Lecture videos corresponding to the "Preliminaries" chapter of "R Programming for Research", the coursebook for CSU's course with the same name. The book chapter is available at <https://geanders.github.io/RProgrammingForResearch/r-preliminaries.html>'.

The right sidebar, titled 'SORT BY', lists five video thumbnails with their titles and durations:

- What is R?** (12:21) by Brooke Anderson
- R and RStudio** (3:30) by Brooke Anderson
- Talking to R** (5:30) by Brooke Anderson
- Function calls** (8:26) by Brooke Anderson
- Objects and assignment** (9:08) by Brooke Anderson



## Attendance and class participation

You will be responsible for watching certain videos *before* you attend each live session. You will receive an email reminder with the list of videos you need to watch before each meeting. There will be about two hours worth of video lectures each week, broken into videos about 10–15 minutes each.

This week, you will be responsible for watching the first nine videos in Chapter 1 (“R Preliminaries”). The full schedule of lecture videos is available in the online-coursebook under the detailed class schedule.

# Attendance and class participation

Excused absences:

- Attendance this week will not be counted
- CSU-related: This is typically missing to attend a conference or for a field study for your research. To be excused, this requires a letter/email from your adviser.
- Serious medical issue.
- For an absence to be excused, you must email me a copy of the letter (if required) by 5:00 pm the Friday afternoon following the class you missed.

## Weekly in-course group exercises

- As long as you are in class and participate in these exercises, you will get full credit for this component.
- **If you miss a class**, to get credit towards this component of your grade, you will need to turn in a few paragraphs describing what was covered in the exercise and what you learned.
- To get credit for this, you must submit it to me by email by 5:00 pm the Friday afternoon of the week of the class you missed.
- All in-class exercises are included in the online course book at the end of the chapter on the associated material.

# Homework

- In approximately the first five weeks, there will be two homework assignments (see detailed schedule in the online course book). There will be six over the course of the semester.
- The first should be done individually.
- Homeworks will be graded for correctness, but some partial credit will be given for questions you try but fail to answer correctly. Some of the exercises will not have “correct” answers, but instead will be graded on completeness.

# Homework

B Appendix B: Homework | R P x +

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Data Visualization in R

Online course book, ERHS 535

Course information

I Part I: Preliminaries

1 R Preliminaries

II Part II: Basics

2 Entering and cleaning data #1

3 Exploring data #1

4 Reporting data results #1

5 Reproducible research #1

Appendices

A Appendix A: Vocabulary

**B Appendix B: Homework**

## B Appendix B: Homework

This section provides the homework assignments for the course.

### B.1 Homework #1

**Due date: Sept. 11 by 5:00 pm**

For this assignment, you will submit the assignment to me **by email** by the due date. You should include three files in your submission:

1. A Word document with seven paragraphs. Each paragraph should be headed with the name of one swirl lesson and the body of the paragraph should describe that lesson and what you learned from

Homework assignments

# Homework

- Homework is due to me by email by midnight on the due date.
- Your grade will be reduced by 10 points for each day it is late, and will receive no credit if it is late by over a week.

## In-class quizzes

- You will have quizzes weekly, starting next Wednesday
- Quizzes will be on Wednesdays at the start of class (first 10–15 minutes)
- Quizzes will continue until week 10 of the course
- Quizzes will be conducted through Google Forms. They will be immediately graded, and you will get back your grade and feedback as soon as you submit the quiz.

## In-class quizzes

- Quiz questions will be multiple choice, matching, short-answer, or similar styles of questions. The questions are designed so that each can be answered fairly quickly.
- If you miss a class with a quiz, you may make it up during office hours on the week of the missed quiz. Except in exceptional circumstances, this will be the only time when make-up quizzes will be offered.



## In-class quizzes

- There will be *at least* 10 questions per quiz. Usually, there will be 12–15.
- If you get, on average, 10 correct questions per quiz, you will get the maximum possible points for the quiz component of your grade.

## In-class quizzes

Nine quizzes total:

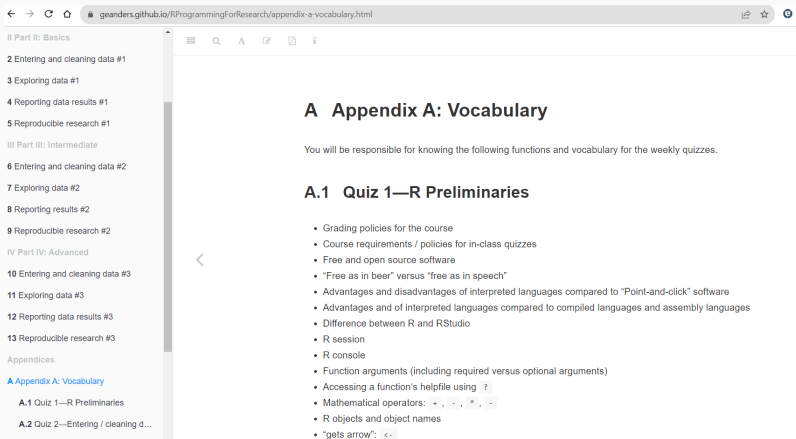
$$\text{Quiz grade} = 25 * \frac{\text{Number of correct quiz answers}}{90}$$

**Note:** You can not get more than the maximum of for this component quiz component (25 points).

## In-class quizzes

- The “Vocabulary” appendix of our online book has the list of material for which you will be responsible for this quiz.
- Most of the functions and concepts will have been covered in class, but some may not.
- You are responsible for going through the list and, if there are things you don't know or remember from class, learning them. To do this, you can use help functions in R, Google, StackOverflow, books on R, ask a friend, and any other resource you can find.

# In-class quizzes



← → ↻ 🏠 geanders.github.io/RProgrammingForResearch/appendix-a-vocabulary.html

II Part II: Basics

- 2 Entering and cleaning data #1
- 3 Exploring data #1
- 4 Reporting data results #1
- 5 Reproducible research #1

III Part III: Intermediate

- 6 Entering and cleaning data #2
- 7 Exploring data #2
- 8 Reporting results #2
- 9 Reproducible research #2

IV Part IV: Advanced

- 10 Entering and cleaning data #3
- 11 Exploring data #3
- 12 Reporting data results #3
- 13 Reproducible research #3

Appendices

- A Appendix A: Vocabulary**
  - A.1 Quiz 1—R Preliminaries
  - A.2 Quiz 2—Entering / cleaning d...

## A Appendix A: Vocabulary

You will be responsible for knowing the following functions and vocabulary for the weekly quizzes.

### A.1 Quiz 1—R Preliminaries

- Grading policies for the course
- Course requirements / policies for in-class quizzes
- Free and open source software
- “Free as in beer” versus “free as in speech”
- Advantages and disadvantages of interpreted languages compared to “Point-and-click” software
- Advantages and of interpreted languages compared to compiled languages and assembly languages
- Difference between R and RStudio
- R session
- R console
- Function arguments (including required versus optional arguments)
- Accessing a function’s helpfile using `?`
- Mathematical operators: `+`, `-`, `*`, `/`
- R objects and object names
- “gets arrow”: `<-`

An example of the vocabulary list:

- `mean()`
- `read_csv`, argument `skip =`
- R object
- open source software
- Hadley Wickham

## In-class quizzes

- Using R frequently in your research or other coursework will also help you prepare.
- Working on your homework assignments will also help you prepare.

# What you have due soon

- Wednesday, Aug. 30, during class: First in-class quiz. The “Vocabulary” appendix of our online book has the list of material for which you will be responsible for this quiz (Quiz 1 list).
- Monday, Sept. 11: First homework is due by midnight by email.