

# **R Quick Reference (Base R)**

**STAT 109: Introductory Biostatistics**

Welcome to **STAT 109: Introductory Biostatistics!**

## Quick Start

- **Course Schedule** - Weekly schedule and course materials
- **Course Syllabus** - Detailed course information and policies
- **Assessments** - Quizzes, exams, and projects

## Course Overview

**STAT 109: Introductory Biostatistics** (4 units) introduces descriptive statistics, probability, random variables, distributions, confidence intervals, hypothesis testing, regression, and ANOVA with emphasis on applications in biological and natural resource sciences.

**Lecture:** Monday, Wednesday, Friday, 11:00–11:50 AM, BSS 166

**Lab:** Thursday (select one section: 9:00–10:50 AM, 11:00–12:50 PM, or 1:00–2:50 PM), FH 202

**General Education:** Lower Division GE Area 2 (Quantitative Reasoning)

## Course Structure

Includes collaborative daily warm-ups, weekly programming labs, weekly quizzes, two midterms, and five portfolio ready projects. Optional final exam may replace one midterm grade.

## Instructor Information

**Instructor:** Dr. Rosanna Overholser

**Office:** BSS 334

**Email:** rho3@humboldt.edu

**Office Hours:** Mondays 2-3pm, Wednesdays 12-12:50pm, Fridays 10-10:50am, or by appointment

# STAT 109: Introductory Biostatistics

Cal Poly Humboldt — Spring 2026

---

## Course Information

**Course Number:** STAT 109

**Course Title:** Introductory Biostatistics

**Units:** 4

**Semester:** Spring 2026

**Mode of Instruction:** In-person

**General Education:** Lower Division GE Area B4 – Mathematical Concepts & Quantitative Reasoning

## Lecture

**Days/Time:** Monday, Wednesday, Friday, 11:00–11:50 AM

**Location:** BSS 166

## Laboratory (Thursday: enroll in one section)

**9:00–10:50 AM, LOCATION: FH 202**

**11:00–12:50 PM, LOCATION: FH 202**

**1:00–2:50 PM, LOCATION: FH 202**

## Final Exam (Optional)

**Optional Final Exam (held during the scheduled final exam period):** Wednesday, May 13, 2026, 10:20–12:10 PM, BSS 166. The final exam is optional and may be taken to replace a midterm grade.

## Instructor Information

**Teacher:** Dr. Rosanna Overholser

**Email:** rho3@humboldt.edu

**Office Location:** BSS 334

**Office Phone:** 707-826-4022

**Office Hours:** Mondays 2-3pm, Wednesdays 12-12:50pm, and Fridays 10-10:50am or by appointment

Please use your Cal Poly Humboldt email account to contact me and check both Canvas and your Cal Poly Humboldt email regularly for course communications.

---

## Course Description (Catalog Description)

Descriptive statistics, probability, random variables, discrete and continuous distributions, confidence intervals, contingency tests, regression and correlation, tests of hypothesis, analysis of variance. Emphasis: methods and applications used in the biological and natural resource sciences.

**Division:** Lower Division **Weekly:** Lecture 3 hrs. Activity 2 hrs. **Instruction Mode:** In-person

**Prerequisite:** MATH 101 or MATH 101I or MATH 102 or MATH 109B (may be taken concurrently with instructor

approval) with a grade of C- or better or ALEKS PPL assessment score over 65 or appropriate high school coursework. See [Math Placement and ALEKS PPL](#) for details. MATH 102 may be taken concurrently with instructor approval.

Note: if you plan to use STAT 109 as a prerequisite for another MATH, DATA or STAT course, you must have a grade of C- or better in this course.

## Course Learning Outcomes

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

1. Use numerical and graphical descriptive statistics to summarize and interpret data.
2. Explain the role of randomness, probability, and sampling in statistical inference.
3. Apply probability rules and work with common probability distributions.
4. Construct and interpret confidence intervals for means and proportions.
5. Conduct and interpret basic hypothesis tests.
6. Analyze relationships between pairs of variables using correlation and regression.
7. Use a statistical programming language to analyze data and communicate results.
8. Distinguish between correlation and causation and recognize limitations of statistical conclusions.

## General Education & Institutional Learning Outcomes

This course fulfills **Lower Division General Education Area 2 (Quantitative Reasoning)** and supports Cal Poly Humboldt's Institutional Learning Outcomes related to quantitative reasoning, critical thinking, and communication.

---

## Course Materials & Workload

STAT 109 includes:

- Three weekly lecture meetings
- One weekly laboratory session

In this 4-unit course, students should expect to spend approximately **12 hours per week** on course-related work, including time in lecture (3 hours), lab time (2 hours), and time outside of class to do practice problems, projects and prepare for exams and quizzes (7 hours).

## Required Materials

**Lecture Notes:** I'll provide packets of guided notes to you in class. These notes have key concepts, definitions and word problems that we'll solve during class time. These notes have spaces for you to fill in during lecture as we go. If you need to miss class, please ask me for the packet you will be missing.

**Optional Textbook:** [Introductory Statistics for the Life and Biomedical Sciences](#) by Julie Vu and Dave Harrington, available for free online.

**Three Binder:** Please bring a three-ring binder to class to keep the lecture note packets in.

**Pen or Pencil:** Please bring a pen or pencil to class to take notes with.

**Software:** R (free and installed on all campus computers; see [R download page](#) to install on your own computer)

**Calculator:** Scientific (not graphing) calculator

**Other Technology:** Regular access to a computer with reliable internet

## Access & Affordability

Students who do not have personal access to required technology may use campus computer labs and library resources. If you want to get a free used computer, please check to see if our campus's [Reuseable Office Supply Exchange \(ROSE\)](#) has one available.

## Fees

There are no additional course fees beyond standard tuition and registration fees.

---

## Course Feedback & Assessment

Students will complete a variety of assessments:

- Daily warm-up problems (Mondays, Wednesdays and Fridays, in lecture)
- Weekly programming labs (due Tuesdays, in Canvas: I'll help you write the code the Thursday before)
- Weekly quizzes based on practice problems and labs (Thursdays at the beginning of lab)
- Two midterms (Week 6 and Week 13 Fridays, in lecture)
- Five projects (Sundays at the ends of the weeks 5, 8, 10, 12, and 15, in Canvas)

Daily warm-up problems are designed to give you an opportunity to work as a team with your classmates. Weekly labs and quizzes are designed to provide regular formative feedback through practice problems, posted solutions, and in-lab support. Midterms require students to demonstrate their understanding of the course material. Projects allow students to apply their knowledge to practical, real-world problems and can be used as part of a portfolio.

Optionally, students may take a final exam (held during the scheduled final exam period: Wednesday, May 13, 2026, 10:20–12:10 PM, BSS 166) to replace a midterm grade.

---

## Grading

Component	Weight
Daily Participation	5%
Weekly quizzes	30%
Weekly labs	15%
Two midterms	30%
Five projects	20%
<b>Total</b>	<b>100%</b>

Final letter grades will be assigned based on overall performance according to the following:

A: 93-100% A-: 90-92% B+: 87-89% B: 83-86% B-: 80-82% C+: 77-79% C: 73-76% C-: 70-72% D: 60-69% F: 0-59%

Note:

- **Grade Mode:** Letter grade by default. Students may elect Credit/No Credit grading according to university deadlines and procedures.
- A minimum grade of **C-** is required for the course to count toward GE Area B4.
- If you stop attending class and stop doing assignments without communicating with me, you will receive a grade of WU (Withdrawal Unsatisfactory). Please communicate with me early if you are having difficulties: it's possible that I can help you get back on track, or help you obtain a more appropriate grade (W or I) for your situation.

## Attendance & Participation

Regular attendance and active participation are expected and essential for success in this course.

- Attendance in lecture will be tracked via participation in the warm-up problems.
- Attendance in lab will be tracked via participation in the quizzes.

If you must miss class, you are responsible for obtaining notes and keeping up with course material.

---

## Late or Missed Work Policies

The policies for late or missed work are as follows:

- **Daily attendance** in lecture is required, but I know that sometimes you will need to miss class due to illness or other emergencies. Each student may miss up to 10 days of lecture without penalty and without contacting me. It's up to you to reserve these days for emergencies only. In my experience, it is rare for a student to succeed if they regularly miss lecture or are absent for more than two weeks so if you find yourself in this situation, please communicate with me and your advisor so we can help you find a solution to getting back on track.
- **Weekly quizzes** during Thursday lab sessions are required, but I know that sometimes you will need to miss lab due to illness or other emergencies. If this happens, please contact me to make an arrangement to take the quiz at another time.
- **Weekly programming labs** are due Tuesdays in Canvas. After the due date, a solution will be posted, so late submissions are generally not accepted except in documented emergencies. These labs will be graded on completion and your reflection.
- **Projects** are due on the specified date in Canvas. You may submit a late project up to a week late with no penalty. After a week, a project can be turned in for 70% of the grade.
- **Midterms** are required. If you need to miss a midterm due to illness or other emergencies, please communicate with me as soon as possible to reschedule it. Alternatively, you may take the optional final exam (Wednesday, May 13, 2026, 10:20–12:10 PM, BSS 166) to replace a missed midterm grade.

**Note:** Technology issues (internet access, device failure, software problems) are not automatically considered valid excuses for late or missed work; students are expected to plan accordingly.

---

## AI Policy

Much of your course grade will be based on materials that you produce in-class without having AI as a resource. But you may use AI, such as NotebookLM or ChatGPT, in this course to help you learn the materials or to perform data analyses or on the projects.

For work that you do at home that is turned in for a grade I have two requirements:

- 1) if you used AI, acknowledge this briefly in the document (you don't need to state in detail how you used AI or give your prompts, just the name of the AI service you used).
- 2) Be responsible for the correctness and appropriateness of all (AI assisted or not) materials you turn in.

I may use AI to assist me in my delivery of the course material, such as asking AI to see if an assignment is appropriate for a college level course or if the wording of a quiz question could be improved. I will not use AI to grade your work or use an AI detection tool to check your work.

---

## Course Topics & Schedule

### Topics (Approximate Order)

- Introduction to data, simulation, and statistical reasoning
- Selected topics in probability
- Binomial Random Process
- A simple hypothesis test
- Normal probability distribution
- Sampling distributions and the Central Limit Theorem

- Sampling methods
- Confidence intervals
- Study design
- More Hypothesis testing
- Simple predictive modeling via Linear regression

## Summary of Schedule and Important Dates

Note: This schedule is subject to change. Any changes will be communicated through **Canvas**.

Date	Event
<b>January 20</b>	Holiday (No class)
<b>January 23</b>	Quiz 1 (during lab)
<b>February 2</b>	Add/Drop Deadline without a serious and compelling reason
<b>February 22</b>	Project 1 due
<b>February 27</b>	Midterm 1
<b>March 15</b>	Project 2 due
<b>March 16-20</b>	Spring Break (No classes)
<b>March 31</b>	Cesar Chavez Day (No class)
<b>April 5</b>	Project 3 due
<b>April 19</b>	Project 4 due
<b>April 24</b>	Midterm 2
<b>May 10</b>	Project 5 due
<b>May 13</b>	Final Exam (Optional, to replace a midterm grade) - 10:20 AM–12:10 PM, BSS 166

### Weekly Schedule:

- **Quizzes:** Weekly quizzes (Quiz 1-12) on Thursdays during lab sessions
- **Lectures:** Monday, Wednesday, Friday, 11:00-11:50 AM with warm-ups in the first 5 minutes of class
- **Labs:** Get help on the code for your programming lab on Thursday (select one section: 9:00-10:50 AM, 11:00-12:50 PM, or 1:00-2:50 PM), then turn into Canvas by the following Tuesday. Elements of a lab may appear on the quiz, in addition to questions from that week's practice problem set.

## Supplemental Instruction (SI)

This class is accompanied by a 1-unit Supplemental Instruction course designed to assist students in better understanding course materials. There is room for 20 students within the SI course, and it can be accessed through the normal enrollment process.

- **SI Course name:** Stat 198 - 31 Supplemental Instruction
- **Class number:** 22835
- **Time and place:** TR 4:00 - 4:50 PM FH 179
- **Instructor:** Em Madrid
- **Contact:** [ebm37@humboldt.edu](mailto:ebm37@humboldt.edu)

## University Policies & Resources

Students are responsible for reviewing the [Cal Poly Humboldt Syllabus Addendum](#), which includes policies and resources related to:

- Academic honesty
- Disability accommodations

- Emergency procedures
- Title IX
- Student conduct and support services

## **Accommodations**

Students who wish to request disability-related accommodations should contact the Student Disability Resource Center (SDRC) as early as possible and then email me (Rosanna Overholser, rho3@humboldt.edu) your letter of accommodation.

## **Classroom & Online Conduct**

Standards of respectful and professional behavior apply to all course interactions, including in-person classes, assignments, and email communication.

## **Changes to the Syllabus**

This syllabus is subject to change. Any changes will be communicated through **Canvas announcements**.

---



# Course Schedule

## Spring 2026

Week	Mon	Wed	Thu	Fri	Sun
1 (Jan 20–23)	Holiday	Lec	Lab 1 + Quiz 1	Lec	—
2 (Jan 26–30)	Lec	Lec	Lab 2 + Quiz 2	Lec	—
3 (Feb 2–6)	Lec	Lec	Lab 3 + Quiz 3	Lec	—
4 (Feb 9–13)	Lec	Lec	Lab 4 + Quiz 4	Lec	—
5 (Feb 16–20)	Lec	Lec	Lab 5 + Quiz 5	Lec	Project 1 due (Sun Feb 22)
6 (Feb 23–27)	Lec	Review	Review (no quiz)	Midterm 1	—
7 (Mar 2–6)	Lec	Lec	Lab 6 + Quiz 6	Lec	—
8 (Mar 9–13)	Lec	Lec	Lab 7 + Quiz 7	Lec	Project 2 due (Sun Mar 15)
— (Mar 16–20)	—	—	—	—	—
9 (Mar 23–27)	Lec	Lec	Lab 8 + Quiz 8	Lec	—
10 (Mar 30–Apr 3)	Lec	Lec	Lab 9 + Quiz 9	Lec	Project 3 due (Sun Apr 5)
11 (Apr 6–10)	Lec	Lec	Lab 10 + Quiz 10	Lec	—
12 (Apr 13–17)	Lec	Lec	Lab 11 + Quiz 11	Lec	Project 4 due (Sun Apr 19)
13 (Apr 20–24)	Lec	Review	Review (no quiz)	Midterm 2	—
14 (Apr 27–May 1)	Lec	Lec	Lab 12 + Quiz 12	Lec	—
15 (May 4–8)	Lec	Review	Lab 13 + Quiz 13	Review	Project 5 due (Sun May 10)
Finals (May 11–15)	—	Final Exam	—	—	—

### Notes:

- Mon Week 1 = Holiday (No class)
- Week 10 = Cesar Chavez Day (No class on Tuesday, March 31)

# Assessments

## Overview

This course includes several types of assessments designed to help you learn and to demonstrate your understanding of statistical concepts and methods.

Component	Weight	Description
Daily Participation	5%	Warm-up problems in lecture (Mondays, Wednesdays, Fridays)
Weekly quizzes	30%	Quizzes on Thursdays at the beginning of lab
Weekly labs	15%	Programming labs due Tuesdays in Canvas
Two midterms	30%	Midterm 1 (Week 6, Friday) and Midterm 2 (Week 13, Friday)
Five projects	20%	Projects due Sundays at ends of weeks 5, 8, 10, 12, and 15
<b>Total</b>	<b>100%</b>	

## Daily Participation (5%)

Daily warm-up problems are completed at the beginning of each lecture (Mondays, Wednesdays, and Fridays). These collaborative activities give you an opportunity to work as a team with your classmates and practice key concepts.

## Weekly Labs (15%)

Weekly programming labs provide hands-on practice with statistical analysis using R. Labs are **due Tuesdays in Canvas**. I'll help you write the code during the Thursday lab session before they're due. Labs are graded on completion and your reflection. After the due date, a solution will be posted, so late submissions are generally not accepted except in documented emergencies.

### Individual Labs

- **Lab 1** - Week 1 (due Tuesday, Week 2)
- **Lab 2** - Week 2 (due Tuesday, Week 3)
- **Lab 3** - Week 3 (due Tuesday, Week 4)
- **Lab 4** - Week 4 (due Tuesday, Week 5)
- **Lab 5** - Week 5 (due Tuesday, Week 6)
- **Lab 6** - Week 7 (due Tuesday, Week 8)
- **Lab 7** - Week 8 (due Tuesday, Week 9)
- **Lab 8** - Week 9 (due Tuesday, Week 10)
- **Lab 9** - Week 10 (due Tuesday, Week 11)
- **Lab 10** - Week 11 (due Tuesday, Week 12)
- **Lab 11** - Week 12 (due Tuesday, Week 13)

- **Lab 12** - Week 14 (due Tuesday, Week 15)
- **Lab 13** - Week 15 (due Tuesday, Finals Week)

## Weekly Quizzes (30%)

Weekly quizzes are administered on **Thursdays at the beginning of lab**. They assess your understanding of key concepts from the lessons, practice problems, and labs. If you need to miss a quiz due to illness or other emergencies, please contact me to make an arrangement to take it at another time.

### Individual Quizzes

- **Quiz 1** - Week 1
- **Quiz 2** - Week 2
- **Quiz 3** - Week 3
- **Quiz 4** - Week 4
- **Quiz 5** - Week 5
- **Quiz 6** - Week 7
- **Quiz 7** - Week 8
- **Quiz 8** - Week 9
- **Quiz 9** - Week 10
- **Quiz 10** - Week 11
- **Quiz 11** - Week 12
- **Quiz 12** - Week 14
- **Quiz 13** - Week 15

## Projects (20%)

Five projects throughout the semester allow you to apply statistical methods to practical, real-world problems. Projects are **due on Sundays** at the ends of weeks 5, 8, 10, 12, and 15 in Canvas. You may submit a late project up to a week late with no penalty. After a week, a project can be turned in for 70% of the grade. Projects can be used as part of a portfolio.

### Individual Projects

- **Project 1** - Due Sunday, Week 5 (Feb 22)
- **Project 2** - Due Sunday, Week 8 (Mar 15)
- **Project 3** - Due Sunday, Week 10 (Apr 5)
- **Project 4** - Due Sunday, Week 12 (Apr 19)
- **Project 5** - Due Sunday, Week 15 (May 10)

## Exams (30%)

### Midterms

- **Midterm 1:** Week 6, Friday (in lecture)
- **Midterm 2:** Week 13, Friday (in lecture)

Midterms require you to demonstrate your understanding of the course material. If you need to miss a midterm due to illness or other emergencies, please communicate with me as soon as possible to reschedule it. Alternatively, you may take the optional final exam to replace a missed midterm grade.

### Final Exam (Optional)

**Final Exam:** Wednesday, May 13, 2026, 10:20–12:10 PM, BSS 166

The final exam is optional and may be taken to replace a midterm grade. It is held during the scheduled final exam

period.

## Grading Scale

Final letter grades will be assigned based on overall performance:

A: 93-100% | A-: 90-92% | B+: 87-89% | B: 83-86% | B-: 80-82% | C+: 77-79% | C: 73-76% | C-: 70-72% | D: 60-69%  
| F: 0-59%

A minimum grade of **C-** is required for the course to count toward GE Area B4.

# Lectures

## Week 1

### Monday

*Holiday - No class*

### Wednesday

Lecture 1

### Friday

Lecture 2

## Week 2

### Monday

Lecture 3

### Wednesday

Lecture 4

### Friday

Lecture 5

## Week 3

### Monday

Lecture 6

### Wednesday

Lecture 7

### Friday

Lecture 8

## Week 4

### Monday

Lecture 9

**Wednesday**

Lecture 10

**Friday**

Lecture 11

**Week 5**

**Monday**

Lecture 12

**Wednesday**

Lecture 13

**Friday**

Lecture 14

**Week 6**

**Monday**

Lecture 15

**Wednesday**

Review

**Friday**

Midterm 1

**Week 7**

**Monday**

Lecture 16

**Wednesday**

Lecture 17

**Friday**

Lecture 18

**Week 8**

**Monday**

Lecture 19

**Wednesday**

Lecture 20

**Friday**

Lecture 21

## **Week 9**

**Monday**

Lecture 22

**Wednesday**

Lecture 23

**Friday**

Lecture 24

## **Week 10**

**Monday**

Lecture 25

**Wednesday**

Lecture 26

**Friday**

Lecture 27

## **Week 11**

**Monday**

Lecture 28

**Wednesday**

Lecture 29

**Friday**

Lecture 30

## **Week 12**

**Monday**

Lecture 31

**Wednesday**

Lecture 32

**Friday**

Lecture 33

## **Week 13**

### **Monday**

Lecture 34

### **Wednesday**

Review

### **Friday**

Midterm 2

## **Week 14**

### **Monday**

Lecture 35

### **Wednesday**

Lecture 36

### **Friday**

Lecture 37

## **Week 15**

### **Monday**

Lecture 38

### **Wednesday**

Review

### **Friday**

Review



# Methods Map

## Descriptive Statistics

### One Quantitative Variable

[Content to be added]

### Two Quantitative Variables

[Content to be added]

### One Categorical Variable

[Content to be added]

### Two Categorical Variables

[Content to be added]

## Inferential Statistics

### One Quantitative Variable

[Content to be added]

### Two Quantitative Variables

[Content to be added]

### One Categorical Variable

[Content to be added]

### Two Categorical Variables

[Content to be added]

# R Quick Reference (Base R)

## Import Data

[Content to be added]

## Summaries

[Content to be added]

## Plots

[Content to be added]

## Simulation

[Content to be added]