



Course Syllabus
STAT 1127: Statistics for the Biological Sciences
Fall Semester – 2022
Monday and Wednesday, 6:10pm to 7:25pm
Phillips Hall, Room B152

Course Title: Statistics for the Biological Sciences

Course Number: STAT 1127, Section 10

Meets: Monday and Wednesday: 6:10pm-7:25pm in Phillips Hall B152

Instructor: Justin Nguyen E-mail: nguyenj@gwu.edu **Teaching Assistant:** TBA

Office Hours: 5:30pm – 6:00pm Monday and Wednesday and by appointment - times will be arranged as needed. I will also respond to questions sent by e-mail. If you sent an e-mail after 5:00pm on Friday through Sunday, I will provide my response on the upcoming Monday.

Required Materials:

- Textbook: Shahbaba, Biostatistics with R, (ISBN 13: 978-1461413011)
- Laptop or Desktop computer with web browser (Google Chrome is recommended), webcam, microphone, and speaker
- Calculator: Texas Instruments (TI) 83 or 84 series calculator recommended
- Software: R: <https://www.r-project.org/>
R Studio: <https://www.rstudio.com/products/rstudio/download/>

Blackboard: Class lectures will be presented in person throughout the semester. I will be posting all course materials on Blackboard. This includes lecture notes, homework assignments,

announcements, and updates. **Students are strongly encouraged to check Blackboard prior to coming to class.** Quizzes and exams will be in class.

Course Prerequisites: This course does not require any background in calculus. However, students who enrolled in this course are required to have basic knowledge in Algebra and Arithmetic.

Course Description: This is an introductory course in statistical sciences applicable to biomedical and related sciences using R. The topics include introduction to numerical measures of central tendency and variability, frequency distributions & graphical presentations, probability, random variables, properties of basic probability distributions, sampling distributions, estimation, confidence intervals, testing of hypotheses, linear regression and correlation.

Learning Outcomes: As a result of completing this course, students will be able to:

- Apply laws of probability
- Apply descriptive statistics to data
- Construct and interpret confidence intervals
- Evaluate evidence for and against hypotheses using statistical tests
- Find the least-squares equation for simple linear regression and assess the utility of the model.
- Use basic Excel and R functions to do statistical analysis

Discussion/Lab: There is no recitation section scheduled for this class.

Homework Assignments: Assignments will be made from the textbook. It is your responsibility to complete your homework assignments prior to coming to class. I will not collect these assignments for grading. However, students are strongly encouraged to complete all these assignments for practice purposes.

Quizzes: There will be 8 quizzes during the semester. There are no makeup quizzes. I will drop two of your lowest quiz scores. Quizzes will be presented in person during class time.

Examinations: There will be a midterm exam and a final exam during the semester. There are no make-up exams nor test corrections. *See Make-up Work for details.* Midterm and final exams will be available in person during class. Please do not ask your instructor to change the manner in which the midterm and final are administered.

- **Midterm:** Wednesday, October 26 at 6:10pm (tentative).
- **Final:** Week of December 14 (time/date to be announced later).

Project: A project will be posted on Blackboard in mid-March to be completed by Wednesday, November 16. This project is intended to give the student first-hand experience in using the ideas

of basic statistics to perform a preliminary analysis of data. You must use R or other statistical software (SAS, SPSS, etc.) for all computations. The final report requires outlines of your approach, methodology analysis, test statistic, formulas performed, etc. The final report should contain sections, paragraphs, graphs, and no misspelled words. This will be a group project with teams of no more than 3 students.

Make-up Work: No late quizzes will be available (unless for serious reasons with documentation). The two lowest quiz scores will be dropped. If there is a need to attend a class with a quiz asynchronously, please contact me in advance and plan. No early or make-up exams (unless for serious reasons with documentation).

Attendance and Class Participation:

Students are expected to attend every class. Students are responsible for all material covered in class whether they are present during the lecture or not. Students who miss class should review the recorded lectures available through Blackboard. All students are expected to take notes during class. Taking detailed, comprehensive notes is necessary. At a minimum, you should take down everything written on the board. The course curriculum is extensive and class time is not available to repeat lecture material for students who missed class. If you missed a class, it is your responsibility to learn the material and for making up all course work missed during an absence. In most cases, regular classroom attendance and regular participation is essential. *All recorded lectures, slides, and lecture materials are available only for student use in this course, STAT 1127 (Spring 2022). Do not duplicate or distribute without written consent from James Hunt.*

Average Minimum Amount of Independent, Out-of-Class, Learning Expected per Week:

The George Washington University has established an average minimum amount of direct in-class instruction, and independent, out-of-class, learning expected per week. For example, a 15-week semester, including exam week, students taking a 3-credit course are expected to spend a minimum of 7.5 hours per week, including 2.5 hours of classroom instruction and a minimum of 5 hours of out-of-class work.

Grading rationale:

<u>Element</u>	<u>Percent of Total Grade</u>
Project	10%
Quizzes	30%
Midterm	30%
Final	30%

Final grades will be assigned based on the following scale:

A = 94% to 100%	C = 74% to 76%
A- = 90% to 93%	C- = 70% to 73%
B+ = 87% to 89%	D+ = 67% to 69%
B = 84% to 86%	D = 64% to 66%
B- = 80% to 83%	D- = 60% to 63%
C+ = 77% to 79%	F < 60%

Academic Integrity: Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. For details and complete code, see: studentconduct.gwu.edu/code-academic-integrity

University Policy:

- **Religious Observance:** In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. For details and policy, see: students.gwu.edu/accommodations-religious-holidays.
- **Incomplete Grades:** At the option of the instructor, the symbol "I" may be recorded if a student is unable to complete the work, and if the instructor is informed of and approves the reasons before the date when the grade must be reported. The course work must be completed within a designated time period agreed upon by the instructor and the student.

Safety and Security: In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

Support for students outside the classroom

- **Disability Support Services (DSS):** Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information see: disabilitysupport.gwu.edu/
- **Mental Health Services 202-994-5300:** The University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals. For additional information see: counselingcenter.gwu.edu/

Student/Instructor Communication Mode: Students are **strongly encouraged** to communicate with the instructor regarding any questions or concerns that you may have. Successful learning requires good communication between students and the instructor. For any reasons that you did not ask question(s) in class, feel free to see me during my office hours or send me an e-mail.

Tentative Schedule for Stat 1127- Fall 2022

* The instructor reserves the right to modify as needed.

Lecture #	Date	Sections	Topics
1	Monday 8/29	Introduction: Class Syllabus, R Introduction Chapter 1	<ul style="list-style-type: none"> ❖ R Introduction ❖ Terminology
2	Wednesday 8/31	Chapter 1 continued	<ul style="list-style-type: none"> ❖ Sampling and related problems
	Monday 9/5	NO CLASS: Labor Day	
3	Wednesday 9/7	Chapter 2 Data Exploration	<ul style="list-style-type: none"> ❖ Methods for describing sets of data
4	Monday 9/12	Chapter 2 continued Quiz #1	<ul style="list-style-type: none"> ❖ Using the mean and standard deviation to describe the data
5	Wednesday 9/14	Chapter 2 continued	<ul style="list-style-type: none"> ❖ Detecting outliers using Box plots and z-Score
6	Monday 9/19	Chapter 4: Probability	<ul style="list-style-type: none"> ❖ Introduction to probability
7	Wednesday 9/21	Chapter 4 continued Quiz #2	<ul style="list-style-type: none"> ❖ Conditional probability, Independence events, Bayes's Rule

8	Monday 9/26	Chapter 5: Random Variables and Probability Distributions	<ul style="list-style-type: none"> ❖ Types of Random Variables ❖ Probability Distributions for Discrete Random Variables
9	Wednesday 9/28	Chapter 5 continued	<ul style="list-style-type: none"> ❖ Binomial Random Variable ❖ Poisson Random Variable ❖ Hypergeometric Random Variable
10	Monday 10/3	Chapter 5 continued Quiz #3	<ul style="list-style-type: none"> ❖ Continuous Probability Distribution ❖ Normal Distribution
11	Wednesday 10/5	Chapter 5 continued	<ul style="list-style-type: none"> ❖ Uniform Distribution ❖ Exponential Distribution
	Monday 10	Chapter 5 continued	<ul style="list-style-type: none"> ❖ Concept of a Sampling Distribution
12	Wednesday 10/12	Chapter 6: Estimation	<ul style="list-style-type: none"> ❖ Properties of Sampling Distributions ❖ Central Limit Theorem
13	Monday 17	Chapter 6 continued Quiz #4	<ul style="list-style-type: none"> ❖ Identifying and Estimating the Target Parameter Confidence Interval for Population Mean
14	Wednesday 10/19	Chapter 6 continued Review for Midterm	<ul style="list-style-type: none"> ❖ Large Sample Confidence Interval for Population Proportion
	Monday 10/24	NO CLASS: Fall Break	
	Wednesday 10/26	MIDTERM	

	Monday 10/31	Chapter 6 continued	Determining Sample Size
	Wednesday 11/2	Chapter 7: Hypothesis Testing Handout Project	Hypothesis Testing
	Monday 11/7	Chapter 7 continued Quiz #5	❖ Hypothesis Testing for Means with Small Samples Hypothesis Testing for Proportions
15	Wednesday 11/9	Chapter 8: Statistical Inference	Comparing Two Population Means
16	Monday 11/14	Chapter 8 continued Quiz #6	❖ Comparing Two Population Means ❖ Paired Difference Experiments
17	Wednesday 11/16	Chapter 8 continued Projects Due	❖ Comparing Two Population Proportions
18	Monday 11/21	Chapter 10: Analysis of Categorical Variables Quiz #7	❖ Categorical Data Analysis ❖ Multinomial Experiments ❖ Chi-Square Tests
19	Wednesday 11/23	NO CLASS: Thanksgiving	
20	Monday 11/28	Chapter 10 continued Chapter 11: Regression Analysis	❖ Chi-Square Tests (Two-Way Tables)
21	Wednesday 11/30	Chapter 11: Regression Analysis	❖ Simple Linear Regression

22	Monday 12/5	Quiz # 8	❖ Model Assumptions ❖ Assessing the Utility of the Model
23	Wednesday 12/7	Chapter 11 continued Review for Final	❖ Linear Regression Using Statistical Software
	Wednesday 12/14	FINAL	

- **Final Exam: TBD**