

# Syllabus: Statistics 1127 (Statistics for Biological Sciences)

Course: STAT 1127 - 10  
Semester: Spring 2022  
Time: Monday & Wednesday, 3:45 ~ 5:00pm,  
Location: BELL 104

Instructor: Darcy Miller  
E-mail address: [darcy\\_miller@gwu.edu](mailto:darcy_miller@gwu.edu)  
Office hour: Fridays: 10am-11am via BB Collaborate,  
Beginning January 14, Adjustments Shared on Class Calendar

**TEXT book:** Biostatistics with R  
Babak Shahbaba  
Springer  
ISBN: 9781461413011

**R Software (free):** R: <https://www.r-project.org/>  
R Studio: <https://www.rstudio.com/products/rstudio/download/>

**Grader:** TBD

## 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:

At the end of the semester you should be able to

- apply laws of probability
- understand and use various probability distributions
- construct and interpret large-sample and small-sample confidence intervals
- evaluate evidence for and against hypotheses using statistical tests
- find the least-squares equation for simple linear regression, evaluate the models and interpret the results
- use basic R functions to do statistical analysis

**GRADING:** Final grade will be based on

- Homework: 15%, *lowest homework score is dropped*
- Mid-Term Exam 1: 25%, *open book/note; no collaboration with others (besides instructor & or TA)*
- Mid-Term Exam 2: 25%, *open book/note; no collaboration with others (besides instructor & or TA)*
- Final: 35%, *Per University Schedule*

**Homework Assignments:** Homework problems will be posted to Blackboard in the Assignment area. You will typically have a few days or more after the topic is covered in class to complete the assignment. Completed assignments should be submitted back to the appropriate area of Blackboard by the due date. *Collaboration is encouraged for homework assignments.*

**Mid-Term Examinations:** The mid-term examinations will be posted to Blackboard in their own content areas and submitted back to Blackboard. You will typically have several days to complete the exam. *Your answers must be your own work.* You may not collaborate or work with anyone other than the instructor and TA.

**Important Instructions:**

- Late homework is acceptable on a case-by-case basis (serious reasons with documentation).
- No early or make-up examinations (unless for serious reasons with documentation).
- The due dates of midterm examinations are Feb 23 and Mar 28.
- The final will be due according to the final exam schedule.
- This is a 3 hour course. Students should expect to spend approximately 3 hours per week on direct instruction (class time/recorded lectures) and 5 hours per week on independent learning (assignments, studying, and independent learning activities).
- Stat 51, 53, 91, 104, 111, and 127 are related in their subject matter, and credit for only one of the six may be applied toward a degree.
- *Recorded lectures, slides, and lecture materials are the property of Darcy Miller and are only for student use in this course, STAT 1127. Do not duplicate or distribute without written consent from Darcy Miller.*

**Online Course Access Instructions**

- Lecture and class materials will be posted in Blackboard in the corresponding content area week.
- At minimum, you will need technology which allows you access to: Blackboard, Blackboard Collaborate Ultra (live class and recorded course materials), R and R Studio Software (free - will discuss in Lecture 1), and read/edit either Word or PDF documents.
- For student support (e.g., technical requirements and support, student services, obtaining a GWorld card, and state contact information) go to: [online.gwu.edu/student-support](http://online.gwu.edu/student-support)

**Tentative schedule of topics, subject to change:**

<b>Week</b>	<b>Topic</b>	<b>Resources</b>
Week 1 Jan 10 & 12	Syllabus - R Overview; Statistics Overview - Study & Data Types; Importing Data; <i>Complete Assignment from Lecture Slides (R Overview)</i>	Chapter 1 & 2.2; Lecture 1 & 2; Importing Data
Week 2 Jan 17 & 19	<b><i>NO CLASS Jan 17 (Per University Schedule);</i></b> <i>Jan 19 - R Primer: Review R/R Studio Concepts (writing programs, running programs, saving program, saving outputs, importing data) and basic functions and Homework Submission Format. Intro to Swirl;</i>	R/R Studio. R Primer - After Lecture 2. Intro to Swirl
Week 3 Jan 24 & 26	Summary Statistics, Graphical Summaries, Manipulating Data in R	Chapter 2 & 3 Lecture 3 & 4 & Data Prep.R
Week 4 Jan 31 & Feb 2	Probability & Contingency Tables; Discrete Distributions (Binomial)	Chapter 3 & 4 Lecture 5 & 6

Week 5 Feb 7 & 9	Discrete Distributions (Poisson); Intro to Swirl; Continuous Distributions/Normal Distribution	Chapter 4 & 5 Lecture 7,8
Week 6 Feb 14 & 16	Continuous Distributions/Normal Distribution; Live Examples;	Chapter 5 &6 Lecture 9
Week 7 Feb 21 & 23	<b>NO CLASS Feb 21 Per University Schedule; Exam Due Feb 23;</b> Confidence Intervals for Mu;	Lecture 10 & 11
Week 8 Feb 28 & Mar 2	Confidence Intervals for Mu; Hypothesis Testing for Means;	Chapter 7 & 8 Lecture 10 & 11 (con't) Lecture 12 &13
Week 9 Mar 7 & 9	Hypothesis Testing for Means; Analysis of Variance	Chapter 8 & 9 Lecture 13 Lecture 18 & 19
Week 10 Mar 14 & 16	<b>NO CLASS SPRING BREAK PER UNIVERSITY SCHEDULE</b>	
Week 11 Mar 21 & 23	<i>Live Examples;</i> <b>NO CLASS Mar 23 (Mid-Term Exam 2)</b>	
Week 12 Mar 28 & 30	<b>Exam 2 Due (Mar 28);</b> Correlation; Linear Regression;	Chapter 11 Lecture 20 Lecture 21
Week 13 Apr 4 & 6	Linear Regression (pt 2); <i>Swirl: Regression Models 1-9;</i>	R Chapter 7 Lecture 21 Chapter 11
Week 14 Apr 11 & 13	CI's for Proportion & Hypothesis Testing Single/Multiple Proportions;	Chapter 8&9 Chapter 10 Lecture 14 Lecture 15
Week 15 Apr 18 & Apr 20	Analysis of Categorical Variables; <i>Live Examples;</i>	Journal Article Lecture 16 Lecture 17
Week 16 Apr 25 & 27	Assigned Reading (TSE) - <b>No Class Apr 25;</b> Open Review	

GW bookstore has moved all course materials, including ALL required and recommended textbooks, to only be available online at [GWShops.com](http://GWShops.com). Therefore, students will NOT be able to purchase books on campus the day of classes.

### University policies

Use of Electronic Course Materials and Class Recordings

**Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes**

**permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at [disabilitysupport.gwu.edu](http://disabilitysupport.gwu.edu) if you have questions or need assistance in accessing electronic course materials.**

University policy on observance of religious holidays

Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see “Religious Holidays” at [provost.gwu.edu/policies-procedures-and-guidelines](http://provost.gwu.edu/policies-procedures-and-guidelines).

### **Academic Integrity Code**

Academic Integrity is an integral part of the educational process, and GW takes these matters very seriously. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and in other ways outlined in the Code of Academic Integrity. Students accused of academic integrity violations should contact the Office of Academic Integrity to learn more about their rights and options in the process. Outcomes can range from failure of assignment to expulsion from the University, including a transcript notation. The Office of Academic Integrity maintains a permanent record of the violation.

More information is available from the Office of Academic Integrity at [studentconduct.gwu.edu/academic-integrity](http://studentconduct.gwu.edu/academic-integrity). The University’s “Guide of Academic Integrity in Online Learning Environments” is available at [studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments](http://studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments). Contact information: [rights@gwu.edu](mailto:rights@gwu.edu) or 202-994-6757.

### **Academic support**

#### **Writing Center**

**GW’s Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online at [gwu.mywconline](http://gwu.mywconline).**

#### **Academic Commons**

**Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at [academiccommons.gwu.edu](http://academiccommons.gwu.edu).**

Support for students outside the classroom

#### ***Disability Support Services (DSS) 202-994-8250***

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services at [disabilitysupport.gwu.edu](http://disabilitysupport.gwu.edu) to establish eligibility and to coordinate reasonable accommodations..

Counseling and Psychological Services 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. [healthcenter.gwu.edu/counseling-and-psychological-services](http://healthcenter.gwu.edu/counseling-and-psychological-services).

#### Safety and Security

- **In an emergency: call GYPD 202-994-6111 or 911**
  - **For situation-specific actions: review the Emergency Response Handbook at: [safety.gwu.edu/emergency-response-handbook](http://safety.gwu.edu/emergency-response-handbook)**
  - **In an active violence situation: Get Out, Hide Out, or Take Out. See [go.gwu.edu/shooterpret](http://go.gwu.edu/shooterpret)**
  - **Stay informed: [safety.gwu.edu/stay-informed](http://safety.gwu.edu/stay-informed)**