

BIOSC 1120: Biostatistics
Fall 2021
Friday 1 – 3:30pm, A214 Langley Hall

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COURSE DESCRIPTION

This course introduces students to foundational methods and practical tools for the analysis of biological data. Approximately two-thirds of the course will be devoted to concepts such as probability, descriptive statistics, and hypothesis testing. The other one-third of the course will cover real-world practices for analyzing data, including programming in R.

COURSE OBJECTIVES

The goals of this course are to:

- manipulate biological data sets, from data entry to carrying out basic descriptive statistics and exploratory analyses,
- interpret statistical output both statistically and biologically,
- differentiate among the variety of statistical tests for biological data,
- select and conduct appropriate statistical tests for biological data,
- solve common problems encountered when dealing with biological data, and
- develop a working knowledge of the statistical program R to successfully describe, display, and statistically analyze biological data.

PREREQUISITES

Students must have earned a “C” or better in: (a) Foundations of Biology 2 (e.g., BIOSC 0160), (b) at least one ‘core’ BIOSC course: genetics, ecology, or biochemistry, and (c) applied statistical methods (STAT 1000).

COURSE MATERIALS

TEXTBOOK

The Analysis of Biological Data, 2nd or 3rd Edition, by Whitlock and Schluter (**Required**). You will need access to a copy of this book for in-class exercises and assignments. Textbook resource website: <https://whitlockschluter3e.zoology.ubc.ca/>

LAPTOP / COMPUTER

One of the goals of this course is to learn how to use the statistical program R to analyze biological data. As such, you will need access to a [laptop or computer](#) that can install and run the software R and RStudio. *If possible, bring a laptop to each class meeting.* Please contact me if this is a problem.

OFFICE HOURS

INSTRUCTOR DROP-IN HOURS on Zoom: Monday 12 – 1pm and Thursday 9 – 10am

Zoom link to office hours posted on Canvas. You are encouraged to come to drop-in hours, no appointment needed. These are times where you can ask questions about or review course material, work through assignment questions, or just to chat.

UTA OFFICE DROP-IN HOURS in 242 Crawford: Tuesday 10 – 11am and Wednesday 1 – 2pm

INSTRUCTOR OFFICE HOURS BY APPOINTMENT

Please email me if you need to discuss any issues privately; not for discussion of general class material.

STAYING IN TOUCH

I encourage you to communicate with me and other students in this course. **Don’t hesitate to reach out for help. The best way to contact me is at dwetzel@pitt.edu. Note that email communication is primarily for personal matters you may encounter, and is not for questions about course material.** All content and logistical questions should be posted to our Canvas discussion board. I will not be able to quickly respond to course content questions via email.

COURSE STRUCTURE

CLASS MEETINGS

Attendance in lecture is required; come to class prepared and on time. We will use our class meeting time for lecture material, but also to collaboratively learn and practice coding in R and to work practice problems. **Bring a laptop with R and RStudio installed if possible.**

WEEKLY SCHEDULE

The course will run on a weekly schedule. Weekly topics are outlined in detail on the last page of this syllabus. Here is an outline of weekly expectations:

Tuesday @ 11am	New lecture topic posted on Canvas
Thursday @ 11am	Problem set due on Canvas
Friday @ 1pm	Class meeting time (1 – 3:30pm) in A214 Langley Hall New problem set posted to Canvas

FLEXIBILITY

Changes to modes of instruction and course adjustments may occur this semester. I appreciate your being flexible with the plan for our course. Please communicate with me if you are encountering an issue that would benefit from flexibility.

EXPECTATIONS

Take care of your health. Remain engaged in the course. Maintain open communication with the instructor and your classmates. Reach out for help when you need it (communicate need for support or flexibility with course deadlines). Take responsibility for your learning. Treat each other and your instructor with respect.

EVALUATION METHODS

Three cumulative exams will be administered throughout the semester. The third exam will be administered during finals week. Problem sets will be assigned approximately weekly. Two final projects will be due toward the end of the semester.

EXAMS (75%)

There will be three (3) cumulative exams @ 100 points each (300 points in total).

- Exams will consist primarily of short answer questions. Exams will ask you to demonstrate statistical knowledge and capabilities with R.
- Some components of exams will be strictly timed, while others will have a “take-home” portion for you to complete within a longer time frame.
- You may not work with others to complete an exam.
- You will not be given extra time if you begin a timed exam late, nor will extra time be provided on a “take-home” portion of the exam.
- There will be no make-up exams given.

PROBLEM SETS (15%)

Problem sets will be assigned approximately weekly and will be worth 60 points in total.

- The goals of the problem sets are to practice addressing biostatistical problems and to demonstrate your ability to conduct data analysis in R.
- Points values for each assignment will be scaled at the end of the semester so that all assignments combined add up to 60 points.
- Late problem set submissions will be penalized 10% for each fraction of a 24-hour period that they are late, up to 72 hours (3 days), at which point a score of 0 will be assigned.
- You may collaborate with other members of this class to complete the problem sets. However, all assignments must reflect your own work and intellectual understanding, including your own unique articulations. *In other words, don't copy answers directly from others - this will be considered plagiarism.*

FINAL PROJECTS (10%)

Two projects will be assigned toward the end of the course and will be worth 40 points in total.

- Project 1 is a short, creative assignment (5 points). Anticipated due date: 11/19/21
- Project 2 is a larger data analysis project that will contain more than 1 component (35 points). All components of this project must be submitted on time, no late submissions will be allowed. Anticipated final due date: 12/10/21

GRADES

The total points earned out of 400 points will determine your final grade. Grades will be posted to Canvas. It is essential that you keep your own record of your grades should any discrepancy arise.

There will be **no make-up exams**. There are no anticipated extra credit opportunities in this course. Final grades in this course will not be curved.

Note: You must earn a “C” or better (not a “C-”) for this course to count toward a major in the Department of Biological Sciences.

Assessment	Points Possible
Exams:	
Exam 1	100
Exam 2	100
Exam 3	100
Problem Sets	60
Final project 1	5
Final project 2	35
Total	400

Final Grade: Your final grade will be determined based on your total points earned during the semester. The following grade scale will be used:

Final Percentage	Letter Grade
97.5 – 100%	A+
92.5 – 97.4%	A
90.0 – 92.4%	A-
87.5 – 89.9%	B+
82.5 – 87.4%	B
80.0 – 82.4%	B-
77.5 – 79.9%	C+
72.5 – 77.4%	C
70.0 – 72.4%	C-
67.5 – 69.9%	D+
62.5 – 67.4%	D
60.0 – 62.4%	D-
59.9% or less	F

ACADEMIC INTEGRITY

Cheating/plagiarism will not be tolerated. Students in this course will be expected to comply with the [University of Pittsburgh’s Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process outlined in the University Guidelines on Academic Integrity. A minimum sanction of a zero score for the exam or assignment will be imposed, but sanctions can also include failure in the course.

For take-home exams, during the time that the assessment is made available to the class, students may not share the content, discuss the content, or discuss the exam difficulty with anyone. Students must refrain from any activity that would fraudulently improve their results or someone else’s results, including working/communicating with another person (whether enrolled in the course or not) or misrepresenting their identity.

Posting (either verbatim or paraphrased) any assignment or exam, or subsection thereof, to online resources (such as Chegg) will constitute an Academic Integrity violation. It also may constitute a violation of US copyright law. Accessing or using any such online postings, even if you did not personally post them, also constitutes an Academic Integrity violation.

You may not work or communicate with another student (or anyone else) during exams. Permitted resources for completing exams are your lecture notes, the textbook, R tutorials posted by the instructor, and resources I post on our Canvas site (lecture slides, outlines, R tutorials, and assigned readings). You may not use any online resources outside of Canvas. You may not use any other resource unless explicitly authorized by the instructor.

Students are permitted to work collaboratively on Problem Sets but must turn in their own work. The following are suitable resources a student may consult for these assignments: instructor, UTA, textbook, assigned readings, fellow students, and the internet. All assignments in this course must reflect your own work and intellectual understanding, including your own unique articulations.

Consulting non-Pitt online tutoring services or other online websites for help with homework or exams is specifically forbidden and is an Academic Integrity violation. Any evidence I find or complaints I receive of students colluding on exams or assignments will constitute an Academic Integrity violation.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands-on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

IMPORTANT POLICY ANNOUNCEMENTS

HEALTH AND SAFETY

During this pandemic, it is extremely important that you abide by the [public health regulations](#), the University of Pittsburgh's [health standards and guidelines](#), and [Pitt's Health Rules](#). These rules have been developed to protect the health and safety of all of us. **Universal face covering is required in all classrooms and in every building on campus, without exceptions, regardless of vaccination status.** This means you must wear a face covering that properly covers your nose and mouth when you are in the classroom. If you do not comply, you will be asked to leave class. It is your responsibility to have the required face covering when entering a university building or classroom. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu, and check your Pitt email for updates before each class.

If you are required to isolate or quarantine, become sick, or are unable to come to class, contact me as soon as possible to discuss arrangements.

EMAIL

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers. Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on **Edit Forwarding Addresses**, and follow the instructions on the page. [Full E-mail Communication Policy](#).

LEARNING MANAGEMENT SYSTEMS

We will use **Canvas** as our Learning Management System. Important information and announcements regarding this course and your course grades will be posted here. Course documents (including PPTs, outlines, assignments etc.) will be posted on Canvas. Assignments will be administered using Canvas. Exams will be administered in-person and on Canvas. Office hours will be held via **Zoom** (accessible through links on Canvas). **Students should check Canvas frequently.**

EXAM REVIEW/REGRAIDING

You may make an appointment to look over your exam. You may not remove or reproduce any part of the exam or answer key; violation of this will result in a grade of 0 on the exam and an Academic Integrity Violation Report. You may request a regrade of an exam by submitting your request in writing within one week of the exam grades being posted. Unless the regrade request is simply due to mathematical error, be aware that your entire exam may be reevaluated.

G GRADE

G grades are assigned to students who have been attending a course, have been making regular progress, and are prevented (by circumstances beyond their control) from completing the course after it is too late to withdraw. If you wish to petition for a G grade, you must submit a request for this grade and documentation of your reason(s) in writing to Dr. Wetzel at least one week prior to the last class.

CLASSROOM RECORDING

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

DISABILITY

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services](#) (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course. Please be aware that DRS testing services require advanced scheduling (up to 7 business days) before the exam date.

ACCESSIBILITY

The Canvas LMS platform was built using the most modern HTML and CSS technologies, and is committed to W3C's Web Accessibility Initiative and [Section 508](#) guidelines. Specific details regarding individual [feature compliance](#) are documented and updated regularly.

IMPORTANT POLICY ANNOUNCEMENTS

DIVERSITY AND INCLUSION

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. [More information.](#)

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be filed [online](#). You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

DISCLAIMER

The instructor reserves the right to modify the course schedule or other aspects of the syllabus during the semester as necessary to achieve course objectives. Any changes to the syllabus (or to the course schedule) will be announced in class, on Canvas, and/or via email. Students are responsible for adjusting to these announced changes to the course.

TAKE CARE OF YOURSELF

Taking care of yourself is vital to gain the most out of your Pitt experience. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking time to relax. Using your time to take care of yourself will help you achieve your academic goals more than spending all your time studying.

For course related assistance: ask questions in class, visit Dr. Wetzel in office hours, and take advantage of student study groups. [Pitt's Study Lab](#) also provides free in-person and online workshops to help you improve your studying and test-taking skills.

All of us benefit from support and guidance during times of struggle. Take the time to learn about the resources available to our students and take advantage of them. The [University Counseling Center](#) is here for you (412-648-7930), and [this site](#) provides links to food, health, employment, housing, and support resources both at Pitt and within the Pittsburgh Community.

SCHEDULE OF TOPICS

WEEK	DATE	TOPIC	CHAPTERS
1	Aug 27	1: Data in Biology	1
2	Sept 3	2: Describing Data	2, 3
3	Sept 10	3: Estimation and Probability	4, 5
4	Sept 17	4: Hypothesis Testing and Inference	6, Interleaf 3
5	Sept 24	5: Categorical Analysis (binomial, goodness of fit, contingency)	7, 8, 9
6	Oct 1	5: Categorical Analysis (binomial, goodness of fit, contingency)	7, 8, 9
7	Oct 8	EXAM 1	
	Oct 8	6: Normal Distribution and the t-test	10, 11, 12
8	Oct 15	6: Normal Distribution and the t-test	10, 11, 12
	Oct 15	FALL BREAK – no physical class meeting	
9	Oct 22	7: Assumptions and Problem Data	13
10	Oct 29	8: Analysis of Variance	15
11	Nov 5	8: Analysis of Variance	15
12	Nov 12	EXAM 2	
	Nov 12	9: Correlation and Regression	16, 17
13	Nov 19	10: More Complex Models	12.2, 14.3, 14.4, 18
	Nov 26	THANKSGIVING RECESS – no class this week	
14	Dec 3	11: Multiple Regression	Ch 10 in Crawley textbook
15	Dec 10	12: Power, Multiple Comparisons, Bayes' Theorem	14.6, Interleaf 8, 5.9
	Dec 13 - Dec 17	Final Exam (date & time of our final exam TBA by University registrar)	

IMPORTANT UNIVERSITY DATES

August 27	Classes begin
September 6	Labor Day (no classes)
September 10	Add/drop period ends
September 17	Extended drop option ends
October 15	Fall break (no class meeting)
October 25	Spring enrollment begins
October 29	Monitored withdraw period ends
November 22-26	Thanksgiving Recess (no classes)
Dec 13 – Dec 17	Final exams

*****Details of this syllabus are subject to change*****