

## BIOL 8250: Statistics Workshop (3 credits) Syllabus - Fall 2020

**Meeting time:** Fridays: 9:00am - 11:50am

**Meeting place:** Online (check Canvas for Zoom link)

**Registration requirements:** Graduate standing

**Instructor:** Dr. Jocelyn Behm

**Instructor email:** [jebehm@temple.edu](mailto:jebehm@temple.edu)

**Office hours:** by appointment - email me to set something up and we'll meet online

**Slack Channel:** TU\_stats\_workshop\_F2020

### **TEMPLE AND COVID-19**

*Temple University's motto is Perseverance Conquers, and we will meet the challenges of the COVID pandemic with flexibility and resilience. The university has made plans for multiple eventualities. Working together as a community to deliver a meaningful learning experience is a responsibility we all share: we're in this together so we can be together.*

### **Course Description**

To do the type of science you want to do, you need to know how to use statistics to extract and summarize trends and patterns in your data. The aim of this course is to help you reach that goal. While it is impossible to become proficient in all statistical techniques within the span of a single semester, we will learn the foundational skills that will allow you to identify and implement the statistical methods you would like to use for your graduate work and into your career. In this class, we will have hands-on use of statistical analyses and graphics with the package R. Students will be responsible for learning and presenting different statistical techniques in R. The goal will be to develop a reference "cheat sheet" of steps and considerations that students can apply beyond this seminar when analyzing a new data set.

### **Learning outcomes**

Upon completion of the course students should be able to

1. Describe the statistical analyses/graphics most appropriate for your research questions and data.
2. Analyze sample datasets with R code you write, and explain how the different steps of the code work (via annotation).
3. Demonstrate critical thinking skills by evaluating other student's analysis approaches and discussing these approaches in class.

### **Technology Requirements**

To participate in the seminar, you will need to use a Zoom-capable computer (laptop or desktop) with working audio and video so that you can share your screen and show your classmates your R code during our seminar meetings. To complete the assignments, you will need to have access to a computer that can run R and R Studio. Please get in touch with me as soon as possible if you do not have access to this equipment.

## Software

### *R and R Studio*

We will be using the statistical software R and use R Studio to interface with R. Both are free, open source software. If you do not already have them, here are links to download them (note, if you already have them downloaded, you may want to check what version you're using and see if it makes sense to update to a more recent version):

R: <https://cloud.r-project.org/>

R Studio: <https://rstudio.com/products/rstudio/download/#download>

If you are not familiar with R and/or R studio, it may be helpful for you to do a free online tutorial to learn how to load data and manipulate datasets. (Note, I have not tried any of these tutorials and cannot vouch for their helpfulness!).

DataCamp Intro to Basics in R: <https://www.datacamp.com/courses/free-introduction-to-r>

DataLab Introduction to R (stop before analyzing data section): <https://datalab.cc/tools/r01>

## Textbooks and other resources

Our course readings will come from freely available online resources (online tutorials, e-books available through the library) and will be posted on Canvas. I will also provide a list of useful freely available resources for statistics and using R on Canvas for you to reference as needed.

## Course Communication

Assignments, Zoom links and all other course information will be posted on our seminar's Canvas website. I will use Canvas and emails through Canvas as my primary mode of communication. I have also set up a Slack channel for the course to facilitate informal communication for the seminar. Please use Slack to ask questions about assignments, communicate to your group members, etc. If you have a particular question about an assignment, I recommend asking the group rather than directly asking me because you will get a faster (and probably better) response.

## Course Schedule (subject to change)

Week	Date	Topic
1	August 28	Intro; Getting started in R and R studio; Data Cleaning
2	September 4	Data manipulation; graphing; exploratory data analyses
3	September 11	Linear models I
4	September 18	Linear models II
5	September 25	GLM
6	October 2	GLMM
7	October 9	Ordination
8	October 16	Redundancy/Correspondence Analysis
9	October 23	TBA
10	October 30	TBA
11	November 6	TBA
12	November 13	TBA

13	November 20	TBA
NA	November 27	Fall break!
14	December 4	Final Project Presentations

## Assignments

1. Weekly problem sets - Most weeks, you will be responsible for working through problem sets either on your own or as part of a group. Regardless of whether you worked on the problem set alone or in a group, you will be responsible for handing in your code through Canvas by the due date. During our class meeting, different individuals/groups will be called on to present their work on the problem sets. You will be evaluated on how you present your work and code when you are called on. It is not necessarily important to get the correct answer (and often there is no one correct answer), it's more important to show your code and explain your process for how you approached the problem, what conclusions you reached and where you got stuck.
2. Analysis of your own data - The final portion of the course will be devoted to analyzing your own data set. This can be data from your research, a data set you find in the literature or an online repository, a data set from the course, a data set from your advisor, etc. Throughout the semester we'll have check-ins about your data set and at the end of the semester you will present your analyses.
3. Contribute to class "cheat sheet" - While it's impossible to master each statistical method, it is possible to gain a foundation of skills and things to consider so that you can be more confident when applying a new statistical technique. As the semester progresses, we will compile useful tricks and tips on a "cheat sheet" that you can then take with you to hopefully help you in your future statistical pursuits.

## Class participation

We will have weekly discussions on readings and problem sets. Even if you are not chosen to present your work on the problem set for a given week, you are encouraged to engage in a discussion on the topic as needed to get your questions answered and be sure you understand the material. In addition, we will break into groups during some class periods to work through problems. As such, class participation will comprise a component of your grade.

## Grading

For this seminar, please focus more on learning statistics than getting the 'right' answer for your grade. I am more concerned about your statistical journey than arriving at a particular answer. I'm looking for a well-documented, demonstrated effort towards approaching a problem, even if it ends in a roadblock.

	Points
Weekly Problem Sets	150
Class Participation	50
Analysis of your own data	100
Contribution to class cheat sheet	25

### **Grading scale**

Each graded component of the course is worth a certain number of points and grades will be based on the total percentage of points accrued during the semester. Assume a standard grading scale for points (A: 93-100%; A-: 90-92%; B+:87-89%; B: 83-86%; B-:80-82%, etc.).

### **Seminar Policies**

#### **COVID-19 Class Attendance and Engagement Protocol**

If you have not already, please familiarize yourself with Temple University's COVID-19 Class Attendance and Engagement

Protocol: [https://tuportal5.temple.edu/html/TEMPLE/apps/WSTF/TUP/Files/PROTOCOL\\_JUNE\\_15\\_Protocol\\_AttendanceEngagement\\_COVID19\\_06.12.2020.pdf](https://tuportal5.temple.edu/html/TEMPLE/apps/WSTF/TUP/Files/PROTOCOL_JUNE_15_Protocol_AttendanceEngagement_COVID19_06.12.2020.pdf)

According to the protocol, faculty are required to take attendance for all in-person and synchronous online class meetings in the fall 2020 semester. Your attendance will be recorded and reported via Qwickly for contact tracing purposes.

If you feel unwell, you should not come to campus. The primary reason for documentation of attendance is to facilitate contact tracing, so that if a student or instructor with whom you have had close contact tests positive for COVID-19, the university can contact you. Recording of attendance will also provide an opportunity for outreach from student services and/or academic support units to support students should they become ill. Faculty and students agree to act in good faith and work with mutual flexibility. The expectation is that students will be honest in representing class attendance.

Unless you are sick or have a professional engagement, class attendance is mandatory. If you need to miss a class session, please contact me as soon as possible to make arrangements.

### **Grade Disputes**

Please submit all grade disputes in writing to me via email. Describe the issue with the grade received and why you believe it was an error. Attach any necessary documents involved in the dispute. This provides a written documentation of the dispute and gives me the information I need to make necessary changes.

### **Late Assignment Policy**

Assignment deadlines are clearly listed on this syllabus and on Canvas. Late assignments will not be accepted. In the case of extreme emergencies where assignment deadlines cannot be met, please talk to me, and I will grant deadline extensions at my discretion.

### **Student and Faculty Academic Rights and Responsibilities Policy**

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty Academic Rights and Responsibilities (Policy #03.70.02) which can be accessed at [policies.temple.edu](https://policies.temple.edu).

### **Respect for Diversity**

It is my intent that students from all diverse backgrounds and perspectives be well served by this seminar, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

It is also important to foster a respectful and productive learning environment that includes all students in our diverse community of learners. Our differences, some of which are outlined in the University's nondiscrimination statement, will add richness to this learning experience. Therefore, all opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. Treat your classmates and instructor with respect in all communication, class activities, and meetings. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Please consider that sarcasm, humor and slang can be misconstrued in online interactions and generate unintended disruptions. Profanity should be avoided as should the use of all capital letters when composing responses in discussion threads, which can be construed as "shouting" online. Remember to be careful with your own and others' privacy. In general, have your behavior mirror how you would like to be treated by others.

### **University policy regarding religious holidays**

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 if they are not already observed by the University.

### **Technology Use Policy**

If you have not already, please familiarize yourself with Temple's technology use policy, accessible here: <https://secretary.temple.edu/sites/secretary/files/policies/04.71.11.pdf>

Basically, by using Temple's technological resources, you agree to use them for the purposes of learning and education rather than personal gain and evil.

### **Honor Code**

I encourage you to reacquaint yourself with Temple's Code of Conduct (see <http://www.temple.edu/assistance/udc/coc.htm>), which prohibits: 1. Academic dishonesty and impropriety, including plagiarism and academic cheating. We will discuss collaboration on the assignments in terms of what is acceptable and what is not. 2. Interfering or attempting to interfere with or disrupting the conduct of classes or any other normal or regular activities of the University. Temple's Honor code provides disciplinary action for cheating which may include expulsion from the University.

### **Class Recordings**

It is my intention to record our seminar sessions and have the recordings available on Zoom as a resource for students. I will confirm with everyone in advance that they are comfortable with me recording our seminars.

Any recordings made in this seminar can only be used for the student's personal educational use. Students are not permitted to copy, publish, or redistribute audio or video recordings of any portion of the class session to individuals who are not students in the course or academic program without the express permission of the faculty member and of any students who are recorded. Distribution without permission may be a violation of educational privacy law, known as FERPA as well as certain copyright laws. Any recordings made by the instructor or university of this course are the property of Temple University.

### **Accommodations**

Any student who has a need for accommodations based on the impact of a documented disability or medical condition should contact Disability Resources and Services (DRS) in 100 Ritter Annex (drs@temple.edu; 215-204-1280) to request accommodations and learn more about the resources available to you. If you have a DRS accommodation letter to share with me, or you would like to discuss your accommodations, please contact me as soon as practical. I will work with you and with DRS to coordinate reasonable accommodations for all students with documented disabilities. All discussions related to your accommodations will be confidential.

### **Student Support Services**

If you are experiencing food insecurity or financial struggles, Temple provides resources and support. Notably, the Temple University Cherry Pantry and the Temple University Emergency Student Aid Program are in operation as well as a variety of resources from the Office of Student Affairs.