Interdisciplinary Biostatistics
16:125:578

Instructor: Valerie Tutwiler, PhD
Contact Information: valerie.tutwiler@rutgers.edu
Class Meetings: Lectures will be held on Tuesdays and Thursdays from 10:20 -11:40AM
Office Hours: TBD
Recommended software: Prism, Excel, Matlab, R, any statistical software that you prefer.
Recommended texts:
Introduction to Probability and Statistics for Engineers and Scientists
Statistics for Biomedical Engineers and Scientists

Course Description and Objectives:
This course is administered virtually through Canvas for the month of January, beyond that point it will be adjusted pending University guidelines. Lectures will be delivered asynchronously and should be viewed prior to online meeting times. Class meeting times will be held during the regular class time. This time will serve as an opportunity to review lecture materials, go through sample problems, work in small groups etc. All additional course materials will be available through Canvas.

This course is geared at building a base of biostatistical methods, rigorous experimental design, and reproducible research reporting. Biostatistics is engrained in experimental design, analysis and reporting of results, and interpretation of findings. This course covers the importance of incorporating statistical principles into all aspects of research. Your research forms the building blocks of this course. We will pull from actual experiments that you are doing and apply the principles learned above into practice. You are welcome to share your own research questions during the class discussion. You are equally welcome to work on statistical techniques and problems that are directly relevant to your research. At the conclusion of the course you will discuss the experimental design and statistical analysis related to your own research. These techniques will be applied to your own research both now and throughout your scientific career.

The following lecture schedule is tentative and subject to change.

Week	Topics	Assignments
1	Descriptive statistics, steps in developing a research project, types of data	
2	Types of distribution, sources of error or bias, mean, standard deviation	HW due
3	Normal vs non-normal distributions and transformations, confidence intervals	
4	Determine needed sample size	
5	Hypothesis driven testing with 2 samples	HW due
6	Hypothesis driven testing with 2+ samples	HW due
7	Nonparametric statistics	HW due
8	Midterm Exam	
9	Correlation analysis	HW due
10	Proposal planning	Proposal due
11	Experimental design	
12	Applying principles of reproducibility and rigor	
13	Critically assessing literature for reproducibility and rigor	
14	Presentations	HW due
15	Presentations	Written plan due

Course Requirements and Grading:

Course assignments consist of homework assignments, a midterm, and a research proposal plan/presentation.

Homework (45%): There will be 6 homework assignments throughout the term related to the relevant lectures. Homework assignments will be designed to reinforce the lectures and to challenge you to critically apply these statistical principles.

- Unless otherwise noted all homework assignments are due at the start of class one week after it is assigned.
- You should work <u>independently</u> on the homework assignments.
- Unless otherwise noted, you must show all of your work to receive full credit. If you use a computer program to perform certain calculations you must write up all of your input parameters and write up the logic of analysis.
- If you have difficulties with a concept contact Dr. Tutwiler with sufficient time for her to respond and for you to complete your assignment.
- If you have issues regarding a grade you have one week after the grade is received to discuss.

Class participation (5%): You must attend class and actively engage in practice problems.

- If you can not attend these sessions for any reason please let me know 24 hours in advance. Notice less than 24 hours will count as an unexcused absence unless there is a compelling reason.

Midterm Exam (15%): There will be one midterm exam that will take halfway through the course.

Final Research Plan (20%) and Presentation (15%): During the semester you will prepare a scientifically rigorous research proposal and the appropriate statistical analysis.

- You will develop methods and results section of a manuscript where you delineate a rigorous experimental design, describe and perform the appropriate statistical tests. This plan will be presented during the final two weeks of class.
- Presentations will be evaluated on experimental design, statistical methods/analysis, and clarity.
- Your plan and presentation will be based on your research
- You will be given Week 10 in the class period to work on the plan in class and discuss ideas with Dr. Tutwiler A brief proposal is due to Dr. Tutwiler by the end week 10.

Academic Integrity:

Rutgers University takes academic integrity very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the <u>Academic Integrity Policy</u> and the possible penalties, including suspension and expulsion, for violating the policy.

As per the policy, all suspected violations will be reported to the Office of Student Conduct.

Academic dishonesty includes (but is not limited to):

- Cheating
- Plagiarism (using the work of others as your own)
- Aiding other students in committing a violation or allowing other students to use your work
- Failure to cite sources correctly
- Fabrication
- Using another person's ideas or words without attribution
- Reusing previous assignments
- Unauthorized collaboration
- Sabotaging another student's work

If you are in doubt about what does and does not constitute academic dishonesty, please consult Dr. Tutwiler.

Adherence to academic integrity principles is important to ensure that:
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.

- The reputation of the University for integrity, ethics, scholarship, and professionalism is maintained and enhanced.

Key points for this course:

All work submitted in this course must be your own, unless the assignment is specifically a group assignment. Homework and exams are not group assignments. For homework, you can discuss your _general approach_ with others

But do not copy other students' work, and do not show or share your work with other students, either directly or through online tools. During exams you must not communicate with others. It is unethical to receive a score / grade using work produced by another person (who may or may not be a student in this class).

Honor pledge:
On each assessment you will be required to re-affirm the university honor pledge: "_On my honor, I have neither received nor given any unauthorized assistance on this examination / assignment_".

The academic integrity policy also states that "_Students are also encouraged to help educate fellow students about academic integrity and to bring all alleged violations of academic integrity they encounter to the attention of the appropriate authorities_". i.e. if you are aware of or suspect that other students are violating the academic integrity policy, you should inform the instructor, anonymously if you prefer.

Disclaimer:
Dr. Tutwiler reserves the right to change the syllabus or any course policies at any time, in order to achieve the learning objectives for the course. Students will be informed of any changes to the syllabus prior to their implementation.