**Interdisciplinary Biostatistics**
16:125:578

**Instructor:** Valerie Tutwiler, PhD
**Contact Information:** valerie.tutwiler@rutgers.edu
**Class Meetings:** Lectures will be asynchronous via Canvas. Class meetings will occur via Zoom on Wednesdays 5-8PM.
**Office Hours:**

**Recommended software:** Excel, R, Prism, Oracle, SPSS, any statistical software that you prefer
**Recommended texts:**

## Course Description and Objectives:
This course is administered virtually through Canvas. 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 (Wednesdays, 5-8PM). 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. All lectures should be viewed prior to course meeting time.

| Week | Date | Topics | Assignments |
|---|---|---|---|
| 1 | 1/20 | Descriptive statistics, steps in developing a research project, types of data | |
| 2 | 1/27 | Types of distribution, sources of error or bias, mean, standard deviation | HW 1 due |
| 3 | 2/3 | Normal vs non-normal distributions and transformations, confidence intervals | |
| 4 | 2/10 | Determine needed sample size | |
| 5 | 2/17 | Hypothesis driven testing with 2 samples | HW 2 due |
| 6 | 2/24 | Hypothesis driven testing with 2+ samples | HW 3 due |
| 7 | 3/3 | Nonparametric statistics | HW 4 due |
| 8 | 3/10 | Midterm Exam | |
| SPRING RECESS | | | |

| 9  | 3/24 | Proposal planning                                           | Proposal due       |
|----|------|-------------------------------------------------------------|--------------------|
| 10 | 3/17 | Relationships and multiple linear regression                | HW 5 due           |
| 11 | 3/24 | Clinically relevant statistical tests                       |                    |
| 12 | 3/31 | Experimental design                                         |                    |
| 13 | 4/7  | Applying principles of reproducibility and rigor            |                    |
| 14 | 4/14 | Critically assessing literature for reproducibility and rigor | HW 6 due        |
| 15 | 4/21 | Presentations                                               |                    |
| 16 | 4/28 | 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 (Wed 5PM) one week after it is assigned.
- You should work underlined independently 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.

**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.
- This project will be performed in groups of 3-4. You will be allowed to pick your own groups and groups need to be submitted to Dr. Tutwiler by the of Week 8 (3/10).
- 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 the research from one of the members of the group.
- You will be given Week 9 (3/24) 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 9.

## Academic Integrity:

All students for responsible abiding by the University Academic Integrity Policy which can be found at [http://academicintegrity.rutgers.edu](http://academicintegrity.rutgers.edu). All homework and midterm assignments must be their own work. Violations of academic integrity will not be tolerated.