

IB 496 SUR - The Analysis of Biological Data in R - Fall 2019

Instructor: Dr. Becky Fuller

Where: NHB - Flex Teaching Classroom

When: Wednesday and Friday, 8 - 10 AM

Textbooks: The Analysis of Biological Data 2nd edition, by Whitlock & Schluter;
The R Graphics Cookbook by Chang.

The R Graphics cookbook is available online as a pdf, but if you are a dinosaur like me, then you might want to have a paper copy so that you can refer to it as you code.

The Whitlock and Schluter book (W-S) is a book that you should own. It can be purchased as a hardback, paperback, or e-book.

Other Required Items: Please bring your own laptop with a functioning copy of R and R Studio loaded. We will discuss how to do this.

Overarching Goals:

1. Students should thoroughly understand *how* basic statistical tools work.
2. Students should be able to correctly interpret statistics. This includes being able to simulate data to understand precisely what the parameters mean.
3. Students should be able to create graphics and tables that are of publication quality and easily interpretable.
4. Students should gain enough knowledge/tools/expertise on any one statistical subject that they can progress on their own after that.

Grades: This is a graded course. On the one hand, I really don't care about grades at the graduate level. Graduate school is all about what you can achieve and what you have to show for yourself at the end of your time here. On the other hand, you learn statistics and programming by ***doing*** it. By the end of this course, you should be able to teach yourself a lot of statistical tools.

The course has 4 graded elements. Each lecture will have a pre-lecture quiz that will require you to read the Whitlock and Schluter book as well as the Thursday paper. Each lecture will also have a post-lecture homework. Every Friday, we will have a paper discussion. Each student will have to help lead a paper discussion with 2-3 other students. Finally, there are 3 large graded projects that you must complete. These are all listed on the course schedule.

Here is the point breakdown:

Pre-lecture Quizzes - 30% (each pre-lecture quiz will count equally to the total)
Post-lecture Homework - 30% (each pre-lecture quiz will count equally to the total)
Three independent projects = 30%
Discussion of article - 10%

You may drop your 5 lowest pre-lecture quizzes and your 5 lowest post-lecture homework assignments. Please note that I do this to accommodate student absences. I do not have a specific attendance policy, but I do expect students to be in class. I understand that students get sick, attend conferences, do field work, and have time sensitive experiments. These 5 drops are intended to cover these types of issues. Please do not ask me for an extension for these online quizzes.

Schedule

I have posted the schedule of lecture topics, discussion papers, and due dates for projects. The last 3-4 weeks of this course is still a work in progress and will depend on how things are going later in the semester.

I reserve the right to alter the schedule.

Academic Integrity:

Course policy on dishonesty follows Article 104 (1-401 through 1-406) of the Student Code, http://studentcode.illinois.edu/article1_part4_1-402.html, which should be consulted for details. To learn about likely penalties for violations of the Student Code on academic honesty, see http://studentcode.illinois.edu/article1_part4_1-403.html. It is your responsibility to know and understand the rules concerning academic honesty.

Your independent projects should be your own. You are encouraged to seek feedback from your fellow students, but you obviously have to do these yourself.

Please note that I am fine with students working on pre-lecture quizzes, post-lecture homework, and paper discussions in groups. However, **you may not post the answers to quizzes or homework assignments anywhere online.** This means no instagram, no facebook (even if a private group), no twitter, no quizlets, etc. Simply copying and pasting answers into quizzes defeats the purpose of working in groups. In addition, we will be completing many of the problems at the end of the chapters. Allowing the answers to these problems to be displayed online ruins the value of this book for other instructors who use it. **I will assign an F to anybody who posts answers to quizzes or homework assignments online. If I find out about such behavior after the course is done, I will retroactively assign an F.**

Disability Accommodations

To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to see me as soon as possible.

Class Schedule

Date	Topic/Reading	Pre-Quiz?	Homework	Discussion/Reading
28-Aug	Intro to the Course	Yes	Yes	
30-Aug	W-S: Chapter 1- Statistics & Samples	Yes	Yes	Touchon_and_McCoy_2016
4-Sep	W-S: Chapter 2 - Displaying Data	Yes	Yes	
6-Sep	W-S: Chapter 2 - Displaying Data	Yes	Yes	Wainer_1984 (3 people)
11-Sep	W-S: Chapter 3 - Describing Data / W-S: Chapter 4 - Estimating with Uncertainty	Yes	Yes	
13-Sep	W-S: Chapter 5 - Probability / W-S: Chapter 6 - Hypothesis Testing	Yes	Yes	Interleaf #2
18-Sep	W-S: Chapter 7 - Analyzing Proportions	Yes	Yes	
20-Sep	W-S: Chapter 8 - Fitting probability models to frequency data	Yes	Yes	Interleaf #3
25-Sep	Class Presentations - Project #1	no	no	
27-Sep	Class Presentations - Project #1	no	no	None
2-Oct	W-S: Chapter 9 - Meta Analysis	Yes	Yes	
4-Oct	W-S: Chapter 9 - Contingency Analysis	Yes	Yes	Interleaf #4
9-Oct	W-S: Chapter 10 - The Normal Distribution; W-S: Chapter 11 - Inference for a normal population	Yes	Yes	
11-Oct	W-S: Chapter 12 - Comparing Two Means	Yes	Yes	Interleaf #5
16-Oct	W-S: Chapter 13 - Handling Violations of Assumptions	Yes	Yes	
18-Oct	W-S: Chapter 14 - Designing Experiments	Yes	Yes	Interleaf #6
23-Oct	W-S: Chapter 15 - Comparing Means of More than Two Groups	Yes	Yes	
25-Oct	W-S: Chapter 16 - Correlation	Yes	Yes	Interleaf #7
30-Oct	W-S: Chapter 17 - Regression	Yes	Yes	
1-Nov	W-S: Chapter 17 - Regression	Yes	Yes	Interleaf #8
6-Nov	Class Presentations - Project #2	no	no	
8-Nov	Class Presentations - Project #2	no	no	None
13-Nov	W-S: Chapter 18 - Multiple explanatory variables	Yes	Yes	
15-Nov	W-S: Chapter 18 - Multiple explanatory variables	Yes	Yes	Interleaf #9
20-Nov	W-S: Chapter 18 - Multiple explanatory variables	Yes	Yes	
22-Nov	Principal Components Analysis/Discriminant Function	Yes	Yes	Interleaf #10
4-Dec	W-S: Chapter 19 - Computer Intensive Methods	yes	yes	
6-Dec	W-S: Chapter 20 - Likelihood	yes	yes	Interleaf #11
11-Dec	Intro to Species as Data Points	yes	yes	
20-Dec	Class Presentations - Project #3 (1:30-4:30)			
Prop. Grade	Projects=30%	Quiz = 30%	HW = 30%	Discussion = 10%

