

## BIOL 5101/5102/5193 – Biostatistics – Spring 2024

### Instructors:

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Office Hours: M 1-3, W 1-2, or by appointment

**Course Description:** A critical evaluation of statistical analyses as applied in the biological sciences. Basic properties of experimental design and data analyses will be reviewed with emphasis on current applications in ecology and systematics.

**Student Learning Outcomes:** Upon completion of this course, students will be able to:

- Describe and understand what is meant by statistics and how to apply statistical analyses to data sets
- Understand the statistical assumptions and limitations of data sets and experimental designs
- Learn how to design experimental and observational studies that can be analyzed using univariate and multivariate statistical methods
- Learn how to present results from statistical methods (both in terms of statistical significance and graphically)
- Integrate statistical results with library research and synthesis of primary research literature in order to present a research paper

**Text:** Quinn and Keough. 2002. Experimental design and data analysis for Biologists. Cambridge University Press.

**Course Requirements:** Participation is expected at all class meetings, and all assignments are due on the dates specified in the schedule. No late assignments will be accepted. As the course only has a few class meetings, any absence should be a documented emergency. Grades will be assigned on a 10-point scale (i.e., 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, <60 = F).

### Assignments

#### *Homework*

Weekly homework assignments will cover statistical tests introduced in the lecture. A total of 8 homework assignments will be required over the course of the semester. You may elect to “drop” one homework, so 7 will count toward your grade. Some will require significant work, so do not procrastinate. Many of the assignments can be completed in class. *Homework will count for 50% of the final grade.*

#### *Presentation*

Learning to effectively communicate both written and verbally may be the most important component of your graduate education. An oral presentation will be required of each student. Students must use at least one of the statistical tests we covered in the class. Appropriate tables, graphs, literature cited, etc. will be required. *The oral presentation will count for 50% of the final grade.*

**Academic Misconduct:** Submitting plagiarized work to meet academic requirements including the representation of another's work or ideas as one's own; the unacknowledged word for word use of another person's ideas; and/or the falsification, fabrication, or dishonesty in reporting research results shall be grounds for charges of academic misconduct. Any cheating or other type of academic misconduct will be reported to university administration and at minimum will result in automatic failure of the course.

**Tentative Schedule**

<b>Date</b>	<b>Topic</b>	<b>Assignment Due</b>
1/18	Scientific Method & Experimental Design	
1/25	Hypothesis Testing & Graphics; T-tests	
2/1	ANOVA	Homework 1
2/8	Correlation & Regression	Homework 2
2/15	Nonparametric tests & frequency analysis	Homework 3
2/22	MANOVA, Discriminant Analysis, & Multiple Regression	Homework 4
2/29	Logistic Regression, AIC, & Classification	Homework 5
3/7	Indirect Gradient Analysis – PCA, CA, DCA, NMDS	Homework 6
3/14	Spring Break	
3/21	Indirect Gradient Analysis	
3/28	Direct Gradient Analysis – RDA, CCA plus post-hoc tests (Mantel, MRPP)	Homework 7
4/4	Presentation preparation/workshop	Homework 8
4/11	Student Presentations	
4/18	Student Presentations	
4/25	Student Presentations	