

BIOL683 Experimental Design in Biology

Instructor:

Dr. Heath Blackmon
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Office Hours: by appointment

Time and Location:

TR 2:20–3:35
BSBW B25

Learning Objectives:

This course is intended to provide a foundation in the proper design of scientific research projects in the field of biology. A wide range of biological experiments will be covered, and each type of experiment will be designed with an eye toward choosing the appropriate statistical technique for analysis. By the end of the course, successful students will be able to design biological studies that are statistically tractable and perform basic statistical analyses using the programming language R.

Prerequisites

STAT651 Statistics in research

Required Textbook:

The Analysis of Biological Data, Second Edition by Michael C. Whitlock and Dolph Schluter (ISBN-10: 1936221489, ISBN-13: 978-1936221586).

Students will write and run R code and will be required to bring a laptop to class.

Suggested reading:

Various articles will be posted during the course

Grading:

A total of 400 points are available in the course: 6 homework assignments (25 points each), two exams (100 points each), and class participation (50 points). The breakdown of grades will be:

A = 90%-100%

B = 80%-90%

C = 70%-80%

D = 60%-70%

F = 0-60%

Class participation points will be given based on participation in group discussions on two specified days. If a student has an excused absence during one of these another class participation grade will be doubled.

Makeup Assignments:

Makeup assignments will be given only for excused absences. Written documentation will be necessary to show that an absence qualifies as an official excused absence according to TAMU policy. The student must contact the course instructor within 3 days to arrange a makeup assignment or the grade will be converted to a zero.

Americans with Disabilities Act (ADA) Policy Statement:

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit <http://disability.tamu.edu>.

Aggie Honor Code:

An Aggie does not lie, cheat or steal, or tolerate those who do. See <http://aggiehonor.tamu.edu>.

Topics: (corresponding roughly to one topic per week)

Week 1 (Jan. 14): Introduction to R and Statistics, Reading: W&S Ch. 1–2

Week 2 (Jan. 21): Summaries and Estimates, W&S Ch. 3–4

Week 3 (Jan. 28): Probability and Bayes' theorem, W&S Ch. 5

Week 4 (Feb. 4): Hypothesis Testing, W&S Ch.6–9

Week 5 (Feb. 11): Continuously Distributed Variables, W&S Ch. 10–13

Week 6 (Feb. 18): Experimental Design, ANOVA, Correlation, W&S Ch. 14–16

Week 7 (Feb. 25): Regression and Multiple Factors, W&S Ch. 17–18

Week 8 (Mar. 3): Review, Exam I

SPRING BREAK (Mar. 9-13)

Week 9 (Mar. 17): Mixed Models

Week 10 (Mar. 24): Non-Gaussian Response Variables

Week 11 (Mar. 31): Species as data points

Week 12 (Apr. 7): GWAS

Week 13 (Apr. 14): Special Topics

Week 13 (Apr. 21): Special Topics

April 23 last day of regular class

Final Exam: May 5, 1-3pm.