

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).

Suggested reading:

Various articles will be posted during the course

Grading:

A total of 400 points are available in the course: 10 homework assignments (10 points each), two exams (100 points each), and class participation (100 points). The breakdown of grades will be:

A = 90%-100%

B = 80%-90%

C = 70%-80%

D = 60%-70%

F = 0-60%

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 anti-discrimination 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. 15): Introduction to R and Statistics, Reading: W&S Ch. 1–2

Week 2 (Jan. 22): Summaries and Estimates, W&S Ch. 3–4

Week 3 (Jan. 29): Probability and Bayes' theorem, W&S Ch. 5

Week 4 (Feb. 5): Hypothesis Testing, W&S Ch. 6–9

Week 5 (Feb. 12): Continuously Distributed Variables, W&S Ch. 10–13

Week 6 (Feb. 19): Experimental Design, ANOVA, Correlation, W&S Ch. 14–16

Week 7 (Feb. 26): Regression and Multiple Factors, W&S Ch. 17–18

Week 8 (Mar. 5): Review, Exam I

SPRING BREAK (Mar. 12–16)

Week 9 (Mar. 19): Mixed Models

Week 10 (Mar. 26): Heterogeneity and Hierarchical Data

Week 11 (Apr. 2): Non-Gaussian Response Variables

Week 12 (Apr. 9): Species as data points

Week 13 (Apr. 16): Expression data

Week 14 (Apr. 23): GWAS

Final Exam: May 8, 1–3pm.