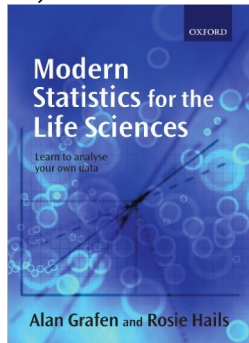


Instructor Information

Jarrett Johnson
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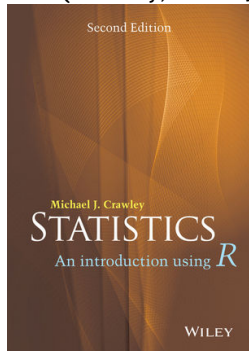
Course Materials

Recommended Texts:
Modern Statistics for the Life Sciences. (Grafen, A. and Hails, R. 2002). Oxford.



—AND—

Statistics—An Introduction Using R, 2nd Ed. (Crawley, M. 2015). Wiley.



Other Helpful Texts:

Biometry, 4th Ed. (Sokal, R and Rohlf, F. 2011). Freeman.

—OR—

Biostatistical Analysis, 5th Ed. (Zar, G. 2010). Prentice Hall.

Additional Materials:

The (free) open-source statistics program, R; download at:
<http://cran.us.r-project.org/>

Course Description and Expectations

Application of statistical techniques to problems in biological sciences. Emphasis is placed on hypothesis testing, use of linear models, and randomization techniques. The successful student will actively engage with lecture material, diligently complete assigned exercises, and frequently practice with sample data. *Students expecting to gain knowledge solely through passive absorption of the lecturer's oration will fail to meet their potential for statistical enlightenment.* The ultimate goal for students in this course is to become proficient in biometry. Proficiency is accomplished only if students embrace responsibility for their own education, immerse themselves in the R statistical environment, and earnestly complete the assigned material.

Course Objectives

- Provide students with the tools and knowledge to develop alternative ways of thinking about biological data.
- Guide students through a review of statistical and probability basics.
- Develop skills for testing hypotheses, using linear models for many types of research designs, assessing statistical power, and using various non-parametric and resampling methods.
- Help students conceive a research problem as a testable model, such that they are able to design experiments or observational studies in their research, which provide sufficient statistical power and allow valuable inferences to be made.
- Introduce the R statistical environment as a tool for evaluating biological data and synthesizing data into graphical form

Learning Outcomes

Upon completion of this course, students will be able to:

- Recognize types of biological data and know which statistical analyses should or should not be employed for different data
- Understand and implement statistical principles and probability theory
- Evaluate the results from statistical analysis of data from biological research
- Explain the implications of results from data analysis to a broad audience
- Critically evaluate statistical analysis of data from publishable research
- Perform analyses and produce high-quality figures in R

University Policies:

As a WKU student enrolled in this course you have certain rights and entitlements established by federal law and described in University policies.

Information regarding the request of an accommodation under the Americans with Disabilities Act can be found by clicking on the “ADA Accommodation” tab at:
<https://www.wku.edu/syllabusinfo/>

Information regarding the reporting of discrimination or harassment under Title IX of the Equal Opportunity in Education Act can be found by clicking on the “Title IX Discrimination/Harassment” tab at:
<https://www.wku.edu/syllabusinfo/>

Students are required to maintain a civil and professional conduct in class. Information regarding academic integrity and the student code of conduct as described in the student handbook can be found by clicking the “Things you should know” tab at:
<https://www.wku.edu/syllabusinfo/>

Additional mechanisms offered by the university, such as for the reporting of complaints and grievances, can be found under the “If issues arise” tab, and information regarding emergency preparedness and counseling/support can be found under the “Be prepared – Know where to go” tab at:
<https://www.wku.edu/syllabusinfo/>

Grading and Evaluation

A combination of a strict scale (e.g., $\geq 90\%$ = A, $\geq 80\%$ = B, $\geq 70\%$ = C, $\geq 60\%$ = D, $< 60\%$ = F) will be used to determine final grades.

The final score for the course will be comprised of scores from data analysis assignments (~55%), from exams (~40%), and from participation (~5%). Both assignments and exams will include analysis of raw data and evaluation of results. A short explanation of assignments and exams is provided below.

Assignment Format

Approximately bi-weekly, a data analysis project will be assigned. The assignments will consist of two parts. Each student will seek to meet the challenge of the assignment and provide a detailed write-up of the analysis. Assignment deadlines will be strictly enforced.

Exam Format

Exams will be a larger version of the assignments. Students will be given data sets and a few challenges to overcome. Like assignments, exams will be submitted as data analysis reports, detailing all analytical steps. Students can expect to have unique data sets, thus reducing the impetus to violate WKU’s Code of Student Conduct.

Cheating, especially in the form of plagiarism, will not be tolerated. It is OK, even advised, that students work with others to discuss concepts and develop new ideas. However, it must be evident that any submitted work is the individual effort of the student.
