

## BY655/755- Biometry Course Syllabus

**Instructors:** Dr. Jessica Hoffman [jmhoffm@uab.edu](mailto:jmhoffm@uab.edu)  
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**Class meeting:** Tuesday/Thursday 3:30-4:45, Room HHB227

**Office Hours:** By appointment

**Text:** The Analysis of Biological Data by Whitlock and Schluter. Practice problems are provided for both the 1<sup>st</sup> and 2<sup>nd</sup> edition.

**Software:** R ([www.r-project.org](http://www.r-project.org)) and Rstudio ([www.rstudio.com](http://www.rstudio.com))- both are free downloads  
-All students are required to have access to a laptop computer

**Other Helpful Reference Materials:**

-**Website for book** <http://whitlockschluter.zoology.ubc.ca/r-code>

-**Biostatistical Design and Analysis Using R**

[http://www.ievbras.ru/ecostat/Kiril/R/Biblio/R\\_eng/Logan%20Biostatistical.pdf](http://www.ievbras.ru/ecostat/Kiril/R/Biblio/R_eng/Logan%20Biostatistical.pdf)

-**R cheat sheet** <https://cran.r-project.org/doc/contrib/Short-refcard.pdf>

**Course Content:** All PowerPoint Lectures and Practice Problems can be found on UAB Canvas

**Course Description:** This is an introductory course for graduate students for application and implementation of statistical analyses in the biological sciences. The course will cover many topics covered in the first two semesters of introductory statistics, from samples means to linear regression. All analyses will be completed either by hand or with the statistical program R. Each class meeting will consist of both lecture and working practice problems in R. At the end of the course, students should feel well versed enough to apply basic statistical concepts to data collected from their own experiments. Students will also gain some basic knowledge of the R programming language in order to store, manipulate, graph, and analyze data.

**Grading:** The course will be graded based on two exams (30% each) and an end of semester final (40%). Problems will be assigned from each chapter. While not graded, it is strongly recommended that students complete the problems from each chapter. Exams will be a mixture of closed and open book. The open book portions will require a computer.

**Disability Support Services:** UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact me to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call **934-4205** or visit <http://www.uab.edu/dss>.

**Title IX Statement:** The University of Alabama at Birmingham is committed to providing an environment that is free from sexual misconduct, which includes gender-based assault, harassment, exploitation, dating and domestic violence, stalking, as well as discrimination based on sex, sexual orientation, gender identity, and gender expression. If you have experienced any of the aforementioned conduct we encourage you to report the incident. UAB provides several avenues for reporting. For more information about Title IX, policy, reporting, protections, resources and supports, please visit <http://www.uab.edu/titleix> for UAB's Title IX Policy, UAB's Equal Opportunity, Anti- Harassment Policy and Duty to Report and Non-Retaliation Policy.

**Add/Drop and Withdraw:** The last day to drop this course without payment of full tuition and fees is **January 16, 2018**. The last day to withdraw from this course with a grade of **W** is **March 2, 2018**. Students withdraw from a course by completing the appropriate paperwork online or in the UAB Registrar's Office. Approval of the instructor is not required.

**Schedule:** This is a general outline for the class and is subject to change.

- Tuesday January 9, 2018- Introduction to statistics and R, populations and samples
- Thursday January 11, 2018- Displaying data
- Tuesday January 16, 2018- Describing data part I
- Thursday January 18, 2018- Describing data part II
- Tuesday January 23, 2018- Computer Lab for R
- Thursday January 25, 2018- Probability
- Tuesday January 30, 2018- Normal Distribution
- Thursday February 1, 2018- Hypothesis Testing
- Tuesday, February 6, 2018- Testing for Normality and Data Transformation
- Thursday, February 8, 2018 - Review
- Tuesday February 13, 2018- **Test**
- Thursday February 15, 2018- One and Two-Sample Comparisons: T-test
- Tuesday February 20, 2018- T-Test Continued and non-parametric T-test
- Thursday February 22, 2018- Designing Experiments
- Tuesday February 27, 2018- Multiple Comparison – ANOVA (one way and two way)
- Thursday March 1, 2018- ANOVA continued and non-parametric test
- Tuesday March 6, 2018- Post Hoc (Tukey's, Liberal Post Hoc)
- Thursday March 8, 2018- Additional ANOVAs (ANCOVA and Repeated Measures)
- Tuesday March 13, 2018- Spring Break
- Thursday March 15, 2018- Spring Break
- Tuesday March 20, 2018- Review
- Thursday March 22, 2018- **Test**
- Tuesday March 27, 2018- Binomial and Poisson Distributions
- Thursday March 29, 2018- Frequency Data
- Tuesday April 3, 2018- Tests with Contingency Tables
- Thursday April 5, 2018- Correlation
- Tuesday April 10, 2018- Linear Regression
- Thursday April 12, 2018- Continuous and factor fixed effects
- Tuesday April 17, 2018- GLM
- Thursday April 19, 2018- Final Review
- Tuesday April 24, 2018 (4:15-6:45)- **Final**- note the change in time

## Practice Problems for 1<sup>st</sup> and 2<sup>nd</sup> Edition

- Chapter 1
  - 1<sup>st</sup>: All problems
  - 2<sup>nd</sup>: All problems
- Chapter 2
  - 1<sup>st</sup>: 2,5,7a/b,13
  - 2<sup>nd</sup>: 2,5,7a/b,11
- Chapter 3
  - 1<sup>st</sup>: 1-4,6,7
  - 2<sup>nd</sup>: 3-8
- Chapter 4
  - 1<sup>st</sup>: 2,3,5d,6
  - 2<sup>nd</sup>: 3,4,6d,7
- Chapter 5
  - 1<sup>st</sup>: 1,2,4,5,7,10,14
  - 2<sup>nd</sup>: 6,7,9,10,11,16
- Chapter 6
  - 1<sup>st</sup>: 1-4,7,10
  - 2<sup>nd</sup>: 4-7,10,12
- Chapter 10
  - 1<sup>st</sup>: 1,2,4,6,7
  - 2<sup>nd</sup>: 3,4,6,8,9
- Chapter 13
  - 1<sup>st</sup>: 1,2a
  - 2<sup>nd</sup>: 4,5a
- Chapter 11
  - 1<sup>st</sup>: 2,6b,7,8
  - 2<sup>nd</sup>: 5,9,10,11
- Chapter 12
  - 1<sup>st</sup>: 1,4b,5,6b,8,11,14
  - 2<sup>nd</sup>: 4,5,6,7b,8,10,13
- Chapter 13
  - 1<sup>st</sup>: 10
  - 2<sup>nd</sup>: 3,12
- Chapter 14
  - 1<sup>st</sup>: 1,3,4,5,6,9a
  - 2<sup>nd</sup>: 1,3,4,5,6,9a
- Chapter 15
  - 1<sup>st</sup>: 1-4,7,8,12
  - 2<sup>nd</sup>: 1,6,7,9,10,11,12
- Chapter 7
  - 1<sup>st</sup>: 1a/b,3,4,7,8,9
  - 2<sup>nd</sup>: 4a/b,6,7,10,11,12,14
- Chapter 8
  - 1<sup>st</sup>: 1,3-6
  - 2<sup>nd</sup>: 2,4,5,9
- Chapter 9
  - 1<sup>st</sup>: 1,3-7
  - 2<sup>nd</sup>: 4,6-10

- Chapter 16
  - 1<sup>st</sup>: 1,3,4,6,8,9,10a/b
  - 2<sup>nd</sup>: 4,5,6,8,10,11,12a/b
- Chapter 17
  - 1<sup>st</sup>: 1,2,3,5,6,7,8,11
  - 2<sup>nd</sup>: 5-11,14
- Chapter 18
  - 1<sup>st</sup>: 1-4,6
  - 2<sup>nd</sup>: 1-6