BIOSTATISTICS - BIO 4374 Spring 2018

Professor:

Lecture: T, Th 02:00 - 3:20 pm Lee Drain Building 213

Dr. Jerry L. Cook Department of Biological Sciences Natural History Collections, room 178 Email: jcook@shsu.edu

Office Hours: Office hours are by appointment

Textbook:

Zar, J.H. 2010. Biostatistical Analysis. Pearson Prentice Hall, Inc. Upper Saddle River, New Jersey. Pp. 944.

Additional References of Interest:

- Sokal, R.R. and F.J. Rohlf. 1995. Biometry. W.H. Freeman and Company, New York, New York. Pp. 887. (*The Bible of Biostatistics*)
- Van Emden, H.F. 2008. Statistics for Terrified Biologists. Blackwell Pub., Malden, Massachusetts. Pp. 343.

COURSE DESCRIPTION

Biostatistics (BIO 474) is a course that introduces biologists to basic statistical methods and their application to real biological problems. As for any good course in Biometry, students will: become familiar with statistical terminology, be introduced to concepts in experimental design and hypotheses testing, and learn statistical procedures for describing and summarizing data. More importantly, this course will focus on identifying different experimental designs and learning which statistical procedures are most appropriate for data interpretation. Thus, this course in Biometry will focus on the application of statistics in biology and not the mathematical theory and derivation of statistical equations. Topics will include data presentation, descriptive statistics, probability, theoretical probability distributions, confidence intervals, hypothesis testing, analysis of variance, correlation and regression, and frequency analysis. The use of computers and statistical software will be required in this course. **Prerequisites** include MATH 1314 or 1420 and minimum grade of C in 8 hours of biology course credit.

STUDY AIDS AND TECHNIQUES

The schedule of lecture topics is attached. Success in this course is directly proportional to the amount of time and effort dedicated to reading course material and studying. You should adopt a study schedule that allows for ample time to be prepared for the lecture. Textbook readings and assignments are most important and should be completed prior to lecture. Each chapter of the text book ends with a set of statistical EXERCISES that should receive your attention. These exercises will help you evaluate your understanding of course material and may be used in *lecture quizzes*. If you do not adopt these study practices, you may gain limited experience from this course which will be reflected in your final course grade.

ATTENDANCE AND PERFORAMANCE

Students are expected to attend every lecture. A student's course performance will greatly reflect class attendance. Quizzes will test your understanding and mastery of material covered and discussed in lecture. All material discussed in lecture may or may not be addressed in your text. Thus, lecture information is crucial for complete preparation for quizzes and the assigned readings should be used in preparation for lecture.

ONLINE HOMEWORK EXERCISES

There will be *Homework Exercises* assigned and to be completed online at:

www.pearsonmylabandmastering.com Course ID: cook27174

Technical Support: 1-800-677-6337 http://247pearsoned.custhelp.com

LECTURE QUIZZES AND FINAL EXAMINATION

There will be several *Lecture Quizzes* (20 points each) given over the course of the semester. These quizzes are unannounced but are always given at the start of a lecture period. These quizzes will address any lecture material presented prior and will help evaluate your understanding of statistical concepts in preparation for the final examination. There will be no make-up quizzes but you will be able to drop one quiz should you be unable to attend class on the day that a quiz is given.

There will be a *Final Examination* (100 points) which will access your knowledge and understanding of lecture material and particular topics presented in the textbook. This final examination will be given the last day of scheduled classes to be completed outside of class and will evaluate each student's ability to apply the concepts taught over the semester to real biological problems.

MISSED EXAMINATIONS

Absence from a quiz due to an unexcused absence will result in a grade of zero for that quiz. If you miss quizzes beyond what can be compensated for by the above dropped quiz policy for medical reasons, an excused family emergency, or official SHSU business, a statement of your illness signed by your attending physician or appropriate official documentation will be required. Documentation for excused absences must be provided to the instructor no later than the next class meeting. Upon providing this documentation, arrangements will be made to replace the missed quizzes.

GRADING

| Lecture Quizzes (20 pts. each) x 10 | 200 points |
|-------------------------------------|------------|
| Online Homework Assignments | 200 |
| Final Comprehensive Take-Home Exam | 100 |
| Total points | 500 |

Grades are based on the total number of points earned in each of the above categories divided by the total possible number of points in that category. The final course grade will be determined base upon the above reported percentages and follow the grading scale of A = 90 - 100% (above 450 points), B = 80 - 89% (400-449 points, C = 70 - 79% (350-399 points), D = 60 - 69% (300-349 points, and F = 0 - 59% (below 300 points).

Students taking this undergraduate course in biostatistics for **graduate credit** will be required to complete and additional problem to be analyzed that will be due at the same time as the Final Comprehensive Exam. This additional set of analyses will evaluate a student's understanding and mastery of course material at the graduate level.

ACADEMIC DISHONESTY

Regulations and responsibilities stated in the Student Code and Faculty Handbook will be followed in the event of academic dishonesty.

Specific Notes and Codes of Conduct for this Course: Much of the work for this course is completed outside of class and independently (i.e. homework assignments and take-home examinations). You will also be allowed to use your statistical tables during in-class exams. Thus the following rules will be enforced:

- 1) Although you are encouraged to study in groups, all outside-of-class course assignments **<u>must</u>** be completed independently. You may not consult with other professionals (i.e. students, graduate students, or professors) regarding answers to outside-of-class course assignments.
- 2) You may **not** place notes on your statistical tables that can be used as an aid during exams (*e.g.*, formulas and definitions). I reserve the right to inspect all tables during or after exams.

Students taking this course are professional biologists and dishonesty in any form should be of concern to all professionals. As may be apparent, I take professional standards of conduct seriously. Students having specific knowledge of behavior that compromises our ethical standards and professionalism, should see me immediately. Misconduct and disrespect for academic professionalism or failure to report such behaviors will result in those students receiving a grade of "F" in this course and may be brought to Academic Council for dismissal from the University.

WITHDRAWAL POLICY

If grades of W(P), W(F), or I, are requested, University policy will be followed.

STUDENTS WITH DISABILITIES

Students who have disabilities that may prevent them from fully demonstrating their abilities should contact the professor as soon as possible to discuss the accommodations necessary to facilitate full participation and to ensure the each student's educational opportunity.

DISCRETIONARY NOTE

This syllabus is subject to change at the discretion of the professor.

Syllabus

| Week | Date | Торіс | Textbook Readings |
|------|--------------|---|------------------------------|
| 1 | 1/18 | Introduction and Basic Definitions Accuracy and Significant Figures | Chapter 1 |
| 2 | 1/23 1/25 | Frequency Distributions and Graphing Populations and Samples | Chapter 2 |
| 3 | 1/30 2/1 | Measures of Central Tendency and Dispersion | Chapters 3-4 |
| 4 | 2/6 2/8 | Probability Binomial Distributions | Chapter 5 Chapter 24 |
| 5 | 2/13 2/15 | Poisson Distributions Normal Distributions | Chapter 25 Chapter 6 |
| 6 | 2/20 2/22 | Central Limit Theorem Confidence Limits | Chapters 7-9 Chapters 7-9 |
| 7 | 2/27 3/1 | Hypothesis Testing Analysis of Variance | Chapters 7-9 Chapter 10 |
| 8 | 3/6 3/8 | Analysis of Variance Multiple Comparisons | Chapter 10 Chapter 11 |
| 9 | 3/20 3/22 | Two-Factor Analysis of Variance | Chapter 12 |
| 10 | | Spring Break no classes | |
| 11 | 3/27 3/29 | Data Transformations Multiway Factorial Analysis of Variance | Chapter 13 Chapter 14 |
| 12 | 4/3 4/5 | Nested Analysis of Variance | Chapter 15 |
| 13 | 4/10 4/12 | Multivariate Analysis of Variance | Chapter 16 |
| 14 | 4/17 4/19 | Simple Linear Regression and Correlation Multiple Regression and Correlation | Chapters 17-19 Chapter 20 |
| 15 | 4/24 4/26 | Testing for Goodness of Fit Contingency Tables | Chapters 22-23 |
| 16 | 5/1-3 | Course overview Final Test distribution | |
| 1 | 5/8 | FINAL COMPREHENSIVE EXAM DUE DATE (by 6pm) | |