Oakland University
College of Arts and Sciences
Department of Mathematics and Statistics

Course: STA 2222: Statistical Methods for Biology (11205)   4 credits

Semester: Winter 2018

Instructor:	Ravi Khattree	E-mail: khattree@oakland.edu
Office:	551 SEB	Office Phone: 248-370-3448
Class Time:	MWF 2:40-3:47 PM	Office Hours: Mon., 1:30-2:20 pm
		Wed., 1:30-2:20 pm
		and by appointment.

Class Meeting Room: SFH 165

Course (Catalog) Description: Introduction to statistical methods for students in biology and other laboratory sciences. Basic principles of experimental design and data collection. Descriptive statistics, probability models, confidence intervals, hypothesis testing, two- and multi-sample comparisons, regression models, categorical data, nonparametric methods. Mathematics or statistics majors cannot use STA 2222/228 to replace STA 2226/226.

Prerequisite: MTH 1441/141 with a grade of 2.0 or higher.

General Education Learning Outcomes:

1. The student will demonstrate knowledge of one or more formal reasoning systems such as computer programming, mathematics, statistics, linguistics or logic.

In this course this entails knowledge of how to summarize data by numbers and graphs, and how to model statistical data from a variety of sources by common distributions such as normal, exponential, binomial, Poisson, etc.

2. The student will demonstrate knowledge of application of formal reasoning to read, understand, model and solve problems across a variety of applications.

This course includes applications of correlation, regression, and analysis of variance models to study relationship between variables, and applications of statistical tests and confidence intervals to make sound statistical judgments.

Cross-Cutting Capacity:

Critical Thinking: The instruction will aim at developing "habits" of statistical thinking, beyond statistical reasoning and literacy taught in the classroom. The course will promote in students the ability to have an understanding of how statisticians think, to be able to explore data in ways beyond the classroom and textbook examples, and will promote students' ability to ask relevant statistical questions when faced with real world problems.

Course Objectives:
The primary goal is to build a fundamental understanding of statistical methods and their proper application in biology and other laboratory sciences. The successful student will develop an

understanding of the purposes and methods for acquiring, displaying and summarizing data; stochastic description of random phenomena and some useful probability distributions for modeling discrete and continuous random variables; the logic of statistical inference for estimation and hypothesis testing; methods for multi-sample comparisons and regression models; methods for analysis of categorical data; and an introduction to nonparametric methods.

Required Text and Supporting Materials:

The Practice of Statistics in the Life Sciences (3rd Edition) by Brigitte Baldi and David S. Moore, Freeman (2013). A copy of the textbook will be available on 2 hour reserve at Kresge Library.

Expectations of Students:

Cultivating good work and study habits is necessary for doing well in mathematics and statistics courses. Attendance at every class is expected. You should keep on top of the subject by doing large amounts of homework (including working on problems not assigned), regularly reviewing earlier material, asking questions in class, and making good use of your instructor's office hours. If you are having difficulty with some concept or mathematical procedure, you should get it clarified as soon as possible. Regular reviewing of older material in the course will put you in good stead when it comes to final exam time. You should expect that doing all of these things will take _at least_ two hours outside of class for each hour in class. Practice problems (not to be graded) will be assigned (in addition to the homework to be graded). It is imperative that you develop a discipline of working out these practice problems in a timely manner.

Grade Determination:

Tests: There will be two in-class tests (tentatively scheduled for February 5 and March 16), each worth 20% of the total points for the course. The tests will be designed to meet the objectives of the course. If the university is officially closed on a scheduled test date, the test will be given on the next class date that the university is officially open.

Homework: Homework (to be graded) will be assigned every week. They are worth 10% of the grade. There will be no make-up homework.

Final Examination: There will be a comprehensive final examination (April 19, 3:30-6:30 pm in regular classroom), worth 40% of the total points for the course.

Attendance: Students are expected to attend every class. 10% of the grade is attributed to attendance. There are no excused absences.

Grading Scale: Your grade in the course will be based on the total points you have earned. There is no fixed grading scale for this course. A conversion formula from your score to Oakland University grades will be determined at the end of the course. However the following list shows the lowest possible grade that a given percentage score will earn (the grade may be higher than this): 95 -> 4.0; 80 -> 3.0; 65 -> 2.0; 50 -> 1.0.

MAKE-UP POLICY: There will be no make-up tests. If you miss a test and have a valid excuse, your grade will be determined by giving more weight to the final exam. However, you do not have any such accommodation for homework and attendance.

CALCULATOR POLICY: You may use a calculator for all tests and homework assignments. However cell phone calculators are <u>not</u> allowed during tests. To receive full credit on tests, be sure to show all the necessary work for setting up a calculation.

Academic Conduct Policy:

ACADEMIC HONESTY: Cheating is a serious academic crime. Oakland University policy requires that all suspected instances of cheating be reported to the Academic Conduct Committee for adjudication. Anyone found guilty of cheating in the course will receive a course grade of 0.0, in additional to any penalty assigned by the Academic Conduct Committee. Working with others on homework assignments does not constitute cheating; handing in an assignment that has essentially been copied from someone else does. Receiving help from someone else or from unauthorized written materials during tests is cheating, so is using a calculator as an electronic "crib sheet" or using cell phones to communicate with unauthorized sources of help. Signing for someone else on attendance sheet or asking someone else to do so for you is also an academic misconduct.

Important Dates

January 3	Classes begin
January 15	Martin Luther King Jr. Day (no class)
January 17	Last Day to Add; Last Day to "no grade drop"
February 17	Winter Recess Begins at 10:00 p.m.
February 26	Classes resume at 7:30 a.m.
March 14	Last Day to Official Withdrawal (No Grade)
April 17	Last Day of Classes
April 19-25	Final Exam Period
April 19	Final Exam 3:30-6:30 PM

Tentative Syllabus:

Week Number	Chapters and Topics
1	Chapter 1: Introduction, Organization and Description of Data
2	Chapter 2: Description of Data
3	Chapter 3, 4 & 5: Study of Bivariate Data
4	Chapter 7 & 8: Producing Data: Observational Studies and Experiments**)**
5-6	Chapter 9 & 10: Probability Concepts, Test 1 **(Monday, Feb. 5)**
7	Chapter 11 & 12: Probability Models
8	Chapter 13 & 14: Sampling Distributions, Confidence Intervals
9-10	Chapter 14, 15, 17 & 19: Interval Estimation & Hypothesis Tests, **Test 2 (Mon, Mar. 14)**
11	Chapter 18 20 & 27: Comparing Two Samples
12	Chapter 24, 26 & 27: Comparing Several Samples
13	Chapter 23: Regression Analysis
14	Chapter 21 & 22: Categorical Data

April 19 **FINAL EXAM** Thursday, 3:30-6:30 PM: in regular classroom