Statistical Methods in Environmental Toxicology
ENTX 6385 & 6100

Stephen B. Cox
101J BLDG 555, Reese Center
Phone: 885-0249
E-mail: stephen.cox@ttu.edu

Fall 2009
9:30-11:00 T-Th & 11:00 – 12:30 Th
Lecture Hall, BLDG 555, Reese Center
Computer Lab, BLDG 552, Reese Center

COURSE INFORMATION

Web page: http://www.tiehh.ttu.edu/scox/stats.htm
Office hours: MW 9-10; other times by appointment (stop by anytime!)

1. Textbooks

a. Required:

i. Zar, J. 1999. Biostatistical Analysis. 5th Ed. Prentice Hall.
ii. Dalgaard, P. 2002. Introductory Statistics with R. Springer-Verlag.

b. Optional:

Salsburg, D. 2001. The Lady Tasting Tea: how statistics revolutionized science in the twentieth century. W.H. Freeman & CO.

c. Other Good References:

Sokal, R. R., and Rohlf, F. J. 1994. Biometry: The Principles and Practice of Statistics in Biological Research. W. H. Freeman and Co. 859pp.

Quinn, G.P. and M.J. Keough. 2002. Experimental Design and Data Analysis for Biologists. Cambridge University Press.

2. Expected Learning Outcomes

After completing this course, you should be able to:

a. discuss the concept of probability and how it underlies statistical methodology,
b. explain statistical sampling, statistical inference, and hypothesis testing - especially as they relate to the scientific method,
c. distinguish the characteristics of the binomial, poisson, and normal probability density functions (which are extremely important within the biological sciences) and be able to recognize when they apply to biological data,
d. recognize when and how to apply some widely used hypothesis tests,
e. discuss in depth the conceptual approach of the analysis of variance (ANOVA),
f. explain the concept of statistical modeling and apply linear, and generalized linear, models,
g. use the R statistical programming environment, including being able to import, manage, plot, and analyze data.

3. Software

R can be downloaded at http://cran.r-project.org. Details about R, documentation, extended statistical routines and datasets (in the form of R 'packages'), and other helpful information, also can be found there.

4. Specific Course Requirements and Policies

Your mastery of the above outcomes will be assessed using class discussions, participation in weekly computer lab exercises, and homework problem sets (approximately weekly). Homework assignments will require you to work out particular problems and appropriately interpret results. Because we will be stressing a working, conceptual understanding of statistics – many problems will be worked out by hand (with the aid of calculators or spreadsheet programs). Lab exercises will count as homework grades. We will also have a midterm exam and a final exam. Grades will be based on individual performance. There will be no curve. Grades will be determined by the following breakdown: 70%,Homework problem sets; 10%, Midterm; and 20%, Final.

5. Schedule

Aug 27	Classes Begin
Approx. Oct 13	Midterm Exam
Nov 25-29	Thanksgiving Holiday
Dec 9	Last Day of Classes
Dec 11	Final Exam (7:30 – 10:00 AM) WEDS

6. Attendance

Attendance will not be monitored; however, homework and exams will focus specifically on material covered in class. It is highly unlikely that any student will be successful without attending lectures and recitations. If you will miss an exam, you must make prior arrangements for a make up exam. The only exceptions will be for unexpected illnesses, events outside of your control (e.g., death in the family), or religious holy days as described below.

7. General Outline (Subject to Change)

1. Introduction to Statistical Methods
2. Probability Theory
3. Probability Density Functions and Parameters
4. Statistical Estimation
5. Hypothesis Testing
6. Alpha, Beta, and Power
7. ANOVA
8. Regression and Correlation
9. ANCOVA
10. Multiple Regression
11. Non-linear Regression
12. Generalized Linear Models (GLM)
13. Non-detects

8. Various

Observance of a Religious Holy Day - Texas House Bill 256 requires institutions of higher education to excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day. The student shall also be excused for time necessary to travel. An institution may not penalize the student for the absence and allows for the student to take an exam or complete an assignment from which the student is excused. No prior notification of the instructor is required.

ADA Statement - Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Student should present appropriate verification from AccessTECH. No requirement exists that accommodations be made prior to completion of this approved university procedure.

Academic Integrity / Academic Misconduct - Texas Tech University Catalog: (p.49) - "It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension."

Cheating - Dishonesty on examinations and quizzes or on written assignments, illegal possession of examinations, the use of unauthorized notes during an examination or quiz, obtaining information during an examination from the examination paper or otherwise from another student, assisting others to cheat, alteration of grade records, illegal entry to or unauthorized presence in an office are instances of cheating.

Plagiarism - Offering the work of another as one's own, without proper acknowledgment, is plagiarism; therefore any student who fails to give credit for quotations or an essentially identical expression of material taken from books, encyclopedias, magazines, internet, and other reference works, or from the themes, reports, or other writings of a fellow student, is guilty of plagiarism.

Civility in the Classroom - More information about this topic is available on-line at www.studentaffairs.ttu.edu/vpsa/publications/civility.htm

Students with Disabilities / ADA Statement - Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Student should present appropriate verification from AccessTECH. No requirement exists that accommodations be made prior to completion of this approved university procedure.

Office of the Ombudsman - The Office of the Ombudsman is available to assist students with any conflict or problem that has to do with being a student at Texas Tech University. You may visit the Ombudsman in 202 Student Union Building or call 742-4791.