

BIOL 310

Research Design and Analysis

Fall 2009

Instructor:

Dr. Paul T. Smith

Science Bldg I, Room 219

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Office Hours: MW: 2:00-2:30PM, TTH 11:00-11:30AM, F: 9:00-10:00AM or by appointment

Meetings: MW, 12:20-1:40 SCI 125 (lecture); TTH, 12:20-2:50 SCI 215 WSL 14 (lab);
F 12:20-2:50 SCI 221

Text: PDFs available at www.csub.edu/~psmith3/teaching

Course Description

This course is designed to teach you how to formulate basic experimental designs, provide you with the tools necessary to analyze and interpret quantitative data, and to communicate scientific results in the style of formal scientific writing. This includes participating in all phases of biological research (design, collection of data, analysis, interpretation and presentation).

Specific Course Objectives

1. To learn the language of statistics.
2. To understand the fundamental principles involved in statistical analysis and interpretation of research data.
3. To learn statistical methodology and become familiar with applications of statistical methods to research in the biological sciences.
4. To learn how to read scientific literature with a “critical eye”.
5. To learn how to “do” research and communicate scientific results effectively.

Attendance, Participation and Policies

Attendance and participation are critical to your success in this course. In the event that an absence is unavoidable it is your responsibility to find out what you missed and get copies of handouts from a fellow classmate (not me). The only acceptable excuse for a missed exam is illness or death in family, either way you must bring valid documentation to support your absence. Failure to do so will result in a 0 for the exam. You are expected to behave professionally and actively engage in the learning process. If you have questions, ask them!

Writing

One of the primary objectives in this course is that by the end of the term you will be able to write a professional, quality scientific paper as if you were submitting the same for publication in a scientific journal. Toward this end, writing will be emphasized throughout the course. Scientific writing is not limited to simply placing the necessary information in each section, but also effectively communicating ideas in a clear, concise manner. Problems with paragraph structure, organization, grammar and typographical errors detract from a reader’s ability to understand the paper. Therefore, in addition to the requirements of a scientific paper explained in the handout “Format for Research

Papers” you will be expected to turn in work that is well-written and has been proof-read so that it is free of grammatical and typographical errors.

Course format and late assignments

Prior to each class meeting, students will study assigned reading and work assigned problems that cover the reading. Assigned problems are due at the class meeting. Class time will be used to lecture, answer questions about the reading and to allow students opportunity to work on practice and/or assigned problems. Keep in mind that for the assigned problems, showing work and explaining the steps in arriving at a solution are as important as the solution itself and provide the students with a valuable study aid when preparing for exams. I do not accept late assignments and one minute late is the same as two days late. I accept only hard copies of assigned problems (i.e., no electronic copies).

Academic dishonesty

All University policies regarding classroom conduct and academic freedom as published in the CSUB catalog will be strictly followed. Also, cheating and plagiarism will not be tolerated, and University policies regarding academic dishonesty will be strictly followed.

Grading scale

Letter grades will be assigned using the following scale as a guide.

93 – 100 = A	83 – 86 = B	73 – 76 = C	63 – 66 = D
92 – 90 = A-	80 – 82 = B-	70 – 72 = C-	60 – 62 = D-
87 – 89 = B+	77 – 79 = C+	67 – 69 = D+	< 60 = F

Evaluation

Date Due	Assignments/Exams	Points
TBA	Assignments/Problem Sets/Quizzes	100
Sep 24	Quiz 1	
Oct 26	Quiz 2	
Nov 12	First Draft/Peer Review	
Nov 16	Final Research Paper	100
Oct 12	In-Class Exam 1	70
Oct 13	Take Home Exam 1	30
Nov 4	In-Class Exam 2	60
Nov 5	Take Home Exam 2	40
Nov 19	Take Home Final Exam	80
Nov 20	Final Exam (Comprehensive)	120
	TOTAL	600

Instructions for problem sets/assignments/research projects will be handed out in class

Tentative Course Schedule

DATE	TOPIC	READING
M-Sep 14	Course Introduction	310syllabus.PDF
T-Sep 15	Introduction to Statistical Computing/Notation	
W-Sep 16	Scientific Methodology & Writing	310-1.PDF
TH-Sep 17	Tables & Figures	TABLE.PDF
M-Sep 21	Experimental Design	310-2.PDF
T-Sep 22	Formation of Research Groups/Project Brainstorming	
W-Sep 23	Descriptive Statistics	310-3.PDF
TH-Sep 24	Descriptive Statistics/ QUIZ 1	
M-Sep 28	Project Proposals Due (send via email by noon)/Project time	
T-Sep 29	Group Meetings	
W-Sep 30	Normal Distribution	310-4.PDF
TH-Oct 1	Project time	
M-Oct 5	Hypothesis Testing	310-5.PDF
T-Oct 6	Project time	
W-Oct 7	Paired Comparisons	310-6.PDF
TH-Oct 8	Project time	
M-Oct 12	EXAM I	
T-Oct 13	TAKE HOME EXAM DUE @ 2:30PM	
W-Oct 14	ANOVA	310-7.PDF
TH-Oct 15	ANOVA	
M-Oct 19	Post ANOVA Multiple Comparisons-SNK	310-8.PDF
T-Oct 20	Post ANOVA Multiple Comparisons-SNK	
W-Oct 21	Nonparametric Statistics	310-9.PDF
TH-Oct 22	Project time	
M-Oct 26	Data Transformation/ QUIZ 2	310-10.PDF
T-Oct 27	Nonparametric statistics & Data Transformation	
W-Oct 28	Correlation & Regression	310-11.PDF
TH-Oct 29	Correlation & regression	
M-Nov 2	ANCOVA	310-12.PDF
T-Nov 3	ANCOVA & SNK	310-13.PDF
W-Nov 4	EXAM II	
TH-Nov 5	TAKE HOME EXAM II DUE @ 2:30PM	
M-Nov 9	Project time	
T-Nov 10	Two-way ANOVA	310-14.PDF
W-Nov 11	Holiday-Veterans Day	
TH-Nov 12	First Draft of Paper Due/Peer Review Session	
M-Nov 16	Final Draft of Paper Due	
T-Nov 17	<i>Research Presentations-Group PowerPoint</i>	
W-Nov 18	<i>Research Presentations cont./ TAKE HOME FINAL EXAM</i>	
TH-Nov 19	TAKE HOME FINAL EXAM DUE @ 2:30PM	
M-Nov 23	FINAL EXAM 2:00-4:30PM in SCI 125	