

## ANSC5313/BIOL5317/NRM5313 - Biostatistical Analysis II Course Syllabus - Spring 2020

### **Instructor**

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### **Teaching Assistant**

Name: Barbara Sugarman  
Office: RAS 117, Desk 11  
Office Hours: MTWR 9:00-10:00; T 3:00-4:00 (Barbara has "open door office hours" as well.)  
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### **Course Description**

An advanced class in statistical concepts and models applied to agricultural and biological systems. The course addresses experimental designs, paired-sample hypotheses, multi-sample hypotheses (ANOVA), multiple comparisons, factorial and nested ANOVA, data transformations, linear regression, correlation, multiple regression and correlation, polynomial regression, the binomial distribution, and information theoretic approaches. Emphasis will be placed on data analysis and interpretation using computer statistical applications.

### **Course Objectives**

This course addresses Program Learning Outcome 1 for the M.S. and 1 for the M.Ag. programs, which states that students should be able to: Apply statistical concepts and procedures to natural resource data.

Specific student outcomes will include the following:

1. Assess and review experimental designs, paired-sample hypotheses, multi-sample hypotheses, multiple comparisons, factorial and nested ANOVA, data transformations, linear regression, correlation, multiple regression and correlation, polynomial regression, and the binomial distribution.
2. Understand and interpret advanced statistical analyses in published research literature.
3. Interpretation and application of analytical results to research projects.
4. Application and interpretation of statistical data analysis using SPSS software.

### **Student Learning Objectives for the M.Agr. in Range and Wildlife Management**

The graduating student will demonstrate that he/she is able to:

1. Apply statistical concepts and procedures to natural resource data
2. Evaluate literature and references as they apply to the natural resource field
3. Demonstrate their knowledge of the fundamentals and advanced concepts of range and wildlife management.

### **Student Learning Objectives for the M.S. in Range and Wildlife Management**

The graduating student will demonstrate that he/she is able to:

1. Apply statistical concepts and procedures to natural resource data
2. Evaluate literature and references to substantiate an applied research project.
3. Examine, select, and utilize appropriate resources, materials, and data collection instruments to implement research projects.
4. Justify and defend the research questions and design.

### Class Meeting Time/Place

Lecture/Lab: Monday, Wednesday 10:00 am -11:50 am  
Lecture: NRM 129; Lab: NRM 126

### Text and Supplies

1. Zar, J. H. 2009. *Biostatistical Analysis*. Fifth edition. Prentice Hall, Inc. Upper Saddle River, NJ. (**Required**)
2. Subscription to Laerd Statistics (<https://statistics.laerd.com/>). (**Required by 1/20/2020, see below**)
3. Burnham, K. P., & Anderson, D. R. 2002. *Model Selection and Multimodel Inference: A Practical Information-Theoretic Approach*. Springer. (VERY Optional)
4. Calculator (**Required**) Note: Use of internet-capable devices (e.g. smartphones) is not allowed for exams.

### Course Outline

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|---|---|
| 10. Multisample Hypotheses and the Analysis of Variance | 17. Simple Linear Regression                    |
| 11. Multiple Comparisons                                | 19. Simple Linear Correlation                   |
| 12. Two Factor Analysis of Variance                     | 20. Multiple Regression and Correlation (maybe) |
| 13. Data Transformations                                | 21. Polynomial Regression (if time)             |
| 14. Multi-way Factorial Analysis of Variance (maybe)    | BA. Information Theoretic Approaches (AIC)      |
| 15. Nested (Hierarchical) Analysis of Variance          | 26. Circular Distributions (if time)            |
| 16. Multivariate Analysis of Variance                   |   |

### Course Grade

Exam I	20%
Exam II	20%
Final Exam	20%
Homework	20%
Final Project	20%

### Grade Assignment

<60 = F, 60-69 = D, 70-79 = C, 80-89 =B, 90-100 = A.

### Class Organization and Policy

Lecture and Lab are consecutive and attendance in both is essential. I expect a high level of engagement to enhance everyone's learning. This includes interacting with the instructor and other students, asking questions during class, completing outside of class assignments and readings, and being prepared to participate in class discussions.

*Each student is **required to purchase** their own, individual subscription to Laerd Statistics **by 1/20/2020**. In doing so, all students must agree to the Laerd Statistics Terms & Conditions. All students **MUST** subscribe individually and sign a printed copy of the Terms & Conditions to be kept by the instructor. **Failure to subscribe** and sign the printed Terms and Conditions will result in a **grade of "F"** for this class. Both the instructor and Laerd will verify your subscription. NOTE: from Laerd Statistics FAQ: "We do not allow the downloading or printing of any Laerd Statistics material (Premium or otherwise). This is to prevent any unauthorized spreading of the content to non-paying members."*

Roll will be taken in each class meeting. The SRSU catalog states "The Instructor will drop a student from a course when the student has a total of nine absences. An absence is defined as nonattendance to 50 minutes of class." Any time class is missed, for any reason, it will be recorded as an absence. College-related events that conflict with class will not be considered an absence **ONLY WITH** my prior approval.

All lectures, labs, and assignments will be posted in Blackboard as Powerpoint files. Laerd content will **NOT** be included in these files due to Laerd's "Terms and Conditions", so class attendance is essential. If you miss class, it is advised you obtain any hand-taken notes from a classmate.

No make up exams will be given for an unexcused absence. You must notify me of an excused absence **PRIOR** to the class you will miss and arrangements for make up exams must be made **BEFORE** the exam is given.

Late assignments will be accepted at the discretion of the instructor, with a **10% penalty for each day late** (i.e. 10% for 0-24 hours late, 20% for 24-48 hours late, etc.) Late assignments are not accepted after seven days. Extended due dates may be allowed due to college-related conflicts ONLY WITH my approval PRIOR to the due date. In case of emergencies, arrangements for completing assignments should be made immediately upon return to SRSU.

The use of personal laptops, cell phones, iPads, and other electronic devices can create distractions for learning, both for yourself and others. However, such devices can also be great tools to aid learning. Therefore, using electronic devices for class purposes (e.g. taking notes, working out problems, searching the internet) is allowed in silent mode. If you choose to use electronic devices in class, do so in a professional manner that does not impede others' learning. **The use of internet-capable devices (e.g. smartphones) is not allowed for exams.**

### **Academic Integrity**

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

Unauthorized aid includes copying, sharing, or obtaining information from an unauthorized source, attempting to take credit for the intellectual work of another person, falsifying information, and giving or receiving information about a test, quiz, or assignment to other students.

Any student involved in academic dishonesty will receive no credit (0) for work done and/or may be penalized in accordance with published University Rules.

### **General Expectations**

Statistics can be a very intimidating subject. However, you cannot survive in the biological sciences without knowing statistics. To maximize learning in this course, we should have some expectations of each other:

I expect from you:

- ATTEND lecture and lab; be on time as a courtesy to others.
- ASK whenever something is unclear. Preferably in class, as it is likely that others have the same question.
- PARTICIPATE in lecture and lab.
- READ the required sections from the text. If you come to me with a question and it is clear that you haven't read the book or the lecture notes, I will direct you to the reading first.
- DO all assignments, do them in a timely manner, and ensure I can read them! Parts of assignments that I can't read will not be graded. If you are late with assignments, it prevents me from returning others' assignments until I have yours in-hand.
- BE HONEST in all of your work.

What you can expect from me:

- GIVE 100% effort in teaching you the best I can.
- Make myself AVAILABLE to help outside of class.
- ANSWER all of your questions to the best of my knowledge, and if I don't know the answer I will find out.
- Be FAIR in all grading.
- Provide you with timely, constructive FEEDBACK regarding your work.

### **Reasonable Accommodations**

Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the Student's responsibility to initiate a request. Please contact Ms. Rebecca Greathouse Wren, M.Ed., LPC-S, Director/Counselor, Accessibility Services Coordinator, Ferguson Hall (Suite 112) at 432.837.8203; mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Students should then contact the instructor as soon as possible to initiate the recommended accommodations.

### Tentative Course Schedule

Week 1	1/13	Course Overview & Chapter 10. Multisample Hypotheses and Analysis of Variance
	1/15	Chapter 10. Multisample Hypotheses and Analysis of Variance
Week 2	1/20	<i>MLK HOLIDAY – NO CLASS</i>
	1/22	Chapter 10. Multisample Hypotheses and Analysis of Variance
Week 3	1/27	Chapter 11. Multiple Comparisons
	1/29	Chapter 11. Multiple Comparisons
Week 4	2/03	Chapter 12. Two Factor Analysis of Variance
	2/05	Chapter 12. Two Factor Analysis of Variance
Week 5	2/10	Chapter 13. Data Transformations
	2/12	Chapter 14. Multi-way Factorial Analysis of Variance & <b>Exam I Review</b>
Week 6	2/17	<b>Exam I</b>
	2/19	<b>Exam I Results</b> / Proj. Overview / Ch 15. Nested (Hierarchical) Analysis of Variance
Week 7	2/24	Chapter 15. Nested (Hierarchical) Analysis of Variance
	2/26	Chapter 16. Multivariate Analysis of Variance
Week 8	3/02	Chapter 16. Multivariate Analysis of Variance
	3/04	Chapter 17. Simple Linear Regression
Week 9	3/09	<i>SPRING BREAK – NO CLASS</i>
	3/11	<i>SPRING BREAK – NO CLASS</i>
Week 10	3/16	Chapter 17. Simple Linear Regression
	3/18	Chapter 17. Simple Linear Regression
Week 11	3/23	Chapter 17. Simple Linear Regression
	3/25	Chapter 19. Simple Linear Correlation
Week 12	3/30	Chapter 20. Multiple Regression and Correlation & <b>Exam II Review</b>
	4/01	<b>Exam II</b>
Week 13	4/06	<b>Exam II Results</b> & Chapter 20. Multiple Regression and Correlation
	4/08	Chapter 21. Polynomial Regression
Week 14	4/13	<b>Draft Projects Due</b> / Information Theoretic Approaches (Burnham & Anderson)
	4/15	Information Theoretic Approaches (Burnham & Anderson)
Week 15	4/20	Chapter 26. Circular Distributions
	4/22	Chapter 27. Circular Distributions
Week 16	4/27	Bayesian Methods Overview
	4/29	<b>Final Projects Due</b> / Bayesian Methods Overview / Final Exam Review
	5/01	<b>Final Exam, 10:15 – 12:15</b>

### Exam Schedule

Exam I ~February 17 (tentative)

Exam II ~ April 01 (tentative)

Final Exam – Fri May 01, 10:15 – 12:15 (firm)