

## **NRM5303 - Biostatistical Analysis Using R Course Syllabus – Summer II 2019**

### **Instructor**

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### **Course Description**

An advanced class in statistical concepts and models applied to agricultural and biological systems. The course addresses all Null Hypotheses Significance Testing procedures taught in the Biostatistical Analysis I and II courses, but executed in the R programming software, after a thorough overview of the R programming language.

### **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**

Times: Monday, Wednesday, Friday 10:00 am -12:30 pm

Place: NRM 126

### **Text and Supplies**

1. Davies, T. M. 2016. The Book of R, A First Course in Programming and Statistics. No Starch Press. San Francisco,CA. **(Required)**

## Course Outline

1. Getting Started
2. Numerics, Arithmetic, Assignment, and Vectors
3. Matrices and Arrays
4. Non-Numeric Values
5. Lists and Data Frames
6. Special Values, Classes, and Coercion
7. Basic Plotting
8. Reading and Writing Files
9. Calling Functions
10. Conditions and Loops
11. Writing Functions
12. Exceptions, Timings, and Visibility
13. Elementary Statistics
14. Basic Data Visualization
15. Probability
16. Common Probability Distributions
17. Sampling Distributions and Confidence
18. Hypothesis Testing
19. Analysis of Variance
20. Simple Linear Regression
21. Multiple Linear Regression
22. Linear Model Selection and Diagnostics

## Course Grade

Exam I (Chapters 1 - 8)	20%
Exam II (Chapters 9 - 12)	20%
Exam III (Chapters 13-16)	20%
Exam IV (Chapters 17-22)	20%
Homework	20%

## Grade Assignment

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

## Class Organization and Policy

Lecture and Lab meet simultaneously, and attendance throughout 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.

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. 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 **20% penalty for each day late** (i.e. 10% for 0-24 hours late, 40% for 24-48 hours late, etc.) Late assignments are not accepted after three 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.

## 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**

It is Sul Ross State University Policy to provide reasonable accommodation to students with disabilities. If you would like to request such accommodations because of physical, mental, or learning disability, please contact the ADA Coordinator for Accessibility Services in Ferguson Hall Room 112 or call 432-837-8203.

### **Key Dates – Summer II 2019**

Tue	07/09	First day of classes
Thu	07/11	Last day for late registration and schedule changes
Thu	08/01	Last day to withdraw from course with a grade of 'W'.
Wed	08/14	Last day of classes
Thu	08/15	Final Exams

### **Tentative Course Schedule**

Week 1	7/10	Getting Started; Matrices and Arrays
	7/12	Non-Numeric Values
Week 2	7/15	Non-Numeric Values; Lists and Data Frames; Special Values, Classes and Coercion
	7/17	Special Values, Classes and Coercion; Basic Plotting
	7/19	Reading and Writing Files; Calling Functions
Week 3	7/22	Conditions and Loops
	7/24	Writing Functions; Exceptions, Timings, and Visibility
	7/26	Elementary Statistics
Week 4	7/29	Basic Data Visualization; Probability
	7/31	Common Probability Distributions
	8/02	Sampling Distributions and Confidence; Hypothesis Testing
Week 5	8/05	Hypothesis Testing
	8/07	Analysis of Variance; Simple Linear Regression
	8/09	Simple Linear Regression; Multiple Linear Regression
Week 6	8/12	Multiple Linear Regression; Linear Model Selection and Diagnostics
	8/14	Linear Model Selection and Diagnostics
	8/15	Final Exam

### **TENTATIVE Exam Schedule**

	Assigned	Due
Exam I (Chapters 1 - 8)	7/19	7/24
Exam II (Chapters 9 - 12)	7/24	7/29
Exam III (Chapters 13-16)	7/31	8/05
Exam IV (Chapters 17-22)	8/12	8/15