

NRM5412/ANSC5403/BIOL5407 - Biostatistical Analysis Theory Course Syllabus - Fall 2020

Instructor

Name: Mr. Richard Mrozinski
Office: RAS 113 on MWF | FH 204 on TR
Main Phone: 432.294.5315 (cell, 9-4 daily, best way to reach me quickly via texts and calls)
Email: richard.mrozinski@sulross.edu (checked daily)
Office Hours: Mon & Wed | 3:00-4:00 | RAS 113 (and virtual)
Tue & Thu | 10:00-11:30 | FH 204 (and virtual)
Friday | 11:00-12:00 | RAS 113 (and virtual)
Appointments (face-to-face or virtual) can always be made via e-mail or text.
I also have "Open Door Office Hours". Feel free to come in anytime you see me in my office.

Teaching Assistant

Name: Joshua Coward
Office: RAS 117
Office Hours: M-F 9:00-10:00 (Josh has "open door office hours" as well.)
Phone: 830.992.1810 (cell)
Email: joshua.coward@sulross.edu

Course Description

An introduction to statistical concepts and models applied to agricultural and biological systems. The course introduces the scientific method, inferential theory, data types, experiment design, descriptive statistics, the normal distribution, and null hypothesis significance testing (NHST) for these scenarios: one-sample, two-independent-sample, two paired sample, multi-sample 1-way (ANOVA), multiple comparisons, factorial and nested ANOVA, multivariate ANOVA, data transformations, linear regression and correlation, multiple regression and correlation, polynomial regression, goodness of fit, contingency tables, and testing for randomness. Emphasis is on theory and hand-calculations.

Enhanced Course Description

H. G. Wells argued that "statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write." Due to its importance to the everyday person, some (a.g. Arthur Benjamin) are currently advocating for courses in statistics to replace algebra courses in high school.

Statistical proficiency is even more important to the scientist, as good science employs statistical knowledge in *every* step of the scientific method. Statistics is *the* tool used to discern truth from fiction, and science is all about finding the truth. Statistics is so fundamental to sound science, that Karl Pearson described statistics as the "grammar of science." Whether you go on to be a technician, a researcher, a manager, or a professor, the knowledge you gain in this course will be critical to your success.

In the short term, statistical knowledge will inform most decision you make in every stage of your graduate research, and will in large part affect the success of your research. Then you will be going to job interviews, where a chief complaint from hiring managers of new hires concerns their lack of statistical ability. So please take this course very seriously. Your graduate committee and future employers *will* want to know if you know your statistics!

Let's be frank. Statistics can be an intimidating subject. My promise is to *walk with you every step of the way*. I have been teaching graduate statistics and helping students with their research at Sul Ross since 2015. Prior to coming to Sul Ross, I had 20-years of experience applying statistical principles as an aerospace engineer at NASA for our nation's human spaceflight programs. Life then brought me to West Texas, and I couldn't be happier. I LOVE teaching statistics, and plan to help each of you become statistically competent by the end of this semester.

Now, let's go delve in and tackle some statistics!

Objectives and Outline

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. Knowledge of various data types and the appropriate analysis for each type.
2. Ability to use sample data to estimate population parameters.
3. Ability to calculate measures of central tendency, dispersion, and variability.
4. Ability to calculate probabilities including permutations and combinations.
5. Knowledge of normal distributions, how to assess normality in data, and which statistical methods to use for normal and non-normal data.
6. Knowledge of the scientific method and how to apply it to research.
7. Ability to use parametric and non-parametric methods for hypothesis testing of these scenarios: one-sample, two-independent-sample, two paired sample, multi-sample 1-way (ANOVA), multiple comparisons, factorial and nested ANOVA, multivariate ANOVA, data transformations, linear regression and correlation, multiple regression and correlation, polynomial regression, goodness of fit, contingency tables, and testing for randomness.

Course Outline (Numbers given are the associated chapters in the textbook)

- | | |
|---|---|
| 1. Data: Types and Presentation | 15. Nested (Hierarchical) Analysis of Variance |
| 2. Populations and Samples | 16. Multivariate Analysis of Variance |
| 3. Measures of Central Tendency | 17. Simple Linear Regression |
| 4. Measures of Variability and Dispersion | 18. <Skipped> |
| 5. Probabilities | 19. Simple Linear Correlation |
| 6. The Normal Distribution | 20. Multiple Regression and Correlation |
| 7. One-Sample Hypotheses | 21. Polynomial Regression |
| 8. Two-Sample Hypotheses | 22. Testing for Goodness of Fit |
| 9. Paired-Sample Hypotheses | 23. Contingency Tables |
| 10. Multisample Hypotheses and the Analysis of Variance | 24. Dichotomous Variables* |
| 11. Multiple Comparisons | 25. Testing for Randomness* |
| 12. Two-Factor Analysis of Variance | 26. Circular Distributions: Descriptive Statistics* |
| 13. <Skipped> | 27. Circular Distributions: Hypothesis Testing* |
| 14. Multiway Factorial Analysis of Variance | • Information Theoretic Approaches (AIC) |

Student Learning Objectives for the M.Ag. 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.

Logistics / Materials / Grading Information / Course Policies

Class Meeting Time/Location

Lecture: Monday 10:00 am -11:50 am | Wednesday 10:00 am -11:50 am | Friday 10:00 am -10:50 am
Location: RAS 128

Text and Supplies

1. Zar, J. H. 2009. *Biostatistical Analysis*. Fifth edition. Prentice Hall, Inc. Upper Saddle River, NJ. (**Required**)
2. Statistics-capable calculator (**Required**)

Course Grade

Exam I	20%
Exam II	20%
Exam III	20%
Exam IV (Final Exam)	20%
Homework	10%
Module Quizzes	5%
Participation/Readings	5%

Grade Assignment

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

Readings

The course and its material are organized by chapter. Each chapter has a reading assignment that explains the material. ***The assigned readings are essential; completing 100% of the assigned readings is expected.***

Homework

Late assignments will be accepted at the instructor's discretion, with a **10% penalty per day late** (i.e. 10% for 0-24 hours late, 20% for 24-48 hours late, etc.) Late assignments are not accepted after 7 days.

Exams

Exams are not cumulative in the sense that Exam II does not test the material tested on Exam I, and Exam III does not test material tested on Exams I and II, etc.; however, concepts from throughout in the course will always be needed to complete every exam. **No make-up exams will be given for an unexcused absence. Use of internet-capable devices (e.g. smartphones) is not allowed for exams.**

Module Quizzes

Most modules (lectures/chapters) will have very short (5 minute) embedded quizzes to check understanding periodically as the course progresses and to ensure students are engaged throughout the semester.

Participation

- 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, posting in the Blackboard discussion forums, writing entries in Blackboard journals, attending office hours (in-person and/or online), completing outside of class assignments and readings, and being prepared to participate in class discussions.
- Although there are many dimensions to participation, participation grades will be determined by two:
 1. Blackboard journal entries will be periodically required, and graded based on how well instructions were followed, whether minimum word requirements were met, and whether proper grammar and spelling was used.
 2. Students will be required to post a minimum of four questions during the semester to the Blackboard discussion forums, and will receive full credit for one with each substantive statistics-related question.
- Online participation: Any time you attend class online (via Blackboard Collaborate Ultra), you are required to be properly dressed, avoid video distractions, and keep your microphone muted except to ask questions or

request clarification. **Anyone causing distractions may be muted, have their video shut off, and/or removed from the session without warning, at the instructor's discretion.**

- **Distractions:** Any repeated distractions either in the classroom or online will lead to a zero for the participation grade for the entire course, regardless of how many points were achieved up to that point.

Due Dates/Times/Extensions

All graded work, including exams, are expected to be on-time. **No due dates for ANY graded work, including exams, will be extended without PRIOR e-mail arrangements** initiated by the student, and only for valid reasons.

Academic Integrity

Academic dishonesty hurts everyone and reduces the value of college degrees. Doing someone else's work, presenting the ideas and work of others as your own, submitting the same paper for multiple classes, and/or failing to cite your sources when you utilize the ideas of others, are all examples of academic dishonesty. It is your responsibility to read and understand the university's policy on academic dishonesty in the SRSU Student Handbook, as all violations will be taken seriously and handled through the appropriate university process. The Student Handbook can be found at: <https://www.sulross.edu/page/2454/student-handbook> (page 80). In addition, please note that plagiarism detection software will be used in this class for written assignments, as well as monitoring software for any online exams. **Any student shown to violate academic integrity will receive no credit (0) for work done and/or may be penalized in accordance with published University Rules.**

Communication

You are required to check your *Sul Ross e-mail and Blackboard announcements several times per week*. I do not use the personal or preferred e-mail addresses that you may have on record with the university.

Attendance

- Students are expected to attend every class. If class must be missed, the student is expected to find out what was missed, and it is advised you obtain any hand-taken notes from a classmate. As much information as possible from lectures (PowerPoints, announcements, etc.) will be posted in Blackboard but it is not guaranteed that everything will make it to Blackboard.
- Roll WILL be taken every lecture for the face-to-face students, attendance will be automatically recorded for those joining live lecture online, and viewing of recorded lectures will also be automatically recorded by Blackboard.
- It is policy of this class to **drop a student with a grade of ``F" if 9 hours or more of class are missed**. Any time class is missed, for any reason, it will be recorded as an absence. Any time class is missed, for any reason, it will be recorded as an absence, unless an absence can be shown to be due to a college-related event.
- Students are expected to arrive to class on time. If a student is perpetually late, they will be asked to not attend class unless they can arrive on time. If tardiness becomes a problem for the class as a whole, people who arrive late will not be permitted to enter the class. If this stricter policy becomes necessary, there will be an announcement made in class.

Electronics in the Classroom

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. Headphones will not be allowed in class for any reason.**

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:

- ASK whenever something is unclear. Preferably in class, as it is likely that others have the same question. **THIS IS YOUR MOST IMPORTANT JOB!**
- ATTEND lecture; be on time as a courtesy to others.
- PARTICIPATE in class.
- 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.

Resources and Assistance

SRSU Library Services

The Sul Ross Library offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu. Appointments to access the building are required (see <https://sulross.libguides.com/covid19/building>). The library also offers curbside delivery of physical resources (see <https://sulross.libguides.com/covid19/curbside>). Off-campus access requires your LoboID and password. Check out materials using your photo ID. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (**432-837-8123**).

Tutoring

Since the library can be visited by appointment only, there will be no drop-in tutoring, nor can face-to-face tutoring be done safely during COVID-19. So, all tutoring will be online. Tutoring will be available starting on August 31. Contact Anita Banegas (**432-837-8992**, abanegas@sulross.edu) or Mabel Garcia **432-837-8629**, mag15bf@sulross.edu) to get an e-mail invitation for either group or individual tutoring, or to request an appointment.

Blackboard's Support Desk

SR has moved its Blackboard site to the Texas State University System's (TSUS) Blackboard Environment. Sul Ross' Blackboard login page will take you straight into the new TSUS Blackboard environment from the Sul Ross website. It may look slightly different to you, and may want to tweak some of your settings that you had previously. If you have any technical issues with the new system or Blackboard itself, e.g. if you are having issues submitting a document, getting videos to play, or you are dealing with a technical error in the course, then the Blackboard Support Desk is ready to help you. The support desk is open 24 hours a day, 7 days a week. You can reach the support desk by calling **888-837-6055**, emailing blackboardsupport@sulross.edu, using resources from the Technology Support tab within Blackboard, or clicking the Support Desk graphic on the course homepage. As always, academic questions about course assignments, due dates, and general course questions should be directed to your instructor.

Americans With Disabilities Act

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 each semester for each class. Students seeking accessibility / accommodations services must contact Rebecca Greathouse Wren, LPC-S, SRSU's Accessibility Services Coordinator at **432-837-8203** (please leave a message and someone will get back to you as soon as possible during working hours), or email rebecca.wren@sulross.edu. The office is located on the first floor of Ferguson Hall (Suite 112), and the mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas, 79832.

Tentative Course Schedule (Subject to Change)

Week	Dates	Topic(s)
1	08/24-08/28	Ch 1. Data: Types and Presentation Ch 2. Populations and Samples Ch 3. Measures of Central Tendency
2	08/31-09/04	Ch 4. Measures of Variability and Dispersion Ch 5. Probabilities Ch 6. The Normal Distribution
3	09/07-09/11	Ch 7. One-Sample Hypotheses
4	09/14-09/18	Ch 7. One-Sample Hypotheses Ch 8. Two-Sample Hypotheses
5	09/21-09/25	Ch 8. Two-Sample Hypotheses Ch 9. Paired-Sample Hypotheses
6	09/28-10/02	Ch 22. Testing for Goodness of Fit Ch 23. Contingency Tables
7	10/05-10/09	Ch 10. Multi-sample Hypotheses and the Analysis of Variance
8	10/12-10/16	Ch 10. Multis-ample Hypotheses and the Analysis of Variance
9	10/19-10/23	Ch 11. Multiple Comparisons Ch 12. Two-Factor Analysis of Variance
10	10/26-10/30	Ch 14. Multiway Factorial Analysis of Variance Ch 15. Nested (Hierarchical) Analysis of Variance Ch 16. Multivariate Analysis of Variance
11	11/02-11/06	Ch 17. Simple Linear Regression
12	11/09-11/13	Ch 17. Simple Linear Regression Ch 19. Simple Linear Correlation
13	11/16-11/20	Ch 20. Multiple Regression and Correlation Ch 21. Polynomial Regression
14	11/23-11/27	Information Theoretic Approaches (AIC)
15	11/30-12/04	Information Theoretic Approaches (AIC)

Holidays

Mon	09/07	Labor Day holiday (no classes)
Wed	11/11	Veteran's Day holiday (no classes)
W-F	11/25-27	Thanksgiving Day holiday

Exam Schedule

Exam I (Chapters 1-7)	Friday, September 18 (tentative)
Exam II (Chapters 8-9, 22-23)	Friday, October 09 (tentative)
Exam III (Chapters 10-12)	Friday, November 06 (tentative)
Final Exam (Chapters 17-21, AIC)	Friday, December 04 (online, due at 11:59 pm)

COVID-19 Safety Pledge - One University/One Community

As a partner in each campus community the faculty, staff, and students agree to the following statements in relation to the COVID-19 virus:

- I will wear a face covering, wash my hands, and disinfect my workspaces to protect others from the potential spread of this virus.
- I promise to follow social distancing guidelines as a way to mitigate the risk of transmission to others both professionally and personally.
- I will monitor my health and report any potential COVID-19 illness and agree to follow the guidelines set forth in the *Sul Ross State University Return to Campus Plan* or as described by Sul Ross State University to protect the public health.
- I understand that my actions may impact the larger community and could affect my academic progress or professional attainment at Sul Ross State University.

Additionally:

- Between classes, incoming and outgoing faculty members and students are expected to sanitize their desks, chairs or other areas they have occupied. Cleaning by both outgoing and incoming individuals minimize the risk of any contagion.
- Students and faculty entering buildings will be asked to respect the flow of foot traffic and to enter and exit buildings and classrooms through designated areas.
- Only two people may ride an elevator at one time. Students are encouraged to take the stairs when possible.
- Students and faculty are **REQUIRED TO WEAR FACE MASKS** while in enclosed spaces for classes and lab.

Furthermore, University employees and students are expected to help monitor COVID-19 as a way to prevent the spread of the virus and protect each other. To accomplish the required data collection, the University asks its community members to take three actions:

1. Keep keep track of their health and track any potential symptoms;
2. Test for the virus when you have potential symptoms or have been in contact with someone who has symptoms; and
3. Trace your steps and keep accurate track of your interactions with others so that contact tracing can, if necessary, be done quickly and efficiently.

If you have been exposed to COVID-19 or think you might have been exposed, then you must quarantine for 14 days before you return to class.

If a student attends class without a face mask, the instructor will ask the student to wear one, and if necessary, leave to get one, advising the student where some disposable masks might be available in the building. If the student refuses to wear a mask, they will be required to leave the lecture and join online. If an unmasked student refuses to leave, the instructor will call UDPS to have the student removed and/or cancel the class to be resumed later online or recorded without students. The violating student will be reported to the appropriate department chair(s) and the Office of Student Life for potential disciplinary action, as described below.

Failing to meet these expectations may be subject to corrective action under University disciplinary policies.

Changes or recommendations to the guidelines based on evolving guidance from federal, state, or local agencies will be communicated to the university community.