

# Welcome to NRES 710

## Graduate Environmental Statistics

Fall 2022

### Instructor

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I have no pre-scheduled office hours for this class- please email me to set up a meeting. Also note that when I am in my office and my door is propped open, as will usually be the case when I am not in a meeting or struggling to meet a deadline, you are welcome to pop in for a chat. When my office door is closed, I am not available.

### Course Meeting Times

**Lecture:** MW 2:30pm to 3:45pm in SEM 347 (Scrugham Engineering and Mines Building)

**Course Website:** <http://kevintshoemaker.github.io/NRES-710/>

### Course Objectives

In this course, students will learn basic principles of statistical inference and will gain experience applying these principles to their research questions using R. In this course we focus on the concepts and implementation and we generally leave the nitty-gritty stats questions to statisticians.

### Student Learning Objectives

Students will be able to:

1. Communicate, in writing or verbally, the assumptions associated with classical statistical models.
2. Understand and perform statistical tests such as T-test, ANOVAs, and linear regression.
3. Identify and perform appropriate statistical tests on data collected during their graduate program
4. Compare and contrast statistical tools and methods.
5. Import data, visualize patterns, interpret plots, and perform statistical tests using R.

### Prerequisites

Curious scientific mind, broad research interests, readiness to engage with data, equations and computer programming. Students are expected to have a basic understanding of standard statistical concepts and methods, obtained through other coursework. If this is not the case, they should be prepared to work harder to develop the necessary prerequisite knowledge.

## Course materials

We will use the course website in addition to the WebCampus page set up for the course. Most course content (lecture materials) can be found on the website, which will be updated frequently. Additional readings are available via WebCampus. We will use the Discussion Board feature in WebCampus as a forum for discussion, Q&A, and mutual support in engaging with course materials outside of our regular class meetings.

Readings will be provided as appropriate. Unless otherwise noted, all readings assigned for a given week should be done before our Wednesday class meetings. All readings will be posted to WebCampus at least a week before they are due.

Students will use the open source statistical software R to perform analyses. *All students should bring laptops to each class*; much of class time will be devoted to hands-on learning in R.

There are many good R books, but ultimately, most material can be found for free online. For the beginner in statistics or R, I recommend the following:

1. Discovering Statistics using R (Andy Field and Jeremy Miles)
2. R for data science (Garrett Golemund and Hadley Wickham). This book is available for free online.
3. Introductory R: A beginner's guide to data visualization, statistical analysis, and programming in R (Robert I. Kabacoff)
4. R Graphics Cookbook (Winston Chang). This book is available for free online.
5. Qian, Song S. Environmental and Ecological Statistics with R, Second Edition, 2nd Edition. Chapman & Hall, 2017.
6. A Primer of Ecological Statistics. (Nicholas Gotelli and Aaron Ellison). *A stats book, but not an R book.*

## Course structure

Instruction will consist of lessons on general statistical concepts and specific methods commonly used to address questions in ecology and environmental science. Stats lessons will include lecture-style materials, readings, demonstrations, exercises and class discussions.

A large portion of the overall grade (30%) will be based upon periodic, relatively brief homework assignments that follow from the topics covered in class. Most assignments will involve statistical analysis and interpretation of sample data sets that are provided. There will be a final project (40% of your grade) that is designed to test your ability to understand and apply the tools that you have developed during the semester using R. The final project will involve conducting a rigorous data analysis using statistical approaches that we have learned during the semester (or other tools as approved by the instructor). You can choose whichever statistical methods are suitable to your project scope and questions, but they must be methods we covered in class and appropriate to your data. Please turn in your own work and assignment, but you may use as many resources as you wish (class material, online material, or the insight/experience of other students) to generate the material presented. More specific instructions will come during the semester.

With roughly 5 weeks left in the semester, first drafts of your final projects will be due. These first drafts will then be subjected to anonymous peer review. At this time, the assignment itself will not be “graded,” but the assignment will be reviewed by at least two other students, and the peer reviews will be graded (20% of the overall grade). The reviews are designed to provide feedback on the statistical approach being used and whether the appropriate connections are made between research question, data, statistical model, and inferences developed from model outputs. Are the statistics relevant to the data, and appropriate for the experimental design? The reviews will be due within two weeks and will be provided to the author for their consideration and assistance in their final project.

Given the nature of graduate classes, student participation is expected.

## Grading

Course component	Weight
Homeworks	30%

Course component	Weight
Final project	40%
Peer review	20%
Participation	10%

Letter grades will be assigned as follows:

Grade	Semester Average (%)
A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
F	below 70

## Course Schedule

NOTE: the course schedule is subject to change, so please check back frequently!

<http://kevintshoemaker.github.io/NRES-710/schedule.html>

## Make-up policy and late work:

If you miss a class meeting or lab period, it is your responsibility to talk to one of your classmates about what you missed. If you miss a lab meeting, you are still responsible for completing the lab activities and write-up on your own time. You do not need to let me know in advance that you are going to miss class or lab.

## DataCamp for the classroom

This class is supported by DataCamp, the most intuitive learning platform for data science and analytics. Learn any time, anywhere and become an expert in R, Python, SQL, and more. DataCamp's learn-by-doing methodology combines short expert videos and hands-on-the-keyboard exercises to help learners retain knowledge. DataCamp offers 350+ courses by expert instructors on topics such as importing data, data visualization, and machine learning. They're constantly expanding their curriculum to keep up with the latest technology trends and to provide the best learning experience for all skill levels. Join over 6 million learners around the world and close your skills gap.

## Students with Disabilities

Any student with a disability needing academic adjustments or accommodations is requested to speak with the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations.

[https://docs.google.com/document/d/1Dv-L036CZWsZCmn9W5p0ikgetlc4GcT-NQ9Rp\\_HebE0/edit#heading=h.wyetydry3jzg](https://docs.google.com/document/d/1Dv-L036CZWsZCmn9W5p0ikgetlc4GcT-NQ9Rp_HebE0/edit#heading=h.wyetydry3jzg)

## Statement on Academic Dishonesty

Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Plagiarism is using the ideas or words of another person without giving credit to the original source; this includes copying another student in class. Always cite the source of your

information. This includes copying or paraphrasing from a book, journal, or unpublished material without giving credit to the author(s), and submitting a term paper that was used in another course. Academic dishonesty will not be tolerated and penalties can include filing a final grade of “F”; reducing the student’s final course grade one or two full grade points; awarding a failing mark on the coursework in question; or requiring the student to retake or resubmit the coursework. For more details, see the University of Nevada, Reno General Catalog.

### **This is a safe space**

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University’s Equal Opportunity & Title IX Office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit: <http://www.unr.edu/equal-opportunity-title-ix>”

### **Statement on Audio and Video Recording**

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

### **Statement on content accessibility**

This course may leverage 3rd party web/multimedia content, if you experience any issues accessing this content, please notify your instructor.

### **Statement on COVID-19 Policies**

**Face Coverings** Pursuant to Nevada law, NSHE employees, students and members of the public are no longer required to wear face coverings while inside NSHE buildings irrespective of vaccination status.

**Social Distancing** In alignment with State of Nevada guidelines, social distancing is no longer required. #### Disinfecting Your Learning Space Disinfecting supplies are provided for you to disinfect your learning space. You may also use your own disinfecting supplies.

**COVID-19, COVID-19 Like Symptoms, and Contact with Someone Testing Positive for COVID-19** Students testing positive for COVID 19, exhibiting COVID 19 symptoms regardless of vaccination status will not be allowed to attend in-person instructional activities and must leave the venue immediately. Students should contact the Student Health Center or their health care provider to receive care and who can provide the latest direction on quarantine and self-isolation. Contact your instructor immediately to make instructional and learning arrangements.

**Accommodations for COVID 19 Quarantined Students** For students who are required to quarantine or self-isolate due to 1) COVID 19 infection or 2) exposure while not vaccinated, instructors must provide opportunities to make-up missed course work, including assignments, quizzes or exams. In courses with mandatory attendance policies, instructors must not penalize students for missing classes while quarantined.

### **Failure to Comply with Policy (including as outlined in this Syllabus) or Directives of a University Employee**

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited

action. “Disruptive behavior” is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

### **Statement on Academic Dishonesty**

“The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: UAM 6,502.”

### **Statement of Disability Services**

Use either the traditional or online statement, in addition to the last sentence regarding third party materials.

#### **For Traditional and Seated Classrooms:**

“Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.”

### **Statement on Audio and Video Recording**

**Student-created Recordings** “Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped, or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.”

**Instructor-created Recordings** Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the “chat” feature, which allows you to type questions and comments live.

### **Statement on Maintaining a Safe Learning and Work Environment**

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University’s Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.

### **Statement for academic success services:**

Your student fees cover usage of the University Math Center (<https://www.unr.edu/university-math-center>), (775) 784-4433; University Tutoring Center (<https://www.unr.edu/tutoring-center>), (775) 784-6801; and University Writing & Speaking Center (<https://www.unr.edu/writing-speaking-center>), (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.