

STA 445: Data Wrangling and Exploration in R Spring 2024

Section 2 Class Number: #9465 Time: TTh 2:20 – 3:35 Room: AMB 222

Instructor: Dr. Bianca Luedeker

Office: AMB 137B

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Office Hours:	Monday	1:30 – 2:30
	Tuesday	None
	Wednesday	12:30 – 1:30
	Thursday	12:30 – 1:30
	Friday	1:30 – 2:30

Prerequisite: STA 444 with a passing grade.

Course Description: This course covers concepts in data wrangling and visualization that are commonly needed in real-world situations where data is already nicely formatted and packaged. This course is intended to be accessible to both STEM undergraduates and graduate students from a wide variety of majors.

Dates: This course is 10 weeks long and runs from Monday February 19 through Friday May 10.

Drop Deadline: The deadline to drop the course without a W is Monday February 26. The deadline to withdraw from the course is Friday May 3.

Required Text:

Introductory Data Science using R, Sonderegger, <https://bookdown.org/dereksonderegger/444/>

Optional Texts:

- *R for Data Science*, Wickham and Grolemund, <https://r4ds.had.co.nz/>
- *Statistical Inference via Data Science: A Modern Dive into R and the Tidyverse*, Ismay and Kim, <https://moderndive.com/index.html>

Student Learning Outcomes: Upon successful completion of the course, the student will be able to:

- Import data from a variety of sources, including cases where the data is not “tidy”.
- Utilize common programming constructs to produce loops and user defined functions.
- Manipulate character strings utilizing regular expressions.
- Create and manipulate date objects.
- Convert data between “Wide” and “Long” formats.
- Summarize data using Split/Apply/Combine methods.
- Create Packages to organize complex analysis projects.
- Additional topics: Web Scraping, Accessing Databases, Speeding up R.

Course Structure: This is a lab-based course with daily lab exercises. Most of the time you will be working independently and asking questions as you encounter problems.

Course Outline: We will be covering chapters 5, 8 through 14, 16, and 17. Expect to cover one chapter per week.

Assessments: Grades will be determined by a weighted average of assignments, attendance, and examination scores.

Attendance	10%
Assignments	40%
Midterm	25%
Final Exam	25%

Attendance: Attendance is expected for all class sessions. Each day is worth one point. You are not allowed to leave early. If you finish assignments early, you may help others or work on something from another class.

Assignments: All assignments will be submitted as Rmarkdowns as PDFs on Canvas. You may only submit an assignment once. Assignments must use Tidyverse code as presented in the text or in class. All lab assignments will be graded on a scale from 0 to 4.

- 4 points – All problems are correct or nearly so.
- 3 points – The problems are mostly correct but there may be one or two medium sized errors.
- 2 points – There are 2 or 3 major mistakes.
- 1 point – The assignment is incomplete. Not all problems were attempted.
- 0 points – You did not turn in an assignment.

Grade Policy: Course grades will be based on percentage of points earned as follows: *A* $\geq 90\%$; *B* 80-89%; *C* 70-79%; *D* 60-69%; *F* $\leq 59\%$. The instructor reserves the right to lower grade cutoffs.

Exams: There will be an in-class exam, an open-book exam, and a take home exam. For the in-class exam you may use one page (8.5" \times 11") of notes (front and back) prepared by you. The final exam will be our take-home exam. You will create a package on R and host it on GitHub.

Exam Dates: The in-class exam will be on Thursday April 11. The final exam will be due on Thursday May 9th at 2:30 pm.

Extensions: Sometimes life outside of the classroom affects our ability to turn in assignments on time. If you need an extension, please contact me before the due date. I will not accept late work, but I am lenient when it comes to granting extensions.

Electronic Devices: Cell phones, mp3 players, and portable electronic communication devices, including but not limited to smart phones, cameras, and recording devices, must be turned off and inaccessible during in-class tests. Any violation of this policy will be treated as academic dishonesty.

Generative AI: Since mathematical reasoning, problem solving, and critical thinking skills are part of the learning outcomes of this course, all assignments should be prepared by the student. You may not submit assignments where you have used ChatGPT or other AI. Such AI-generated submissions are not permitted and will be treated as plagiarism and a violation of the University's Academic Integrity Policy.

Cheating: Cheating is a serious offense, and the penalties can range from zeros on tests to expulsion. Cheating includes copying other students' homework, using notes on a test, providing other students with answers, or anything that gives yourself or another student an unfair advantage.

Changes to the Syllabus: The instructor reserves the right to make changes in the syllabus as needed, including changes in exam dates. Such changes will be announced in class and posted to the course website.

COVID-19 REQUIREMENTS AND INFORMATION

Additional information about the University's response to COVID-19 is available from the **Jacks are Back!** web page located at <https://nau.edu/jacks-are-back>.

SYLLABUS POLICY STATEMENTS

ACADEMIC INTEGRITY

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full *Academic Integrity* policy available at <https://policy.nau.edu/policy/policy.aspx?num=100601>.

COPYRIGHT INFRINGEMENT

All lectures and course materials, including but not limited to exams, quizzes, study outlines, and similar materials are protected by copyright. These materials may not be shared, uploaded, distributed, reproduced, or publicly displayed without the express written permission of NAU. Sharing materials on websites such as Course Hero, Chegg, or related websites is considered copyright infringement subject to United States Copyright Law and a violation of NAU Student Code of Conduct. For additional information on ABOR policies relating to course materials, please refer to ABOR Policy 6-908 A(2)(5).

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, *Academic Credit*), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

DISRUPTIVE BEHAVIOR

Membership in NAU's academic community entails a special obligation to maintain class environments that are conducive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of "W". For additional information,

see NAU's *Disruptive Behavior in an Instructional Setting* policy at <https://nau.edu/university-policy-library/disruptive-behavior>.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, veteran status and genetic information. Certain consensual amorous or sexual relationships between faculty and students are also prohibited as set forth in the *Consensual Romantic and Sexual Relationships* policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's *Nondiscrimination and Anti-Harassment* policy. EAO also assists with religious accommodations. For additional information about nondiscrimination or anti-harassment or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or visit the EAO website at <https://nau.edu/equity-and-access>.

TITLE IX

Title IX of the Education Amendments of 1972, as amended, protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. In accordance with Title IX, Northern Arizona University prohibits discrimination based on sex or gender in all its programs or activities. Sex discrimination includes sexual harassment, sexual assault, relationship violence, and stalking. NAU does not discriminate on the basis of sex in the education programs or activities that it operates, including in admission and employment. NAU is committed to providing an environment free from discrimination based on sex or gender and provides a number of supportive measures that assist students, faculty, and staff.

One may direct inquiries concerning the application of Title IX to either or both the Title IX Coordinator or the U.S. Department of Education, Assistant Secretary, Office of Civil Rights. You may contact the Title IX Coordinator in the Office for the Resolution of Sexual Misconduct by phone at 928-523-5434, by fax at 928-523-0640, or by email at titleix@nau.edu. In furtherance of its Title IX obligations, NAU promptly will investigate or equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. The Office for the Resolution of Sexual Misconduct (ORSM): Title IX Institutional Compliance, Prevention & Response addresses matters that fall under the university's Sexual Misconduct policy. Additional important information and related resources, including how to request immediate help or confidential support following an act of sexual violence, is available at <https://in.nau.edu/title-ix>.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at <https://nau.edu/disability-resources/student-eligibility-process> or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at <https://nau.edu/research/compliance/research-integrity>.

MISCONDUCT IN RESEARCH

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University's Research Integrity Officer, Dr. David Faguy, who can be reached at david.faguy@nau.edu or 928-523-6117. More

information about misconduct in research is available at <https://nau.edu/university-policy-library/misconduct-in-research>.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

Last revised August 4, 2022