# DATA 402/602: Statistical Thinking

## Spring 2026

### Course Information

#### Instructor Information

**Instructor:** Anna Panorska  
**Office:** DMSC 222  
**Phone:** 775-782-8256  
**Email:** ania@unr.edu  
**Office Hours:** TBD

#### Course Description

This course introduces students to the discipline of statistics as a science of understanding

and analyzing data. Throughout the semester, students will learn how to effectively make use

of data in the face of uncertainty: how to collect data, how to analyze data, and how to use

data to make inferences and conclusions about real world phenomena.

#### Course Pre/Co-requisites

College Algebra and Computational Thinking DATA 601/602

#### Core Course Objectives

*Do we need those? Get some from the SLOs below.*

#### Student Learning Outcomes

Upon completing this course students will be able to:

*1.* Recognize the importance of data collection, identify limitations in data collection

methods, and determine how they affect the scope of inference.

2. Use statistical software to summarize data numerically and visually, and to perform data

analysis.

3. Have a conceptual understanding of the unified nature of statistical inference.

4. Apply estimation and testing methods to analyze single variables or the relationship

between two variables in order to understand natural phenomena and make data-based

decisions.

5. Model numerical response variables using a single or multiple explanatory variables.

6. Interpret results correctly, effectively, and in context without relying on statistical jargon.

7. Critique data-based claims and evaluate data-based decisions.

8. Complete a research project demonstrating mastery of statistical data analysis from

exploratory analysis to inference to modeling.

9. Students will be able to seamlessly integrate statistical and data science methods into the scientific research and synthesize results of all analyses.

10. Students will be able to work in interdisciplinary teams both as members and leaders.

11. Students will be able to support their conclusions/decisions with data and scientific evidence.

12. Students will be able to effectively communicate results and how the data and statistical results support them to a variety of audiences.

#### Required Texts/Course Materials

Textbook: OpenIntro Statistics (<http://openintro.org/os>) - Diez, Barr, Çetinkaya-Rundel

CreateSpace, 3rd Edition, 2015 (ISBN: 978-1943450039)

The textbook is freely available online (<http://openintro.org/os>). You’re welcomed to read on

screen or print it out. If you prefer a paperback version you can buy it at the cost of printing

(around $10) on Amazon (<http://openintro.org/os>).

Additional text: [R for Data Science](https://r4ds.had.co.nz/) is an excellent text unifying statistical ideas and their implementation in R. It is a free online resource.

#### Class Procedures/Structures

The course is divided into learning modules. Each module’s materials will be posted on Canvas before the start of the module. You are expected to watch the videos and/or complete the readings and familiarize yourselves with the learning objectives. The class time will be split between discussion of the material and application exercises that you’ll complete in teams. Slides and other relevant materials for each class and lab will be available on the schedule page before each class.

Videos and other relevant prep materials for each unit are also available on that page.

#### Work load:

You are expected to put in about 4-6 hours of work / week outside of class. Some of you will

do well with less time than this, and some of you will need more.

#### Teams:

To construct highly functional teams of learners, you are asked to complete a short survey as well as a pre-test to gauge your previous exposure to statistics and statistical literacy. If you haven’t yet done so please complete these items as soon as possible. You will be assigned to teams of 3-5 students based on the results of the survey and the pretest.

Once team assignments have been made there is no option for changing teams, other than under extraordinary circumstances. You will work in these teams during application exercises and team portions of the readiness assessments. In addition, your team members will be your first point of contact in this class.

You are encouraged to study with your team members and other classmates. But remember that anything that is not explicitly a team assignment must be your own work.

#### Course Requirements

*Homeworks*

*These will be assigned (approximately) weekly on the course webpage and will be comprised*

*of problems from the textbook. Each assignment will list roughly five to seven problems from*

*the book to be turned in for grading, and roughly 10 practice problems. You do not need to*

*turn in the practice problems, and the solutions can be found in the back of the book.*

*The objective of the homeworks is to help you develop a more in-depth understanding of*

*the material and help you prepare for exams and the project. Grading will be based on*

*completeness as well as accuracy. In order to receive credit you must show all your work.*

*You are welcomed, and encouraged, to work with each other on the problems, but you must*

*turn in your own work. If you copy someone else’s work, both parties will receive a 0 for the*

*problem set grade as well as being reported to the Office of Student Conduct*

*Work submitted on Canvas will be checked for instances of plagiarism prior to being graded.*

*Submission instructions: You will turn in your problem sets on Canvas as PDF files. We strongly*

*recommend working in a word processor of your choice (Word, Google Docs, etc.), saving*

*your work as PDF, and submitting the PDF. This will ensure that what we read is exactly what*

*you intended to submit.*

*Lowest score will be dropped.*

*Labs – discussion sections:*

*The objective of the labs is to give you hands on experience with data analysis using modern*

*statistical software. The labs will also provide you with tools that you will need to complete*

*the project successfully. We will use a statistical analysis package called RStudio, which is a*

*front end for the R statistical language.*

*In class your TAs will give a brief overview of the lab and learning goals, and guide you*

*through some of the exercises. You will start working on the lab during the class session, but*

*note that the labs are designed to take more than just the class time, so you will meet up with*

*your team at a later time to finish the lab before the due date (which will be the following lab*

*session).*

*With each lab you will also be asked to note team members’ attendance in lab session and*

*percentage contribution. Team members who fail to attend a lab section (for any reason) but*

*who still contribute to the week’s lab report will lose 20 pts on the lab. Team members who*

*both don’t attend lab and also do not contribute to that week’s lab report will not be eligible*

*for any points on that lab.*

*Submission instructions: Always submit the Rmd and the HTML files for your lab. One*

*submission per team.*

*Lowest score will be dropped.*

*Readiness assessments:*

*Readiness assessments will be given at the beginning of a unit. These are 10 question*

*multiple choice assessments comprised of conceptual questions addressing the learning*

*objectives of the new unit. You are not expected to master all topics in the unit ahead of time,*

*but you are responsible for completing the reading assignment, understanding how the*

*material fits in the greater framework of the course, and acquire a conceptual understanding*

*of the learning objectives.*

*Lowest score will be dropped.*

*Performance assessments:*

*Performance assessments will be given at the end of a unit. These are very similar to the*

*readiness assessments in format, however you will be taking them outside of class on Canvas (?)*

*Outstanding performance will require mastery of all topics in the unit.*

*Lowest score will be dropped.*

*Project:*

*The objective of the project is to give you independent applied research experience using real*

*data and statistical methods. You will complete the semester long project in teams. There will*

*be a mid-checkpoint where you write a proposal for your research direction and present*

*results from exploratory data analysis. At this stage you will also describe your collaborative*

*approach outlining each team member’s past and planned contribution and a plan for how*

*the work will come together.*

*Note that each student must complete the project and score at least 30% of total*

*possible points on each project in order to pass this class.*

*Team members will provide feedback on percentage contribution to the final product, and*

*grades for each student will be determined based on the quality of the product and their*

*contribution to the work. If everyone contributes equally, all members will get full credit. Team*

*members who do not contribute sufficiently will be deducted points.*

*Exams:*

*There will be two midterms and one final in this class. See course info (/info/#exams) for*

*dates and times of the exams. Exam dates cannot be changed and no make-up exams will*

*be given. If you can’t take the exams on these dates you should drop this class. You can’t*

*pass the class if you do not take the final exam.*

*You are allowed to use one sheet of notes (``cheat sheet”) to the midterm and the final. This*

*sheet must be no larger than 8 1/2 x 11, and must be prepared by you. You may use both*

*sides of the sheet.*

#### Grading Criteria, Scale, and Standards

*Enter grading policy, including statement on whether or not plus/minus grading will be used, and list letter grade assignment.*

Sample letter grade assignment:

A: 90% - 100%

A-: 88% - 90%

B+: 85% - 88%

B: 80% - 85%

B-: 78% - 80%

C+: 75% - 78%

C: 70% - 75%

C-: 68% - 70%

D+: 65% - 68%

D: 60% - 65%

D-: 58% - 60%

F: <58%

Attendance & participation + peer evaluation 7.5%

Problem sets 10%

Labs 10%

Readiness assessments 7.5% (75% individual, 25% team)

Performance assessments 5%

Project 10%

Midterm 1 12.5%

Midterm 2 12.5%

Final 25%

#### Late Work or Make-up Exams Policies

*Enter information regarding late assignments and/or make-up exams due to emergencies or other circumstances.*

There will be no make-up or early exams, unless you miss an exam for a valid reason: written doctor’s note or documented campus sanctioned activity.

#### Attendance

* *This course is an in-person class. Lectures, exams, quizzes, projects, assignments, and in-class activities may not be available as an online option. In-person attendance is expected and strongly recommended.*
* *Absences must be communicated to the instructor, in advance if possible, for makeup opportunities; makeup opportunities are only available for University approved absences*
* *Medically related absences must be communicated to the instructor within 24-hours and with appropriate documentation. Other institutionally approved absences including religious holidays, athletic competitions, etc. must be officially documented and communicated within the first week of the course.*

#### Communication with students

All communication from the instructor to the entire class outside the classroom regarding matters such as class cancellations, meeting times, or room changes will be done via Canvas Annoucements.

Students who want to communicate with the instructor outside class and office hours must use their MyNevada official email, NOT Canvas communicator which does not carry the email thread.

#### Policies:

* Late work will not be accepted.
* There will be no make-ups for readiness or performance assessments, labs, problem sets, or project. exams. If the midterm exam must be missed, absence must be officially excused in advance, in which case arrangements for a make-up will be made.
* There will be no make –up final. The final exam must be taken at the stated time.
* All other missed assessments will receive a grade of 0.
* You must take the final exam and turn in the project in order to pass this course.
* Regrade requests must be made within one week of when the assignment is returned,
* and must be submitted in writing. These will be honored if points were tallied incorrectly, or
* if you feel your answer is correct but it was marked wrong. No regrade will be made to alter
* the number of points deducted for a mistake. There will be no grade changes after the final
* exam.
* Use of disallowed materials (textbook, class notes, web references, any form of
* communication with classmates or other persons, etc.) during exams will not be tolerated. This will result in a 0 on the exam for all students involved, possible failure of the course, and will be reported to the Office of Student Conduct. If you have any questions about whether something is or is not allowed, ask me beforehand

#### Course Calendar or Topics Outline

Week 1: 1.1 - 1.4 Introduction to data

Week 2: 2.1 - 2.3 Summarizing data

Week 3: 3.1 - 3.5 Probability

Week 4: 4.1-4.5 Distributions of random variables

Week 5: 4.1-4.5 Distributions of random variables contd.

Week 6: Review and Midterm 1

Week 7: 5.1 - 3.3 Foundations of inference

Week 8: 6.1- 6.4 Inference for categorical data

Week 9: 7.1 - 7.5 Inference for numerical data

Week 10: 7.1 - 7.5 Inference for numerical data, contd.

Week 11: Review and Midterm 2

Week 12: 8.1 - 8.4 Intro to linear regression

Week 13: Multiple and logistic regression

Week 14: Multiple and logistic regression, contd.

Week 15 and 16: Project work and Final Exam Review

#### Material Subject to Change

Course material, topics, schedule, assignments, policies, and content are subject to change.

#### Tips for success:

* Complete the reading before a new unit begins, and then review again after the unit is over.
* Be an active participant during lectures and labs.
* Ask questions - during class or office hours, or by email. Ask me, your TAs, and your classmates.
* Do the problem sets - start early and make sure you attempt and understand all questions.
* Start your project early and allow adequate time to complete it.
* Give yourself plenty of time to prepare a good cheat sheet for exams. This requires going through the material and taking the time to review the concepts that you’re not comfortable with.
* Do not procrastinate - don’t let a unit go by with unanswered questions as it will just make the following unit’s material even more difficult to follow.

#### Netiquette Expectations

*Please see the* [*Nevada Online netiquette page*](https://nevadaonline.unr.edu/student-support/netiquette) *(https://nevadaonline.unr.edu/student-support/netiquette).*

### University Policies

#### 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.](https://www.unr.edu/administrative-manual/6000-6999-curricula-teaching-research/instruction-research-procedures/6502-academic-standards)

*Consider adding a generative AI statement in the academic integrity section. Clarify what, if any, use of generative AI tools is permitted (for which assignments, for which purposes) and how students will be expected to document and disclose use of generative AI tools. See appendix for sample language.*

#### Statement on Student Compliance with University Policies

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 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](http://www.unr.edu/drc) (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.

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

#### 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 Center for Civil Rights and Equal Access at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the [Center for Civil Rights & Equal Access](https://www.unr.edu/civil-rights) page.

#### Statement on Campus Closures or Delays

In the event of class cancelations or delays caused by inclement weather conditions, fire/smoke conditions, or other unforeseen emergencies, the safety and well-being of students are the University’s top priority. Official notifications will be disseminated through the University website and other official channels with details related to any campus delays or closures.

In the event of a campus closure, you will be informed as to whether the class will be offered remotely or if it will be canceled. If the class is cancelled, you will receive information on how to address any missed course content.

Students facing significant impacts due to these events are encouraged to communicate with their instructor for potential accommodations.

### *Optional Additional Information*

*In addition to the required information listed above, it is strongly recommended that the syllabus include:*

* *Information for students who must miss classes due to illness or other excused reasons. A sample statement is “*If you are sick, please do not come to class. If you must miss class due to illness, please contact your instructor immediately to make arrangements for any missed work or lecture materials.*”*
* *Methods for communicating with students outside the classroom regarding matters such as class cancellations, meeting times, or room changes.*
* *Community guidelines and/or ground rules for respectful discourse.*
* *More details about academic integrity, with a concrete list or examples of "dos and don'ts" in the context of the class. See appendix for sample statements on use of generative AI.*

#### Statement for Academic Success Services

Your student fees cover usage of the [University Math Center](file:///C:\Users\sac\Desktop\University%20Math%20Center) (https://www.unr.edu/university-math-center), (775) 784-4433; [University Tutoring Center](https://www.unr.edu/tutoring-center) (https://www.unr.edu/tutoring-center), (775) 784-6801; and [University Writing & Speaking Center](https://www.unr.edu/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.

#### Mental Health Support Statement

There are times when you may experience difficulties in life, and you may benefit from seeking help. Mental health services are available to you as a student at no additional cost through Counseling Services at the Pennington Student Achievement Center. This includes same-day in-person and tele mental health initial consultations, brief individual counseling, and group counseling sessions. Limited same-day appointments can be scheduled online via [Counseling Services](https://www.unr.edu/counseling) or by calling 775-784-4648. Additional brief drop-in "Let's Talk" student consultations are also available in the Counseling Services Annex located at the southwest corner of Great Basin Hall.

#### Veteran Statement

Veterans, Reservists, National Guard and military connected family members may wish to check the office of [Veteran Services](https://www.unr.edu/veteran) for benefits and support. Besides processing VA educational benefits, the department offers a variety of programs year-round to support student academic and personal success while transitioning to higher education and throughout your educational experience. They welcome inquiries regarding VA benefits and assist in navigating resources, the campus, and in the Reno community.

### *Appendix: Sample AI Syllabus Language*

*Select one of the following statements to adapt / adopt. The sample language can be adapted with information specific to the course, such as which learning outcomes align with usage of generative AI tools or expectations for documenting and disclosing use of generative AI tools on assignments.*

#### [Sample Language] Generative AI Use is Permitted or Encouraged

In this course you are welcome to use generative artificial intelligence/large language model tools (such as ChatGPT, DALL-E, Gemini, Perplexity, etc.). Using these tools aligns with the course learning outcomes/student goals [*insert the course learning goal(s) that use of AI aligns with*].

Please be aware that many AI companies collect and store personal information. Please do not enter your confidential information as part of a prompt.

Also, please note that some of these large language models may “make up” or “hallucinate” information. These tools may reflect misconceptions and biases of specific data. Students are responsible for checking facts, finding reliable sources for, and making a critical examination of any work that is submitted.

All use of AI tools or content must be acknowledged or cited. If you do not acknowledge or cite your use of an AI tool, what you submit will be considered a form of cheating, as outlined in [UNR Academic Integrity Policy (UAM 6,502)](https://www.unr.edu/administrative-manual/6000-6999-courses-curricula-and-organizational-change-process/6502-academic-standards).

Please make sure to use the appropriate guidelines for acknowledging/citing generative AI in your assignments.

* [UNR MLA Citation Guide](https://guides.library.unr.edu/mlacitation/generativeai)
* [UNR APA Citation Guide](https://guides.library.unr.edu/generative-ai/cite)

Additional Considerations

* [Generative AI for Research](https://guides.library.unr.edu/generative-ai)

#### [Sample Language] Generative AI Use is Allowed for Certain Purposes and/or Assignments

This course assumes that all work submitted by students - which includes all process work, drafts, brainstorming artifacts, final works – will be generated by the students themselves, working individually or in groups as directed by course assignment instructions. This policy indicates the following constitute violations of academic honesty and “cheating”:  any unauthorized use of generative AI tools (such as ChatGPT), as outlined in UNR Academic Integrity Policy ([UAM 6,502](https://www.unr.edu/administrative-manual/6000-6999-courses-curricula-and-organizational-change-process/6502-academic-standards)).

Some assignments may allow for the use of the authorized use of such tools, but will be expressly described in the assignment instructions. For the purposes of those assignments, specific instructions will be provided on the use of generative AI tools regarding the type of work being allowed (i.e. brainstorming, drafts, final works, etc.). Please email the instructor for any questions or concerns.

#### [Sample Language] Generative AI Use is Not Allowed

For the purposes of  this course, any and all uses of generative artificial intelligence (AI)/large language model tools (such as ChatGPT, DALL-E, Gemini, Microsoft Copilot, etc.) will be considered a violation of the [UNR Academic Integrity Policy (UAM 6,502),](https://www.unr.edu/administrative-manual/6000-6999-courses-curricula-and-organizational-change-process/6502-academic-standards) specifically the prohibition against cheating or submitting work that is not your own.

This applies to all assessments in the course, including case studies, written assignments, discussions, quizzes, exams, and problem sets.

The following actions are prohibited:

* Submitting any part or all of an assignment statement or test questions as part of a prompt to a large language model AI tool.
* Incorporating any part of an AI-written response into a submitted assignment or assignment component.
* Using AI to summarize or contextualize reading assignments or source materials.
* Submitting your own work for this class to a large language model AI tool for iteration or improvement.