# DATA 401/601: Computational Thinking

## Spring 2026

### Course Information

#### Instructor Information

**Instructor:** Emily Hand  
**Office:** WPEB 415  
**Phone:** 775-782-8256  
**Email:** emhand@unr.edu  
**Office Hours:** TBD

#### Course Description

TODO

#### Course Pre/Co-requisites

N/A

#### Core Objectives

* Students will be able to work effectively with statistical tools of data science.
* Students will be able to seamlessly integrate statistical and data science methods into the scientific research and synthesize results of all analyses.
* Students will be able to work in interdisciplinary teams both as members and leaders.
* Students will be able to support their conclusions/decisions with data and scientific evidence.
* Students will be able to effectively communicate results and how the data and statistical results support them to a variety of audiences.

#### Student Learning Outcomes

Enter Student Learning Outcomes (SLOs). Syllabi must include all SLOs in the official course record, i.e. as listed in the *University* [*Catalog*](https://catalog.unr.edu/content.php?catoid=57&navoid=119326). For example, the ABET EAC SLOs:

Students will have

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

#### Required Texts/Course Materials

TBD

#### Class Procedures/Structures

*Enter information such as web based, hybrid, cooperative exercises, panel presentations, case study methods, class journals or learning logs, attendance at events outside of class, exams requiring use of the Testing Center, etc.*

#### Course Requirements

*Exams, quizzes, projects, papers and the proportion each counts toward the final grade. If class participation and/or attendance are factored in, explain how these are evaluated.*

***REQUIRED FOR ONLINE COURSES ONLY****: The following are****required****for all fully online courses to meet Department of Education and accreditation requirements:*

1. ***Regular and Substantive Interaction:****Federal US Department of Education (DoE) regulatory definitions of distance education require that institutions ensure that*[*Regular and Substantive Interaction*](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Feric.ed.gov%2F%3Fid%3DED593878&data=05%7C02%7Csac%40unr.edu%7C4eab0a0f89b54e46674708dd1ae1a703%7C523b4bfc0ebd4c03b2b96f6a17fd31d8%7C0%7C0%7C638696278666167713%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=DRHL4%2B8pBIAb%2BI5%2BfKGIh4xwIe9tgMfrCJnTeugr1Ko%3D&reserved=0)*between students and instructors. Options include weekly or bi-weekly discussions, peer review, and/or group work for student-student interaction, as well as instructor-initiated interaction and presence throughout the duration of the course.*
2. ***Identity Verification Assessment:****At least one*[*identity verification assessment*](https://www.unr.edu/provost/faculty-affairs/instructional-resources/student-identity-verification)*or activity is required, which should be clearly listed in the Course Requirements section of the syllabus. Options include: one-on-one meetings with instructor, video presentation, and/or proctored/supervised exam or experience where students are required to present photo identification. Note that Respondus LockdownBrowser without the use of Monitor does not satisfy this requirement.*

**Example Proctored Exam wording:** All students taking fully online courses will be required to complete a proctored identity-verification assessment or activity. In this course, you will be required to complete one proctored online exam using either the remote proctoring software, **Respondus Lockdown Browser + Monitor**or the [UNR Testing Center](https://www.unr.edu/testing-center). Students who choose the remote proctor will be required to install the Respondus Lockdown Browser + Monitor software and will only be able to access the exam through this software. The software will prompt students to show their IDs and will record their test attempt. Requirements for LockDown Browser + Monitor can be found on the [UNR webpage](https://www.unr.edu/digital-learning/tools-and-technologies/online-test-proctoring/respondus/respondus-student-resources).  More information can be found in the WebCampus course section.

**Example Alternate ID-Verification Assessment wording:** All students taking fully online courses will be required to complete a proctored identity-verification assessment or activity. In this course, you will be asked to give a video presentation whereby you present a photo ID at the start so your instructor can verify your identity.  See the [Zoom essential quick-start for students webpage](https://www.unr.edu/digital-learning/tools-and-technologies/web-conferencing/zoom/zoom-for-students) for more information on recording with Zoom. More information will be provided in the WebCampus course section.

#### 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: 93% - 100%

A-: 90% - 92.9%

B+: 87% - 89.9%

B: 84% - 86.9%

B-: 80% - 83.9%

C+: 77% - 79.9%

C: 74% - 76.9%

C-: 70% - 73.9%

D+: 67% - 69.9%

D: 64% - 66.9%

D-: 60% - 63.9%

F: <60%

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

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

#### Attendance

*Enter information indicating the course is in-person and attendance is required. It is acceptable to not have a grade associated with attendance, but this statement will help to clarify expectations. Following are some examples for language.*

* *Students are required to attend in-person lectures at the scheduled time to earn credit for assignments and lectures. Institutionally approved absences must be* *communicated to the instructor with 24-hour notice and appropriate documentation. Absences must be communicated to the instructor, in advance if possible, for makeup opportunities; makeup opportunities are only available for University approved absences*
* *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 required.*
* *Attendance is required for this in-person course. 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.*
* *Excessive absences may result in course failure regardless of assignments.*

#### Course Calendar or Topics Outline

**Week 1: Introduction to Computational Thinking & Python**

* Topics
  + What is computational thinking?
  + Problem-solving framework: Decomposition, Pattern Recognition, Abstraction, Algorithms
  + Installing Python and setting up the environment
  + Writing your first Python program: print() and basic syntax
* Reading
  + Chapter 1 from *Python for Everbody* by Charles Severance (Intro & Setup)
  + Article: “What is Computational Thinking?” by Jeannette Wing
* Assignment:
  + Install Python & IDE (e.g. VS Code or IDLE)
  + Write a simple program that prints your name and favorite hobby
  + Start thinking about a simple problem you want to solve during the course

**Week 2: Variables, Data Types, and Input/Output**

* Topics
  + Variables and assignment
  + Basic data types: integers, floats, strings, booleans
  + Getting user input with input()
  + Simple programs using variables and input
  + Basic output formatting
* Reading
  + Automate the Boring Stuff with Python, Chapter 1 (variables and types)
* Assignment
  + Write a program that asks the user for their age and prints out how old they will be next year
  + Experiment with different data types

**Week 3: Operators and Expressions**

* Topics
  + Arithmetic operators
  + Comparison operators
  + Logical operators (and, or, not)
  + Expressions and precedence
  + Order of evaluation
* Reading
  + Python Crash Course, Chapter 2 (Operators and Expressions)
* Assignment
  + Create a program that calculates the area of a rectangle from user inputs
  + Write expressions that use logical operators (e.g. check if a number is between two values)

**Week 4: Conditional Statements**

* Topics
  + if, elif, else statements
  + Nested conditionals
  + Using conditionals in problem-solving and decision-making
* Reading
  + Python for Everbody, Chapter 3 (conditional statements)
* Assignment
  + Write a program that classifies a number as positive, negative or zero
  + Develop a simple grading program that assigns letter grades based on numerical input

**Week 5: Loops - Part 1 (While loops)**

* Topics
  + Understanding iteration
  + while loops and loop control with break and continue
  + Infinite loops and loop debugging
* Reading
  + Automate the Boring Stuff, Chapter 2 (while loops)
* Assignment
  + Write a program that asks the user to guess a number until they get it right
  + Create a countdown timer that prints numbers from 10 to 1

**Week 6: Loops - Part 2 (For loops)**

* Topics
  + for loops and range() function
  + Looping through strings and lists
  + Nested loops
* Reading
  + Python Crash Course, Chapter 4 (for loops)
* Assignment
  + Print all even numbers from 1 to 100
  + Print each character of a user-input string on a new line

**Week 7: Functions and Modular Programming**

* Topics
  + Defining functions with def
  + Calling functions
  + Function parameters and return values
  + Importance of modularity in computational thinking
  + Scope and variable lifetime
  + Code reuse and modularity
* Reading
  + Python for Everybody, Chapter 4 (functions)
* Assignment
  + Write a function to convert Celsius to Fahrenheit
  + Write a function that takes a number and returns whether it is prime

**Week 8: Lists and Basic Data Structures**

* Topics
  + Lists: creation, indexing, slicing
  + Common list methods (append(), remove(), etc.)
  + Introduction to data organization
  + Lists as Data Containers
  + WHAT ABOUT OTHER BASIC DATA STRUCTURES?
* Reading
  + Automate the Boring Stuff, Chapter 4 (lists)
* Assignment
  + Create a shopping list program where the user can add and remove items
  + Write a program that finds the largest and smallest number in a list

**Week 9: Problem Solving with Lists**

* Topics
  + Iterating through lists for problem-solving
  + Searching and sorting techniques
  + List comprehensions introduction
* Reading
  + Python Crash Course, Chapter 5 (list comprehensions)
* Assignment
  + Write a program to count the frequency of an element in a list
  + Use list comprehensions to create a list of squares for numbers 1-20

**Week 10: Strings and Text Processing**

* Topics
  + String operations and methods
  + Formatting strings
  + Text Analysis (e.g. counting vowels)
* Reading
  + Python for Everybody, Chapter 6 (strings)
* Assignment
  + Write a program to count vowels in a user-input sentence
  + Format a user’s name in “Last, First” format

**Week 11: Introduction to Dictionaries**

* Topics
  + Key-value pairs
  + Creating, accessing and updating dictionaries
  + Using dictionaries to model data
* Reading
  + Automate the Boring Stuff, Chapter 5 (dictionaries)
* Assignment
  + Create a phone book program that stores and retrieves phone numbers
  + Count the frequency of each word in a sentence

**Week 12: Algorithms and Algorithmic Thinking**

* Topics
  + Algorithm design and pseudocode
  + Examples: linear search, binary search (conceptual)
  + Efficiency and problem-solving strategies
* Reading
  + Selected Articles or Textbook Exerpts on algorithms (intro level)
* Assignment
  + Implement linear search on a list
  + Write pseudocode for a simple sorting algorithm (e.g. bubble sort)

**Week 13: Debugging and Testing**

* Topics
  + Common Python Errors and Exceptions
  + Using Print Statements
  + Debugging Strategies and Tools
  + Writing Simple Test Cases
* Reading
  + Python Crash Course, Chapter 11 (testing and debugging)
* Assignment
  + Introduce bugs intentionally in small programs and debug them
  + Write test cases for a previous written function

**Week 14: Introduction to Recursion**

* Topics
  + Concept of recursion
  + Recursive functions with examples (factorial, Fibonacci)
  + When and why to use recursion
* Reading
  + Automate the Boring Stuff, Chapter 8 (recursion introduction
* Assignment
  + Write a recursive function for factorial
  + Write a recursive function to compute Fibonacci numbers

**Week 15: Final Project Work / Applying Computational Thinking**

* Topics
  + Applying computational thinking to solve a complex problem
  + Project Planning, coding, and iterative testing
  + Peer code review and collaboration
* Assignment
  + Begin final project development
  + Write a project proposal including problem statement and planned approach

**Week 16: Project Presentations and Course Wrap-up**

* Topics
  + Student presentations of final projects
  + Review of key concepts
* Assignment
  + Finalize and present final project

#### Material Subject to Change

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

#### [Optional:] Netiquette Expectations

*Instructors teaching fully online courses or courses leveraging online discussions or collaborative activities may also consider including a Netiquette Statement. Creating a netiquette policy for your students will help make clear to them what sort of behavior is encouraged, and what sort of behavior will not be tolerated in creating a safe and successful learning environment. You can build your own netiquette guidelines specific to your course, your activities, and your preferences for student communication and interaction. You may also consider linking to 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.

##### For Online Courses:

If you are a student who would normally seek accommodations in a traditional classroom, please contact me as soon as possible. You may also contact the Disability Resource Center for services for online courses by emailing [drc@unr.edu](mailto:drc@unr.edu) or calling 775-784-6000. Academic accommodations for online courses may be different than those for seated classrooms; it is important that you contact us as soon as possible to discuss services. The University of Nevada, Reno supports equal access for students with disabilities. For more information, visit the [Disability Resource Center](http://www.unr.edu/drc).

**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.