DTSC 4501.401
Principles of Data science and Analytics
Fall 2026

COURSE INFORMATION

- **Course Name:** DTSC 4501
- **Course Title:** Principles of Data Science and Analytics
- **Course Section:** 401
- **Course Format:** UNT Internet Course. *Recordings and materials published on Zoom every Friday unless mentioned otherwise.*
- **Credit Hours:** 3

CONTACT INFORMATION

Instructor

- **Name:** Dr. Yang Zhang (Assistant Professor of Data Science, Anuradha and Vikas Sinha Department of Data Science, UNT)
- **Office hours:** Appointments via Email
- **Office Location:** Discovery Park, E296J.
- **Email:** yang.zhang@unt.edu

Teaching Assistants

- **Name:** Jinyu Liu
- **Office Hours:** Appointments via Email
- **Email:** JinyuLiu@my.unt.edu

**Please email the TA first about grading or attendance concerns. All other matters, you may directly contact the instructor.*

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT's full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Course Description

This course introduces to the student basic mathematical knowledge for Data Science. It reviews and teaches essential concepts and skills in statistics, probability, and linear algebra that data science is built upon. These skills and knowledge enable students to understand data science literature and principles behind data analytics tools and algorithms. Python Basics, Sympy, Numpy, Pandas and application examples like Gradient Descent, Principle Component Analysis dimensionality reduction, K-Means Clustering, and Linear Regression will be introduced.

Course Prerequisites

This course was created for learners who have taken/studied college algebra, basic calculus, basic linear algebra, basic statistics and probability.

Course Objectives

By the end of this course, students will be able to: Master the core math concepts and obtain the basic math skills that data scientists must have before moving on to study more advanced or practical Data Science courses.

Materials

Textbooks:

1. "Principles of Data Science" by Sinan Ozdemir, Packt Publishing Co., ISBN: 978-1-78588-791-8

2. "Computational and Inferential Thinking: The Foundations of Data Science" by Ani Adhikari and John DeNero, https://www.inferentialthinking.com/chapters/intro. Free available online.

3. "Principles and Techniques of Data Science" by Sam Lau, Joey Gonzalez, and Deb Nolan, https://www.textbook.ds100.org. Free available online. *(optional)*

4. "Introduction to Computation and Programming Using Python: With Application to Understanding Data" 2nd ed. by John Guttag. MIT Press, 2016. ISBN: 9780262529624. *(optional)*

Teaching Philosophy

I have an active learning approach to teaching where I prefer students to not just accept what I tell them, but rather directly experience the benefit of what they learn. I always try to mix new didactic content directly with applications of it, emphasizing that although you may have learned an explicit set of facts, the implicit knowledge needed for more fluid application takes time and effort. In this course students are expected to finish a set of practical tasks similar to the tutorial examples with the help of the instructor and the TA in the last third of the class. Under this setup, students will be more motivated and make rapid progress relative to a traditional lecture style.

Course Technology & Skills

Minimum Technology Requirements

Computers/Laptops are **required during class and exams**. You will be expected to connect to the UNT wireless network. If you don't own a laptop, you may borrow one from the library: https://library.unt.edu/services/laptop-checkout/

- **Labs**: You will need a computer/laptop to do lab assignments.
- **Exams:** You will need a computer/laptop to take the exams. These will be done individually on your laptop. Exams will use the Canvas quiz system: Canvas Technical Requirements (https://clear.unt.edu/supported-technologies/canvas/requirements)
- **Recorded lectures and demos:** Computers/Laptops are required to watch recorded video lectures on Canvas in order to understand and apply the material.

Computer Skills & Digital Literacy

The following technical skills are required to succeed in the course:

- Using Canvas
- Using email with attachments
- Downloading and installing Anaconda Python version 3 and be able to open an Jupyter notebook
- Using presentation programs

Technical Assistance

Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

UIT Help Desk: UIT Student Help Desk site
(http://www.unt.edu/helpdesk/index.htm)
Email: helpdesk@unt.edu
Phone: 940-565-2324
In-Person: Sage Hall, Room 130
Walk-In Availability: 8am-9pm
Telephone Availability:

- **Sunday:** noon-midnight
- **Monday-Thursday:** 8am-midnight
- **Friday:** 8am-8pm
- **Saturday:** 9am-5pm

Laptop Checkout: 8am-7pm

For additional support, visit Canvas Technical Help
(https://community.canvaslms.com/docs/DOC 10554-4212710328)

Rules of Engagement

Rules of engagement refer to the way students are expected to interact with each other and with their instructors. Here are some general guidelines:

- While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis of race, color, national origin, religion,sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law will not be tolerated.
- Treat your instructor and classmates with respecting any communication online or face-to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use "I" statements to share thoughts and feelings. Try not to speak on behalf of groups or other individual's experiences.
- Use your critical thinking skills to challenge other people's ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as "YELLING!"
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using "text-talk" unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

See these EngagementGuidelines (https://clear.unt.edu/online-communication-tips) for more information.

Course Requirements

Readings/Tutorials: These will be available on the UNT Canvas. Expectations of what is learned will be discussed in class and, as will be clear in the first few weeks, lab assignments will test your knowledge on the most important aspects of the readings/tutorials only.

Lab assignments: Lab assignments are designed to engage you in your learning, so you can begin to apply these principles in practice and tailor them to your needs. These assignments are supposed to be finished in a timely manner. Unless otherwise specified, assignments are due at midnight exactly one week after they are assigned (allowing for questions in class on the day the assignment is due). Results should be presentable, with appropriate comments for someone to follow what you have done. Assignments can be done individually or in a group of no more than 3 people, but must be submitted to Canvas individually unless otherwise specified. If you complete an assignment in a group, please indicate the names of the group members in the assignment. Notably, low-point assignments are more for learning and self-evaluation than assessment.

Exams: There will be 2 exams. Exams will resemble assignments, but will be on a new data set with a slightly different request for tasks. Exams will be taken on Canvas with a lockdown browser. Time will be limited, and all work will be individual. You are strongly encouraged to attempt to solve the tasks iteratively and incrementally - write code that works first, but works poorly, and improve from there, rather than write perfect code top to bottom. Exams are cumulative, but the emphasis will be on the newer material. Exam days are already posted and are considered fixed. Prior arrangements can potentially be made without loss of points, but have to be discussed. **Exams cannot be missed without prior arrangements or later documented proof of extenuating circumstances.**

Grading

Grades are determined by a simple points system, with a total of *at least* 100 pts given though more than 100 points are likely. The expected distribution of points is given below, with the exact scale determined by point values given for each assignment or exam - this is subject to minor modification based on actual points given. Note, due to the nature of the course, exams are a significant means of establishing your final grade, so please complete the assignments in a timely way and study appropriately prior to each exam.

Activities	***Points Possible***	***Percentage of Final Grade***
Lab Assignments ● ***6 assignments***	*60 points*	*60%*
Exams ● ***2 exams @ 20 points each***	*20 points* *20 points*	*40%*
Reading Materials (Bonus) ● ***5 reads @ 2 points each***	*10 points*	*10%*
Total Points	*100+10 points*	*100+10%*

Grading Scale: A>=90, B=80-89.9, C=70-79.9, D=60-69.9, F=0-59.9 pts. No exceptions. If class grades are low (e.g. I expect the vast majority of students will end with A's and B's), extra points will be added to all the students in the class (we do not assign extra work or extra points for individuals).

Note: All questions about grades must be brought up within a week after the grades are released. No grade change can be made afterwards.

Course Evaluation

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course.

Course Policies

Attendance

Students are encouraged to attend every class. Attendance is not mandatory.

Course Materials for Remote Instruction

Remote instruction may be necessary if community health conditions change or you need to self-isolate or quarantine due to COVID-19. Students will need access to a computer/laptop with a webcam and microphone to participate in fully remote portions of the class. Information on how to be successful in a remote learning environment can be found at https://online.unt.edu/learn

Class Participation

Students must complete assignments, exams, presentations, and any work in time to receive the

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Class Participation

Students must complete assignments, exams, presentations, and any work in time to receive the

points associated with each activity.

Late Work

When assignments and work are turned in after the due date, this places an undue burden on the instructor and the TA, especially when this policy is abused. As a compromise, if the assignment or work is turned in *prior to grading* there will be no reduction in points, however, grading can occur any time after the due date (including the following morning!).

Assignments submitted within 1 day after the due date will receive a 20% deduction.
Assignments submitted within 2 days after the due date will receive a 50% deduction.
Assignments submitted 3 or more days late will not be accepted.
You must provide an accommodation letter, medical note, or doctor's excuse if there is an emergency preventing you submitting work in a timely manner for grading considerations.

Examination Policy

Exams will be on the computer/laptop using the Canvas quiz system. You need to bring a laptop if no computer is available in the classroom on the appropriate exam days. Make sure your laptop battery can last more than 2 hours. Exams are open book, open note, and open internet unless otherwise specified in advance, however, you shouldn't search for the solution online and no communication with others other than the instructor or the TA is allowed in any form (e.g., email, chatting, etc.). Exams must be taken at the same time in the classroom unless special accommodations have been made through the Office of

Disability Accommodation (ODA). Other accommodations must be given by prior arrangement with the instructor, otherwise documentation proving an extenuating circumstance will have to be provided after the missed exam. Time will be limited, and all work will be individual. **Anyone involved in cheating (copying other students' exams or exams in the previous semesters, searching the same question on chegg.com, helping others cheat, posting the question online, etc.) will receive 0 points in the exam and drop a letter in the final grade.** Exams will focus on the most recent material but are expected to be cumulative in scope.

Technical Errors during Exams

If during an online exam there is a technical error which affects your ability to complete the exam, you are immediately to let the exam proctor know and the exam proctor will discuss ways to allow you to resume the test without giving an unfair advantage. In the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Assignment Policy

Students are encouraged to complete assignments during lab sections in class, with the help of the instructor, the TA, and their classmates. Unless otherwise specified, assignments are due at midnight exactly one week after they are assigned (allowing for questions in class on the day the assignment is due). Results should be presentable, with appropriate comments for someone to follow what you have done. Assignments can be done individually or in a group of no more than 3 people, but must be submitted to Canvas individually unless otherwise specified.

Instructor/TA Responsibilities and Feedback

- Instructor responsibilities include: helping students grow and learn, providing clear instructions for assessments, answering questions about assignments, identifying additional resources as necessary, providing grading rubrics, reviewing and updating course content, etc.
- TA responsibilities include: grading assignments and exams, answering questions about assignments, helping students grow and learn.

Syllabus Change Policy

Any substantial changes to the syllabus after the first week will be highlighted in red on the online platform. Approximate point values are expected to vary but will be fixed when the assignment or exam is given.

UNT Policies

Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT Policy 06.003 (https://policy.unt.edu/policy/06-003), Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of

academic penalties or sanctions ranging from admonition to expulsion from the University.

ADA Policy

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website (https://disability.unt.edu/).

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)

The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Retention of Student Records

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's Code of Student Conduct (https://deanofstudents.unt.edu/conduct) to learn more.

Access to Information - Eagle Connect

Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward email: Eagle Connect (https://it.unt.edu/eagleconnect).

Student Evaluation Administration Dates

Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website or email spot@unt.edu.

Important Notice for F-1 Students taking Distance Education Courses

Federal Regulation

To read detailed Immigration and Customs Enforcement regulations for F-1 students taking online courses, please go to the Electronic Code of Federal Regulations website (http://www.ecfr.gov/). The specific portion concerning distance education courses is located at Title 8 CFR 214.2 Paragraph (f)(6)(i)(G).

The paragraph reads:

(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of

one class or three credits per session, term, semester, trimester, or quarter may be counted toward the full course of study requirement if the class is taken on-line or through distance education and does not require the student's physical attendance for classes, examination or other purposes integral to completion of the class. An on-line or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student's course of study is in a language study program, no on-line or distance education classes may be considered to count toward a student's full course of study requirement.

University of North Texas Compliance

To comply with immigration regulations, an F-1 visa holder within the United States may need to engage in an on-campus experiential component for this course. This component (which must be approved in advance by the instructor) can include activities such as taking an on-campus exam, participating in an on-campus lecture or lab activity, or other on-campus experience integral to the completion of this course.

If such an on-campus activity is required, itisthe student'sresponsibility to do the following:

(1) Submit a written request to the instructor for an on-campus experiential component within one week of the start of the course.

(2) Ensure that the activity on campus takes place and the instructor documents it in writing with a

notice sent to the International Student and Scholar Services Office. ISSS has a form available that you may use for this purpose.

Because the decision may have serious immigration consequences, if an F-1 student is unsure about his or her need to participate in an on-campus experiential component for this course, s/he should contact the UNT International Student and Scholar Services Office (telephone 940-565-2195 or email internationaladvising@unt.edu) to get clarification before the one-week deadline.

Student Verification

UNT takes measures to protect the integrity of educational credentials awarded to students enrolled in distance education courses by verifying student identity, protecting student privacy, and notifying students of any special meeting times/locations or additional charges associated with student identity verification in distance education courses.

See UNT Policy 07-002 Student Identity Verification, Privacy, and Notification and Distance Education Courses (https://policy.unt.edu/policy/07-002).

Use of Student Work

A student owns the copyright for all work (e.g. software, photographs, reports, presentations, and email postings) he or she creates within a class and the University is not entitled to use any student work without the student's permission unless all of the following criteria are met:

- The work is used only once.
- The work is not used in its entirety.
- Use of the work does not affect any potential profits from the work.
- The student is not identified.
- The work is identified as student work.

If the use of the work does not meet all of the above criteria, then the University office or department using the work must obtain the student's written permission. Download the UNT System Permission, Waiver and Release Form.

Transmission and Recording of Student Images in Electronically-Delivered Courses

1. No permission is needed from a student for his or her image or voice to be transmitted live via video conference or streaming media, but all students should be informed when courses are to be conducted using either method of delivery.

2. In the event an instructor records student presentations, he or she must obtain permission from the student using a signed release in order to use the recording for future classes in accordance with the Use of Student-Created Work guidelines above.

3. Instructors who video-record their class lectures with the intention of re-using some or all of recordings for future class offerings must notify students on the course syllabus if students' images may appear on video. Instructors are also advised to provide accommodation for students who do not wish to appear in class recordings.

No notification is needed if only audio and slide capture is used or if the video only records the

instructor's image. However, the instructor is encouraged to let students know the recordings will be available to them for study purposes.

Academic Support & Student Services

Student Support Services

Mental Health

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- StudentHealth and Wellness Center(https://studentaffairs.unt.edu/student-health-and wellness-center)
- Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
- UNT Care Team (https://studentaffairs.unt.edu/care)
- UNT Psychiatric Services (https://studentaffairs.unt.edu/student-health-and-wellness center/services/psychiatry)
- Individual Counseling (https://studentaffairs.unt.edu/counseling-and-testing services/services/individual-counseling)

Chosen Names

A chosen name is a name that a person goes by that may or may not match their legal name. If you have a chosen name that is different from your legal name and would like that to be used in class, please let the instructor know. Below is a list of resources for updating your chosen name at UNT.

- UNT Records
- UNT ID Card
- UNT Email Address
- Legal Name

**UNT euIDs cannot be changed at this time. The collaborating offices are working on a process to make this option accessible to UNT community members.*

Pronouns

Pronouns (she/her, they/them, he/him, etc.) are a public way for people to address you, much like your name, and can be shared with a name when making an introduction, both virtually and in-person. Just as we ask and don't assume someone's name, we should also ask and not assume someone's pronouns.

Below is a list of additional resources regarding pronouns and their usage:

- What are pronouns and why are they important?
- How do I use pronouns?
- How do I share my pronouns?
- How do I ask for another person's pronouns?
- How do I correct myself or others when the wrong pronoun is used?

Additional Student Support Services

- Registrar(https://registrar.unt.edu/registration)

- Financial Aid (https://financialaid.unt.edu/)
- Student Legal Services (https://studentaffairs.unt.edu/student-legal-services)
- Career Center (https://studentaffairs.unt.edu/career-center)
- Multicultural Center (https://edo.unt.edu/multicultural-center)
- Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
- Pride Alliance (https://edo.unt.edu/pridealliance)

  UNT Food Pantry (https://deanofstudents.unt.edu/resources/food-pantry)

Academic Support Services

- Academic Resource Center (https://clear.unt.edu/canvas/student-resources)
- Academic Success Center (https://success.unt.edu/asc)
- UNT Libraries(https://library.unt.edu/)
- Writing Lab (http://writingcenter.unt.edu/)