

College of Information
The Anuradha and Vikas Sinha
Department of Data Science

DTSC 4050
Statistical Methods for Data Science and Analysis

Syllabus
Fall 2026

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COURSE INFORMATION

- **Course Name: DTSC 4050**
- **Course Title: Statistical Methods for Data Science and Analysis**
- **Course Section(s): 020**
- **Classroom: NTDP B192**
- **Class Time: Mon 3:30pm – 6:20pm**
- Credit Hours: 3 Hours
- Course Pre-requisites: None

Instructor Contact Information

- **Name: Sahara Ali**
- **Assistant Professor**
- **UNT Email: Sahara.ali@unt.edu**
- **Office Hours: Monday 1:00pm - 2:00pm (NTDP E297C).** If required, an appointment can be arranged via email.

TA Contact Information

- TBD

Welcome to UNT!

As members of the UNT community, we have all committed 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 provides an overview of statistical learning and introduces a variety of topics. Students will learn the core concepts of statistical learning for data analysis while working hands-on with real data using Python and interactive notebooks. We will be using Google Colab and Python for data analysis and statistical methods in this entry-level course on data science. No prior experience is required. While mastery is not expected, the goal is for you to *enjoy learning something exciting!*

Course Goals:

- Summarize and visualize data using appropriate descriptive statistical methods.
- Apply probability concepts and statistical distributions to quantify uncertainty in data.
- Select and conduct appropriate statistical inference procedures, including estimation and hypothesis testing.
- Analyze relationships among variables using correlation, regression, and statistical comparison methods.
- Evaluate statistical assumptions, limitations, and potential sources of bias when analyzing real-world data.
- Conduct reproducible statistical analyses using Python and effectively interpret and communicate the resulting findings.

Materials

Recommended Textbooks

1. An Introduction to Statistical Learning (2nd Edition) by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani. You can access the book through this (https://statlearning.com/) (open source).

2. Computational and Inferential Thinking: The Foundations of Data Science (2nd Edition) by Ani Adhikari, John DeNero, and David Wagner. Access the book via this link (https://inferentialthinking.com/chapters/intro.html#) (open source).

Required Software

1. Python 3+
2. Google Colab
3. Jupyter Notebook (optional)

Other Materials:

1. All the hands-on demos covered in the session, along with the PowerPoint slides and reference links to tutorials, will be available on the UNT Canvas portal.

TECHNICAL SUPPORT AND ASSISTANCE

The UNT University Information Technology provides student IT services and technical support, including Canvas.

- UIT Homepage: https://it.unt.edu/uit
- Email: helpdesk@unt.edu
- Phone: 940.565-2324
- In Person: Sage Hall, Room 330

Canvas technical requirements: https://clear.unt.edu/supported-technologies/canvas/requirements

Minimum Technical Skills Needed

Students should be able to use the learning management system – Canvas to access course related materials and resource, keep up with emails regularly, create, modify or submit files according to instructors' direction, such as proper file format, be able to download and install software when needed, and utilize the basics of the Microsoft Suite (Word, Excel, Power Point).

Student Academic Support Services

- Code of Student Conduct: provides Code of Student Conduct along with other useful links
- Office of Disability Access: exists to prevent discrimination based on disability and to help students reach a higher level of independence
- Counseling and Testing Services: provides counseling services to the UNT community, as well as testing services; such as admissions testing, computer-based testing, career testing, and other tests
- UNT Libraries

- UNT Learning Center: provides a variety of services, including tutoring, to enhance the student academic experience
- UNT Writing Center: offers free writing tutoring to all UNT students, undergraduate and graduate, including online tutoring
- Succeed at UNT: information regarding how to be a successful student at UNT

COURSE CALENDAR

This course consists of 16 Weeks. Please refer to Table 1 for topics, readings materials, and assignments due dates.

- Assignments will be due on **11:59 pm of Mondays** of the specified week.
- Quizzes will be due on **11:59 pm of Fridays.**
- Late assignment submissions: 10% penalty (per day) unless you email before the deadline and receive approval.
- No late submissions or make-ups are allowed for quizzes.
- Once grades are posted, you have 24 hours to raise concerns; after that, grades are final.

Table 1. Study Schedule and Due Dates

Week	Topics	Due
Week 1	Orientation & Introduction	Introduce Yourself
Week 2	What is Statistical Analysis	
Week 3	Programming in Python	Quiz 1
Week 4 Labor Day – No class		
Week 5	Data Preparation and Exploratory Data Analysis	
Week 6	Probability & Distributions – I	Quiz 2
Week 7	Probability & Distributions – I I	Assignment 1
Week 8	Estimation	Quiz 3
Week 9	Midterm Review	Assignment 2
Week 10	Hypothesis Testing, Test of Means, and ANOVA	Project Proposal
Week 11	Supervised Learning: Classification	Quiz 4
Week 12	Supervised Learning: Regression	Assignment 3
Week 13	Unsupervised Learning	
Week 14	AB Testing	Assignment 4
Week 15	Final Project Presentation	
Week 15 – Thanksgiving Break		
Week 16	No Lecture	Project Report

ASSESSMENT & GRADING

Assignments and Assessments

Quizzes

There will be four quizzes consisting of multiple-choice questions, one word, and short-answer questions.

Assignments for Learning Modules

The course consists of four programming assignments to be attempted in Python using Google Colab.

Data Science Project

The final project will involve mathematical modeling or statistical analysis using data analysis tools, Python programming, and data summarization with concepts from any preferred data visualization tool. Detailed instructions and the project format will be provided before its distribution.

Project proposal (100)
Project presentation (100)
Project report (100)

Grading

Grading Table

Assessment	Points Possible
Assignments (4)	125x4 = 500
Group Project Proposal Final Report & Presentation	100x1 =100 100x2 =200
Quizzes (4)	50 x 4 =200
TOTAL	**1000**

Total Points Possible for Semester/Grading Scale = 1000

1000-900 = A
899-800 = B
799-700 = C
699-600 = D
599-500 = F

Final Examination:
There is no final exam in this course.

COURSE EVALUATION

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT, implemented in the summer 2015, to comply with the State of Texas House Bill 2504. Each semester student will receive an email from UNT to their student UNT email to response to the anonymous survey. For more information, visit Office of the Provost, SPOT page: https://vpaa.unt.edu/spot

COURSE POLICIES

Use of Generative AI

Generative AI tools (such as ChatGPT, Microsoft Copilot, Gemini, Claude, and similar tools) can be valuable resources for learning, brainstorming, debugging, and improving your understanding of course concepts. This course encourages students to develop the skills needed to use these tools responsibly, critically, and transparently.

The use of Generative AI will vary by assignment. Each assignment will clearly indicate whether and how Generative AI tools may be used. When an assignment permits AI use, students are expected to follow the specific guidelines provided with that assignment.

Whenever you use a Generative AI tool in completing an assignment, you must include a brief AI Use Disclosure describing:

1. The AI tool(s) you used.
2. How you used the tool (e.g., brainstorming, explaining a concept, debugging code, improving writing, or generating an initial approach).
3. How you reviewed, verified, or modified the AI-generated content before incorporating it into your work.

You remain responsible for all work that you submit. AI-generated responses may contain errors, inappropriate statistical methods, fabricated information, or incorrect interpretations. Therefore, you should be able to explain and justify the statistical reasoning, code, and conclusions in your submitted work, regardless of whether AI assisted you.

Using Generative AI when an assignment does not permit it, failing to disclose its use when required, or submitting AI-generated work without appropriate understanding and verification may be considered a violation of the course's academic integrity expectations.

The goal of this policy is not to discourage the use of AI, but to help you learn how to use emerging AI technologies as responsible and informed data science professionals.

Assignment Policy

This course uses Turnitin for assignment submissions. The University is committed to providing a reliable online course system to all users. However, 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 an 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. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Assessment Policy

Quizzes and assignments must be completed online using the Canvas system and are open-book.

Instructor Responsibilities and Feedback

The instructor will post feedback on quizzes and assignments within one week after their due date.

Late Work and Missed Work

Students are expected to submit all assignments and projects on time. Unless otherwise noted, assignments are due on Mondays at 11:59 p.m. In cases of extenuating circumstances, such as illness or family emergencies, students must notify the instructor as soon as possible. Late work without prior approval will incur a penalty of up to 10% (10 points out of 100) per day. Students who anticipate difficulties with assignments are strongly encouraged to contact the instructor early for guidance and support.

Course Incomplete Grade

The UNT Graduate Catalog (https://registrar.unt.edu/grades/incompletes) describes and explains grading policies. A grade of Incomplete (I) will be given only for a justifiable reason and only if the student is passing the course. The student is responsible for meeting with the instructor to request an incomplete and discuss requirements for completing the course. If an incomplete is not removed within the time frame agreed to by instructor and student, the instructor may assign a grade of F.

Attendance Policy

Students are encouraged to attend class sessions and are required to participate in online meetings when scheduled; updates regarding such meetings will be posted in the course announcements. Please check announcements regularly to stay informed about class meetings, to make the most of each session, please preview the readings beforehand and prepare any questions for discussion.

Class Participation

Students are expected to actively participate in the online discussions. While participation is not graded, students should check Canvas regularly for course content and announcements and share brief weekly takeaways that reflect their learning and insights.

Students' Responsibility for Their Learning

To achieve the above learning objectives, students are expected to study 9 - 12 hours per week for this course.

Syllabus Change Policy

Any changes to the syllabus will be notified to the students via announcements on Canvas and/or emails from the instructor.

UNT POLICIES

Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT 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 at disability.unt.edu.

Course Safety Procedures (for Laboratory Courses)

Students enrolled in [insert class name] are required to use proper safety procedures and guidelines as outlined in UNT Policy 06.038 Safety in Instructional Activities. While working in laboratory sessions, students are expected and required to identify and use proper safety guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Students should be aware that the UNT is not liable for injuries incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider Standard Syllabus Statements Related Policy 06.049 Course Syllabi Requirements obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.

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 Blackboard for contingency plans for covering course materials.

Optional UNT Policies Statements

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 Blackboard 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. The Code of Student Conduct can be found at deanofstudents.unt.edu/conduct.

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 e-mail: eagleconnect.unt.edu/

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 [insert administration dates] 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 at http://spot.unt.edu/ or email spot@unt.edu.

Sexual Assault Prevention

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

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 videoconference 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.

   Example: This course employs lecture capture technology to record class sessions. Students may occasionally appear on video. The lecture recordings will be available to you for study purposes and may also be reused in future course offerings.

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.

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 at 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, it is the student's responsibility 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.