

INFO 5709: Data Visualization and Communication (Spring 2023)

Instructor Information

Name: Dr. Lingzi Hong
Email: lingzi.hong@unt.edu
Phone Number: 919-260-7578
Office Location: E292E Discovery Park
Teaching Assistant: Xinchun Yu (XinchunYu@my.unt.edu)

Course Description, Structure, and Objectives

This course is designed to enable students to combine statistical methods and graphic-centered computer-based treatment of structured and unstructured data. It includes theoretical considerations to visual design as well as practical computer scripting that will enable students to use visualization techniques and the necessary tools to visualize large sets of data and facilitate visual analysis.

Well-designed Data Visualization would improve comprehension, memory, inference, and decision making. This course introduces techniques, algorithms, and tools for creating effective data visualizations based on principles and techniques from graphic design, visual art, perceptual psychology, and cognitive science. Emphasis is placed on the identification of patterns, trends, and differences among data sets.

Required/Recommended Materials

Course website: <https://unt.instructure.com/courses/70363>

Textbooks:

- Tufte, E. R. (2001). The visual display of quantitative information (Vol. 2). Cheshire, CT: Graphics press. ISBN: 9780961392147 (required).
- Munzner, T. (2014). Visualization Analysis and Design. A K Peters Visualization Series, CRC Press. (required)
- Knaflic, C. N. (2015). Storytelling with data: A data visualization guide for business professionals. John Wiley & Sons. (optional)

Required Technology: Laptop - We will do lab exercises during most classes. Any reasonably current operating system can be used.

How to Succeed in this Course

While I want to make myself as available as possible to each of you, I do have to place some limitations on when I can be contacted. I would prefer that most general questions go through the Q & A forum in the Discussion Board area. If you have a general question about the course or assignments, please post it there. Either I will answer it, or, one of your classmates will. This way we can all benefit from questions asked, and they can be answered in a venue that the whole class can see. You may also want to find someone in class to be a "buddy" with. This will give you at least one other person who you can email with questions.

If you have a private question, please contact me via email and I will respond within 24 hours on weekdays (usually sooner). Please do not expect a response over the weekend. Please use my phone number as a last resort - but, also, please use it if you need to!

Office hours offer you an opportunity to ask for clarification or find support with understanding class material. Come visit me! I encourage you to connect with me and/or my TA for support. Additional office hours, in person and virtually, will be offered by appointment. Don't feel nervous to come to the office hours. If you have difficulties in understanding the course content, different opinions about quiz answers, or don't know how to complete your lab assignments, please come to visit. Successful students in this course usually come to my office hours frequently. Please utilize office hours and other academic resources as much as you can. Your success is our goal!

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable 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 reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the [Office of Disability Access](http://www.unt.edu/oda) website (<http://www.unt.edu/oda>). You may also contact ODA by phone at (940) 565-4323.

Supporting Your Success and Creating an Inclusive Learning Environment

I value the many perspectives students bring to our campus. Please work with me to create a classroom culture of open communication, mutual respect, and inclusion. All discussions should be respectful and civil. Although disagreements and debates are encouraged, personal attacks are unacceptable. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together.

Assessing Your Work

Assessments

A student's grade is composed of the following:

- Participation in online discussion (5%)
- Knowledge assessment (20%)
- Practical assignment (40%)
- Final project paper and presentation (35%)

Grading

Participation in online discussion (5%). Students are required to participate in online discussions, either post questions or contribute to ideas to solve questions.

Knowledge assessment (20%). Students are required to complete 12 quizzes based on course content. The quizzes are designed to test whether students have read textbooks and watched lectures in time, and whether they have grasped the knowledge covered in the lectures. There are extra points. A few mistakes in quizzes are allowed.

Practical assignment (40%). The class will have 10 lab assignments. The assignments are designed to help students understand important concepts, methods to work with different types of data and gain hands-on experience of using Tableau or other tools for data manipulation and visualization.

Final project paper and presentation (35%). At the end of this semester, students are required to work on a data visualization project independently, write a paper on the project and record a video presentation for the project.

Total Points Possible for Semester/Grading Scale = 1000

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

Final Examination

The final grade is calculated based on grade points of online discussions, assignments, labs, quizzes, and term project. NO final exam is given this time.

Course Requirements/Schedule

The contents of the course are organized into 14 weeks. Please refer to Table 1 for lessons, topics. Table 2 lists the preliminary schedule. It will be updated according to progress – do not depend on this version for assignment due dates, instead refer to the assignment due dates on canvas.

Table 1. Schedule of Lessons

Academic Week	Topics	Study Focus
1	Introduction	Lesson 1, Lab 1
2	Graphical Excellence	Lesson 2, Lab 2
3	Graphical Integrity	Lesson 3, Lab 3
4	Fundamentals	Lesson 4, Lab 4
5	Data and Image Models 1	Lesson 5, Lab 5
6	Data and Image Models 2	Lesson 6, Lab 6
7	Exploratory Data Analysis	Lesson 7, Lab 7
8	Spatial Layout	Lesson 8, Lab 8
9	Text and Time	Lesson 9, Lab 9
10	Multidimension and Graphs	Lesson 10, Lab 10
11	User Interaction and Collaboration	Lesson 11
12	Evaluation	Lesson 12
13	Review 1	Final Project
14	Review 2	Final Project

Lesson 1:

- Download [Tableau](#): Register with your student email (end with unt.edu), you will get one year free trial.

- Steven Johnson, [How the Ghost Map Helped End a Killer Disease](#) at TedSalon2006, 2006.
- Matejka, Justin, and George Fitzmaurice. Same stats, different graphs: generating datasets with varied appearance and identical statistics through simulated annealing. Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems. ACM, 2017.
- Hans Rosling, [Let my Dataset Change your Mindset](#) at TED@State, 2009.
- Laramee, Robert S, How to read a visualization research paper: Extracting the essentials. Computer Graphics and Applications, IEEE 31.3 (2011): 78-82.
- Segel, Edward, and Jeffrey Heer. Narrative visualization: Telling stories with data." IEEE transactions on visualization and computer graphics 16.6 (2010): 1139-1148.

Lesson 2 & 3:

- Tufte, E. R. (2001). The visual display of quantitative information (Vol. 2). Cheshire, CT: Graphics press. ISBN: 9780961392147

Lesson 4 - 9:

- Cynthia Brewer, [ColorBrewer: Color Advice for Maps](#)
- David Borland and Russell M. Taylor II, Rainbow Color Map (Still) Considered Harmful, CG & A, March/April 2007 (vol. 27 no. 2), pp. 14-17
- Munzner, T. (2014). Visualization Analysis and Design. A K Peters Visualization Series, CRC Press.

Lesson 10:

- YH Fua, MO Ward, and IA Rundensteiner (1999), Hierarchical Parallel Coordinates for Exploration of Large Datasets, Proceedings of IEEE Visualization '99, pp. 43-50.
- Stolte, C., Tang, D., and Hanrahan, P., Polaris: a system for query, analysis, and visualization of multidimensional databases, Commun. ACM 51, 11 (Nov. 2008), 75-84.
- Mark A. Livingston, Jonathan W. Decker, Evaluation of Trend Localization with Multi-Variate Visualizations. IEEE Trans. Vis. Comput. Graph. 17(12): 2053-2062 (2011)

Lesson 11:

- Andy Cockburn, Amy Karlson, and Benjamin B. Bederson. A review of overview+detail, zooming, and focus+context interfaces. ACM Computing Surveys 41(1), pp. , 2008.
- Jack J. van Wijk and Wim A.A. Nuij, Smooth and Efficient Zooming and Panning, Proc. InfoVis 2003, p. 15-22
- Beth Yost and Chris North (2006), The Perceptual Scalability of Visualization, IEEE Transactions on Visualization and Computer Graphics, vol. 12, no. 5, pp. 837-844.
- Jonathan C. Roberts. On Encouraging Multiple Views for Visualization. In IEEE Information Visualization, pages 8-14, July 1998.

Lesson 12:

- Robert Kosara, Christopher G. Healey, Victoria Interrante, David H. Laidlaw, and Colin Ware. User Studies: Why, How, and When?. IEEE Comput. Graph. Appl. 23, 4 (July 2003), 20-25.

- Ben Shneiderman, Catherine Plaisant, Strategies for evaluating information visualization tools: multi-dimensional in-depth long-term case studies, BELIV '06 Proceedings of the 2006 AVI workshop on BEyond time and errors: novel evaluation methods for information visualization.
- Tory, M., Moeller T. Evaluating Visualizations: Do Expert Reviews Work? IEEE Computer Graphics and Applications, 25(5), 2005, 8-11.
- Heidi Lam, Enrico Bertini, Petra Isenberg, Catherine Plaisant, Sheelagh Carpendale, Empirical Studies in Information Visualization: Seven Scenarios, TVCG, December 2011

Note

Students will be notified by Eagle Alert if there is a campus closing that will impact a class and describe that the calendar is subject to change, citing the [Emergency Notifications and Procedures Policy \(PDF\)](https://policy.unt.edu/sites/default/files/06.049_Standard%20Syllabus%20Policy%20Statements_supplement.pdf) (https://policy.unt.edu/sites/default/files/06.049_Standard%20Syllabus%20Policy%20Statements_supplement.pdf).

Course Policies

Assignment Policy

Students should submit the assignments and term project reports at class site in canvas.unt.edu.

Late Work and Missed Work

Students are expected to submit assignments and projects on time. If an extenuating circumstance such as a medically diagnosed illness or family emergency arises, which prevents you from submitting your assignments, you should contact the instructor and the TA as soon as possible before the due date. Late work without the permission of the instructor will receive a grade with a 10% penalty (or 10 points out of 100) per day after the due date. A student who is having trouble with assignments is strongly encouraged to contact the instructor and the TA as early as possible for personal advising.

Grade Dispute

Your grade is determined by your performance on the learning assessments and is assigned individually (not curved). All assessment scores will be posted on the course page. If you would like to review any of your grades, or have questions about how something was scored, please email me to schedule a time for us to meet online. Any grade disputes must be submitted in writing and within one week of receiving the grade.

Instructor Responsibilities and Feedback

- Helping students grow and learn
- Providing clear instructions for projects and assessments
- Answering questions about assignments
- Identifying additional resources as necessary
- Providing grading rubrics
- Reviewing and updating course content
- The instructor and TA will respond to students' emails and questions posted to the discussion boards within two days except for the weekends
- Assignments grades and feedbacks will be returned to the students within one week after the submission deadline.

Course Incomplete Grade

The UNT Graduate Catalog (<http://catalog.unt.edu/index.php?catoid=16>) 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.

Withdrawal

The UNT Graduate Catalog (<http://catalog.unt.edu/index.php?catoid=16>) describes and explains withdrawal policies and deadlines. The UNT semester course schedule lists specific deadlines regarding withdrawal. A grade of Withdraw (W) or Withdraw-Failing (WF) will be given depending on a student's attendance record and grade earned. Please note that a student who simply stops attending class and does not file a withdrawal form may receive an F.

Attendance Policy

Research has shown that students who attend class are more likely to be successful. You should attend every class unless you have a university excused absence such as active military service, a religious holy day, or an official university function as stated in the [Student Attendance and Authorized Absences Policy \(PDF\)](https://policy.unt.edu/sites/default/files/06.039_StudAttandAuthAbsence.Pub2_.19.pdf) (https://policy.unt.edu/sites/default/files/06.039_StudAttandAuthAbsence.Pub2_.19.pdf). If you cannot attend a class due to an emergency, please let me know. Your safety and well-being are important to me.

Attendance for students during COVID

Students are expected to attend class meetings regularly and to abide by the attendance policy established for the course. It is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community. If you are experiencing any [symptoms of COVID](https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) (<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Team at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.

Students' Responsibility for Their Learning

The students are required to follow course schedule and finish the class work, assignments, and term projects. Students are expected to study at least 15 hours per week to achieve satisfactory class performance.

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.

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.

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/.

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.