

PSYC 5710
Quantitative Methods II
Spring 2023
Tuesdays/Thursdays 2-3:20pm on Zoom:
<https://unt.zoom.us/j/83486940586>

LECTURE

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Office Hours: By appointment

Lecture Meets: Tuesdays and Thursdays, 2-3:20PM, on Zoom:

Join Zoom Meeting: <https://unt.zoom.us/j/83486940586>

Meeting ID: 834 8694 0586

One tap mobile: +13092053325,,83486940586# US

LAB

Teaching Fellow: Minqi (Will) Pan; minqipan@my.unt.edu

Tuesday 5-6:50pm; GAB 550

(See separate lab syllabus for more details)

Course Description

This is the second semester of the statistics sequence for graduate students in psychology. The overarching goal of this course is for you to master basic quantitative methods used in the social sciences. This would be at a level sufficient for you to carry out basic analyses for a thesis or dissertation. There is no way we will cover everything you will eventually need to know for your particular research, but we will lay the groundwork to facilitate you learning more advanced methods on your own. Students entering this course are expected to already have a firm grasp of basic quantitative methods, including basic experimental design and the family of techniques associated with analysis of variance and simple regression. The basic topics that will be covered in depth during this semester include simple and multiple regression, logistic regression, reliability and validity, and factor analysis. We will also cover more advanced topics, such as structural equation modeling and multilevel modeling.

Course Goals

The main goals of this course are to provide the background in advanced statistics and research methods to enable students to design appropriate studies and conduct statistical tests to answer their research questions. Additionally, the course aims to help students understand the methods and statistics used commonly used in their research areas. The course begins with a review of reliability and validity, simple and multiple linear regression, and mediation and moderation. Then we will cover more advanced topics such as power analyses, missing data, factor analysis, structural equation modeling, and multilevel modeling. Coverage of each topic will focus on breadth, rather than depth, so that students may be exposed to multiple topics that can be further explored in additional courses.

Software

Most of the demonstrations in lab will be with SPSS, but I will supplement these with demonstrations in R in the lectures. Whenever possible, I will try to provide examples in both. The textbook has both an SPSS and an R version. Students are welcome to use whichever program they prefer for assignments.

Lab

All students are required to attend an additional two-hour lab each week. These labs will be directed by teaching fellows and focus on the application of concepts discussed in class using computer software, primarily SPSS (but also R and SAS). Lab hours and TF contact information will be provided during your lab. If you have any questions about the expectations regarding labs, please direct these to your TF, as they are the instructors for the lab. You will receive a grade for the work you do associated with the lab (see **Course Grading** section on page 2-3). Your homework will be part of these labs. TFs will explain in more detail how your lab grade will be assigned. In general, however, you will be expected to complete lab homework assignments and to actively participate in the lab. Several of your lab assignments will require that you analyze and interpret data sets and then report them using the style of the American Psychological Association (APA) 7th edition manual. These will be closely graded and critiqued. These assignments are meant to mimic the process of writing up results for your thesis/dissertation or for publication. TFs will announce when assignments are due.

Course Grading

The course grading structure is outlined below. The graded course components involve: 1) lab assignments, 2) a poster, and 3) a short final paper, totaling 500 points:

- **Lab assignments:** The lab assignments will be assigned and graded weekly by your TF. Together, the lab assignments will be worth a total of 40% of your overall grade for the course. Please consult the separate lab syllabus provided by your TF for more information about this component of the course.
- **Poster:** The poster will be worth 100 points, or 20% of your overall grade. The poster will be a continuation of the project in the first semester. By this point, you should have a cleaned dataset and the general idea for a research question. For this semester, you will be tasked with implementing some of the analyses with your data. You may choose any statistical technique of your choice. This may require you to modify your original research question in order to make it appropriate for your chosen statistical analysis. Furthermore, as you learn more statistical procedures, you may wish to modify your original question. The poster can serve as a means to outline your final paper. It should contain information on the background literature/rationale, methods, results, and discussion of results, but otherwise may be in any format of your choice. Posters will be presented in lab (see lab syllabus).
- **Final paper:** The final paper will be worth 200 points, or 40% of your overall grade. The final paper will involve a ~5-page paper on a topic of your choice, using any of the methods covered in class (1 pg. for intro, 2-3 pgs. for methods and results, and 1 pg. for discussion). This can be the same analysis or a different analysis than what you choose to present for your poster. Overall, I would highly recommend choosing a dataset and topic that is of interest to you, so that you may be able to use this paper as a starting point for an actual publication or thesis/dissertation. If you do not have a dataset, below are some links to publicly available datasets:
 - <https://www.apa.org/research/responsible/data-links>
 - <https://guides.library.ucla.edu/psychology/data>
 - <https://www.apa.org/science/about/psa/2018/06/publicly-available-data>
 - <https://hrs.isr.umich.edu/data-products>
 - <https://www.pathwaysstudy.pitt.edu/>
 - <https://datasetsearch.research.google.com/>

Course points breakdown

Course Component	Points	Percentage of Grade
Lab Assignments	200	40%
Poster	100	20%
Final Paper	200	40%
Total	500	100%

<u>Score</u>	<u>Grade</u>
90-100%	A
80-89%	B
70-79%	C
60-69%	D
<60%	F

COVID-19 Considerations

As a result of COVID-19, I acknowledge we are all facing additional stressors that can make it hard to focus. Your priority should be maintaining your health, well-being, and safety—not this class. If you ever need accommodations at any point, please let me know. I will be flexible with course grading and expectations.

If you are experiencing any symptoms of COVID-19, 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.

UNT encourages everyone to wear a face covering when indoors, regardless of vaccination status, to protect yourself and others from COVID infection, as recommended by current CDC guidelines. Face covering guidelines could change based on community health conditions.

If you need help in this course for any reason: Please send me an email. I want to hear what you're experiencing and will do my best to work with you to find an appropriate solution. Both UNT and I believe it is important to foster an environment that encourages students to maintain a standard of responsibility for self-care, which includes the ability to respond adequately to one's emotional, physical, and educational needs. If you are experiencing physical or emotional distress which adversely affects your ability to succeed in class, please see me as soon as possible. I will strive to direct you toward the appropriate resources so you can succeed.

Some UNT resources that may be helpful:

- Counseling Services: <https://studentaffairs.unt.edu/counseling-and-testing-services/services>
- Student Health and Wellness Center: <https://studentaffairs.unt.edu/student-health-and-wellness-center#programs>
- Psychology Clinic: <https://psychology.unt.edu/clinics-and-centers/psychology-clinic/>
- Substance Use Resource and Education Center: <https://studentaffairs.unt.edu/sure-center>
- CARE Team: <https://studentaffairs.unt.edu/care>

Other UNT Policies

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 \(https://disability.unt.edu/\)](https://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. Visit UNT's [Code of Student Conduct \(https://deanofstudents.unt.edu/conduct\)](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 e-mail [Eagle Connect \(https://it.unt.edu/eagleconnect\)](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 \(http://spot.unt.edu/\)](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.

Course Recordings

Synchronous sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester. Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.

Optional Textbooks

For basic statistics concepts and an overview of multivariate techniques:

- **(R version):** Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage Publications.
- **(SPSS version):** Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage Publications.
- Dugard, P. (2010). *Approaching Multivariate Analysis, 2nd Edition: A Practical Introduction*. Routledge.

For multilevel modeling:

- Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. Guilford Press.

For structural equation modeling:

- Kline, R.B. (2011). *Principles and practice of structural equation modeling* (3rdnd edition). New York: Guilford Press.
- Schumaker, R.E. & Lomax, R.E. (2004). *A beginner's guide to structural equation modeling* (2nd edition). Mahwah, NJ: Erlbaum.

Online tutorials on advanced data analyses in R:

- <https://quantdev.ssri.psu.edu/tutorials> (various types of longitudinal analyses using R)
- <http://lavaan.ugent.be/> (structural equation modeling using lavaan R package)

Recommended Readings

1. **Reliability:** Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment*, 8, 350-353.
2. **Validity:** Clark, L.A. & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7 (3), 309
3. **Validity:** Campbell, D.T., & Fiske D.W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105
4. **Validity:** Smith GT, McCarthy DM, Zapolski TC. (2009). On the value of homogeneous constructs for construct validation, theory testing, and the description of psychopathology. *Psychological Assessment*, 21:272-84.
5. **Moderators and mediators:** PA Frazier, AP Tix, KE Barron (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*.
6. **Moderators and mediators:** Baron, R.M. & Kenny, DA. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.
7. **Moderators and mediators:** Holmbeck, GN. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology*, 65(4), 599-610.
8. **Multicollinearity:** Kraha A, Turner H, Nimon K, Zientek LR, Henson RK. (2012). Tools to support interpreting multiple regression in the face of multicollinearity. *Frontiers in Psychology*, 14;3:44
9. **Significance testing:** Schmidt, FL. (1996). Statistical significance testing and cumulative knowledge in psychology: Implications for training of researchers. *Psychological Methods*, 1, 115-129.
10. **Power analysis:** Thoemmes F, Mackinnon DP, Reiser MR. (2010). Power Analysis for complex mediational designs using Monte Carlo methods. *Structural Equation Modeling*. 2010;17(3):510-534
11. **Multilevel modeling:** Tasca, G. A., & Gallop, R. (2009). Multilevel modeling of longitudinal data for psychotherapy researchers: I. The basics. *Psychotherapy Research*, 19(4-5), 429-437.
12. **Structural equation modeling:** Ullman, J. B. (2006). Structural equation modeling: Reviewing the basics and moving forward. *Journal of Personality Assessment*, 87(1), 35-50.
13. **Effect sizes:** Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863.
14. **Reproducible science:** Klein, O., et al. (2018). A Practical Guide for Transparency in Psychological Science. *Collabra: Psychology*, 4, 20.
15. **Reproducible science:** Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, 349, aac4716.
16. **Measurement:** Flake JK, Fried EI. Measurement schmeasurement: Questionable measurement practices and how to avoid them. *Advances in Methods and Practices in Psychological Science*. 2020;3(4):456-465.
17. **Missing data:** Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60, 549-576.

Tentative Course Schedule

*NOTE: The syllabus and schedule may be modified; changes will be announced in class and on Canvas. Additional required readings may also be announced in class and posted to Canvas.

Date	Topic	Assignment due	Recommended Reading #
Tue., Jan. 17	1. Introduction to Course: Why do we need statistics?		9
Thu., Jan. 19	2. Introduction to R, Part 1		14-15
Tue., Jan. 24	3. Introduction to R, Part 2		14-15
Thu., Jan. 26	4. Reliability and Validity		1-4, 16
Tue., Jan. 31	5. ANOVA and MANOVA		
Thu., Feb. 2	6. Review of Simple Regression		
Tue., Feb. 7	7. Regression Assumptions	TOPIC FOR POSTER DUE (on Canvas)	
Thu., Feb. 9	8. Multiple Regression		
Tue., Feb. 14	9. Multiple Regression		
Thu., Feb. 16	10. Regression Diagnostics: Multicollinearity		8
Tue., Feb. 21	11. Regression Diagnostics: Outlier Analyses		
Thu., Feb. 23	12. Categorical Predictors in Regression		
Tue., Feb. 28	13. Moderation		5-7
Thu., Mar. 2	14. Moderation		5-7
Tue., Mar. 7	15. Mediation		5-7
Thu., Mar. 9	16. Mediation		5-7
Tue., Mar. 14	NO CLASS – Spring Break	POSTER DUE (on Canvas)	
Thu., Mar. 16	NO CLASS – Spring Break		

Date	Topic	Assignment due	Recommended Reading #
Tue., Mar. 21	17. Hierarchical and Curvilinear Regression		
Thu., Mar. 23	18. Logistic Regression		
Tue., Mar. 28	19. Logistic Regression		
Thu., Mar. 30	20. Power Analysis		10, 13
Tue., Apr. 4	21. Power Analysis	TOPIC FOR FINAL PAPER AND IDENTIFICATION OF DATASET DUE (on Canvas)	
Thu., Apr. 6	22. Missing Data		17
Tue., Apr. 11	23. Exploratory Factor Analysis		
Thu., Apr. 13	24. Confirmatory Factor Analysis		
Tue., Apr. 18	25. Structural Equation Modeling		12
Thu., Apr. 20	26. Structural Equation Modeling		12
Tue., Apr. 25	27. Multilevel Modeling		11 and Bolger & Laurenceau, Ch 1-4
Thu., Apr. 27	28. Multilevel Modeling		11 and Bolger & Laurenceau, Ch 1-4
Tue., May. 2	29. Multilevel Modeling		11 and Bolger & Laurenceau, Ch 1-4
Thu., May. 4	30. Consultations for final papers		
Tue., May. 9	NO CLASS	FINAL PAPER DUE (on Canvas)	