

PSYC 5405: Advanced Statistics I

Fall 2023

Lecture: Tuesday/Thursday 11:00 AM – 12:20 PM – LS 318

Lab: Friday 8:00 AM – 10:50 AM – LS 318

Instructor Information

Instructor(s)

Dr. Amandeep Dhaliwal

Office Number

Life Science 519

Email Address

Amandeep.dhaliwal@uta.edu

Official communication from UTA to you will come only through your UTA e-mail box.

Faculty Profile

<https://www.uta.edu/academics/faculty/profile?username=dhaliwalas>

Office Hours

Tuesday/Thursday: 1 pm – 3 pm, or via appointment.

Teaching Assistants: TBA

Email: TBA

Office Hours: TBA

Course Information

Section Information

PSYC 5405-001 (80954)

Time and Place of Class Meetings

Lecture: Tuesday/Thursday 11 AM – 12:20 PM in LS 318

Lab: Friday 8 AM – 10:50 AM in LS 318

Description of Course Content

This course offers an in-depth practical and conceptual approach to fundamental descriptive and inferential statistics used in psychological research. This course consists of learning a variety of procedures commonly used for testing hypotheses in psychological research, learning to examine and analyze the data accordingly, and learning to communicate the research results to the scientific community.

Student Learning Outcomes

1. Students will demonstrate a comprehensive understanding of advanced statistical concepts, including multivariate analysis, hierarchical modeling, and non-parametric methods.
2. Students will gain proficiency in using statistical software packages such as SPSS, R, or Python to conduct complex data analyses.
3. Students will develop the ability to select appropriate statistical techniques based on research questions, data type, and assumptions of the analysis.
4. Students will learn to critically evaluate and interpret statistical results, including effect sizes and measures of uncertainty, to draw meaningful conclusions from data.
5. Students will be able to design and implement advanced research studies, incorporating appropriate statistical controls and addressing potential confounding variables.
6. Students will gain an understanding of the assumptions underlying different statistical tests and how to assess and deal with violations of these assumptions.
7. Students will be able to apply advanced statistical techniques to various types of data, including longitudinal data, multilevel data, and categorical data.
8. Students will develop the skills to communicate statistical findings effectively through written reports, visualizations, and oral presentations.
9. Students will engage with primary research literature in behavioral sciences, analyzing and critiquing research articles that utilize advanced statistical methods.
10. Students will acquire the knowledge and ethical considerations required for responsible and transparent use of advanced statistical techniques in behavioral research.

Required Textbooks and Other Course Materials

1. Lomax, R. G. & Hahs-Vaughn, D. (2020). *An introduction to statistical concepts* (4th ed.). New York, NY: Routledge. ISBN-13: 978-1138650558
2. *Publication Manual of the American Psychological Association* (7th edition). Washington, D.C.: American Psychological Association. ISBN: 978-1-4338-3215-4
3. Additional required readings available on Canvas
4. A calculator with statistical functions
5. Access to a computer with a webcam and SPSS and R statistical software. Webcams will be used with Respondus Lockdown Browser. SPSS, the statistical software, is available for free for all students enrolled at the University of Texas at Arlington through OIT and compatible with PC and Mac operating systems. Additionally, computers are available in the OIT Labs, library computers, and on most Departmental desktops (see UTA.edu for hours of operation). SPSS will be used in the lecture and lab, but students can use another statistical software program if they choose. R is an open source software package that can be downloaded for free from <https://posit.co/download/rstudio-desktop/>

Note: This course will be computer/internet intensive. You will need a personal device (desktop, laptop, smartphone, tablet, etc.) or access to a UT Arlington computer lab so you can access Canvas and Microsoft Teams regularly and participate in class effectively. If you do not own a computer, please make arrangements to rent one through the UTA library or to access and use the computers available to you on campus during lab and lecture times.

Descriptions of major assignments and examinations

Exams (2, 100 pts each): There will be two examinations, a midterm and final exam, that will each be given in two parts. For Part I, you will be given questions that assess your conceptual knowledge of the concepts that were covered in the class and lab. Part I of the exam will be a combination of multiple-choice and short answer questions given through Respondus LockDown Browser with Monitor and will focus on data screening, selection of statistical analyses, variable characteristics, and analyses. For Part II, you will be provided with data sets and required to analyze and interpret the data. You will be required to write up your answers in APA style. Only work and materials uploaded before the submission deadline will be graded. Work submitted after the deadline will not be graded.

In-Lab Assignments (ILAs; 13, 100 pts each): Lab attendance is mandatory. You are expected to be in lab for the entirety of the class period. Lab is an experiential, hands-on experience (i.e., flipped classroom). You are expected to come to the lab prepared, having read lab assignments, reviewed lecture notes, and completed the necessary readings. Students have been assigned to a lab group of prior to the semester beginning. During each weekly lab, you and your teammates will be assigned a role within the group and together, you will complete the in-lab assignments (ILAs). Laboratory assignments are designed to be completed during each lab and must be submitted to Canvas at the end of the lab. Beyond University excused absences (see **Make-Up Work** policy), there are no make-up opportunities for missed in-lab assignments. If you are not present for the lab assignment, you will receive a grade of a zero, even if your group completes the assignment without you.

Homework (12, 100 pts each): In addition to In-Lab Assignments, each week you will be responsible for individual homework. Each homework assignment will be completed by the following week in which it is assigned. All homework assignments will be submitted via Canvas by 11:59PM on the date that it is due. No late homework will be accepted.

Attendance/Participation (100 pts): Participation in lecture and lab is expected and will be determined by your instructor and teaching assistants. You will be evaluated on your attendance, participation in class discussions, responses to polling questions, and your teammate assessment.

Quizzes (10, 100 pts each): Frequently testing your understanding of course material and concepts is key component to academic success and retention of information. All students are responsible for keeping up with reading the assigned materials and participating in class activities. As such, you will have weekly quizzes over the readings, lab, and/or class lectures. The quizzes will evaluate your understanding of the previous weeks' material. Some of the questions on the quizzes may even be taken straight from homework questions. Quizzes will be completed online through Canvas using Respondus LockDown Browser. Students will have two attempts to take each quiz, and the final quiz grade will be an average of the two attempts. Students will have a week to attempt the quiz. Quizzes will open after class on Thursdays and are due the following Thursday throughout the semester as indicated on the **Course Schedule**. Beyond University excused absences (see **Make-Up Work** policy), there are no make-up opportunities for missed quizzes.

Grading

Grade: You will receive one course grade for your combined performance in the lecture and laboratory. All exams, in-lab and homework assignments, and quizzes in this course will be graded on a 100-point

scale, scored based on percentage correct, averaged together, and then weighted accordingly (see table below).

Assignment	Percentage of Final Grade
Exams (2)	40%
In-Lab Assignments (13)	25%
Quizzes (10)	20%
Homework (12)	10%
Attendance/Participation	5%
Total:	100%

Final Grades: Final grades will be assigned based on the following:

Percentage	Letter Grade
100 – 90.0%	A
80.0 – 89.9%	B
70.0– 79.9%	C
60.0– 69.9%	D
< 59.9%	F

Institutional Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the [Institutional Information](https://resources.uta.edu/provost/course-related-info/institutional-policies.php) page (<https://resources.uta.edu/provost/course-related-info/institutional-policies.php>) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Face Covering Policy

Face coverings are not mandatory, all students and instructional staff are welcome to wear face coverings while they are on campus or in the classroom.

Attendance

At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, attendance is mandatory. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to verify Federal Student Aid recipients' attendance in courses. UT Arlington instructors should be prepared to report the last date of attendance as part of the final

grading process. Specifically, when assigning a student a grade of F, faculty must report the last date a student attended their class based on evidence of academic engagement such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Emergency Exit Procedures

Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Course Policies and Important Things to Know

Expectations for Out of Class Study: A general rule of thumb is this: for every credit hour earned, an undergraduate student should spend 3 hours per week working outside of class during a regular 15-week semester. Hence, a 4-credit course might have a minimum expectation of 12 hours of reading, study, etc. *each week* for a 15-week semester. Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend *at least* an additional 12 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, taking exams, doing out-of-class assignments, etc.

Make-Up Work: Lecture attendance is required, and lab attendance is mandatory. Make-up and/or late assignments and exams will be granted only for University-approved, documented absences. Routine scheduled activities, such as work, doctor's appointments, vacations, weddings, or other conflicting appointments, will not be considered excused absences. Arrangements to make-up work should be made with me within 48 hours of your absence. You must make-up missed work within 5 working days.

Late Work: Beyond University-approved, documented absences, no late work is accepted in this course. Any missing or late work will receive a grade of a zero.

Respondus Lockdown Browser and Monitor: Quizzes and Exams will be administered on Canvas with an online proctoring service, Respondus Lockdown Browser, which must be downloaded onto the computer/laptop where all exams will be taken. You will need a webcam and the Lockdown Browser software downloaded on your computer or use of a computer lab on campus that has the Lockdown Browser and a webcam. The Lockdown Browser locks down the testing environment in Canvas and requires use of a webcam for students to record the quizzing/testing session. The webcam can be the type that is built into your computer or one that plugs in with a USB cable. *Note:* not all devices (for example Chromebooks) can access Lockdown Browser with Monitor. Please check that you have access to a device on which you can access all required software. Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature:

<https://www.respondus.com/products/lockdown-browser/student-movie.shtml>

Download and install LockDown Browser from this link:

<https://download.respondus.com/lockdown/download.php?id=163943837>

Once Installed:

- Start LockDown Browser
- Log into Canvas

- Note: if you do not follow this order, it will not work properly. This is the first thing to check if you experience a problem.

Cheating, Plagiarism, and Collusion Course Policy: Any student who engages in academic misconduct including cheating, plagiarism, and collusion on any assignment, quiz, or exam will receive a grade of “F” for the entire course. No exceptions. It is the responsibility of the student to understand what plagiarism is, how to avoid it, and how to properly cite your sources. Additional information is available at [Student Conduct](#). Any work presented using previous assignments from other classes/projects is considered academic dishonesty and will not be accepted as gradable material. Any work that is copied directly from classmates or course materials including textbooks and PowerPoints will not be accepted as gradable material. If you are caught plagiarizing, cheating, or colluding on an exam, quiz, homework assignment, or other independent work, you will receive a grade of “F” for the entire course and be reported to the University.

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. –Aman Dhaliwal, Ph.D.

Course Schedule

Lecture Schedule

Week	Date	Lecture Topic	Readings
1	T 8/22	Course Overview & Statistics Basics	L&H Ch. 1-3
	Th 8/24	Population Parameters & Sample Statistics	
2	T 8/29	The Normal Distribution, Data Screening, & Transformations	L&H Ch. 4 T&F Ch. 4 (Canvas)
	Th 8/31		
3	T 9/5	Probability & Sample Statistics	L&H Ch. 5
	Th 9/7	Sampling Distributions & Hypothesis Testing	L&H Ch. 6
4	T 9/12	Hypothesis Testing: z-test	
	Th 9/14	Introduction to the <i>t</i> Distribution	
5	T 9/19	Inferences About the Difference Between Two Means: <i>t</i> -tests	L&H Ch. 7
	Th 9/21		
6	T 9/26	Inferences About Proportions: Chi-Square	L&H Ch. 8
	Th 9/28		
7	T 10/3	Bivariate Measures of Association: Correlation & Prediction	L&H Ch. 10
	Th 10/5		
8	T 10/10	Introduction to Linear Regression	L&H Ch. 17
	Th 10/12	MIDTERM EXAM	
9	T 10/17	One-Factor Analysis of Variance (ANOVA)	L&H Ch. 11
	Th 10/19		
10	T 10/24	Multiple Comparison Procedures	L&H Ch. 12
	Th 10/26		
11	T 10/31	Trends & the Linear Model	L&H Ch. 12
	Th 11/2	Factorial ANOVA	L&H Ch. 13
12	T 11/7	Factorial ANOVA	L&H Ch. 13
	Th 11/9		
13	T 11/14	Repeated Measures ANOVA	L&H Ch. 15, pp. 700-708; 723-731
	Th 11/16		
14	T 11/21	Multivariate Approaches to Repeated Measures	T&F Ch. 8 (Canvas)
	Th 11/23		
15	T 11/28	Mixed ANOVA	L&H Ch. 15, pp. 708-716; 734- 747
	Th 11/30		
16	T 12/5	Hypothesis Generation	
	Th 12/7	FINAL EXAM 11 AM – 1:30 PM	

Lab Schedule

Week	Date	Lab Exercises/Assignments	Assignment Due
1	8/25	Codebook, Database Construction, Data Entry, Checking Data	ILA 1
2	9/1	Data Screening, Descriptive Statistics, Missing Data	HW 1; ILA 2
3	9/8	Probability	HW 2; ILA 3
4	9/15	z-test & Single Sample <i>t</i> -test	HW 3; ILA 4
5	9/22	<i>t</i> -tests	HW 4; ILA 5
6	9/29	Chi-Square	HW 5; ILA 6
7	10/6	Correlation	HW 6; ILA 7
8	10/13	Simple Linear Regression	HW 7; ILA 8
9	10/20	MIDTERM EXAM	
10	10/27	One-way ANOVA & Post-hocs	HW 8; ILA 9
11	11/3	Comparisons and Contrasts	HW 9; ILA 10
12	11/10	GLM Factorial ANOVA	HW 10; ILA 11
13	11/17	GLM RM ANOVA	HW 11; ILA 12
14	11/24	Thanksgiving Break-No lab	
15	12/1	GLM Mixed ANOVA	HW 12; ILA 13
16	12/7	FINAL EXAM	