Course Information:
PSYC 5340 – Advanced Statistics and Design
Fall 2026
Wednesday 9:30am – 12:15pm

Instructor Information:
Adam P. McGuire, Ph.D.
Office: HPR 237
Office Hours: 8:00-9:30am, 12:30-2:00pm on Wednesdays or by appointments on Fridays
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Course Catalog Description:
Includes aspects of complex experimental designs, statistical hypothesis testing, decision theory, multiple regression analysis, ANOVA, distribution-free techniques, and factor analysis.

Student Learning Outcomes: As a result of this course, successful students will be able to:

- Identify and articulate the theoretical underpinnings of inferential statistics and experimental design.
- Articulate basic principles of statistical analyses, including measures of central tendency, variability, sampling distributions and hypothesis testing.
- Accurately choose and conduct statistical data analyses, using R software, emphasizing the basic assumptions, appropriate uses, and the interpretation of each.
- Employ qualitative, quantitative, and single-case research methods.

Required Text:

- Learning statistics with R: A tutorial for psychology students and other beginners (Version 0.6) by Danielle Navarro. Available for free:
    - Online version here: https://learningstatisticswithr.com/book/
    - Downloadable pdf here: https://learningstatisticswithr.com/lsr-0.6.pdf

Other texts that are not required, but could be useful resources for anyone looking for more or different ways of explaining these concepts include:

- R for Data Science by Garrett Grolemund and Hadley Wickham (2nd edition). Available for free here: https://r4ds.hadley.nz/
- Discovering Statistics Using R by Andy Field, Jeremy Miles, and Zoë Field (2012). ISBN 13: 9781446200469 (1st edition).

A student at UT-Tyler is not under any obligation to purchase a textbook from a university- affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

Required Software:

- R (https://www.r-project.org/)
- R Studio (https://posit.co/download/rstudio-desktop/)

Grading: 400 points total
Weekly Video Assignments – 18%
Weekly Pop Quiz – 2.5%
Homework Assignments – 27%
Professionalism – 2.5%
Midterm Exam – 20%
Final Exam – 30%

Assignment type	*Points per assignment*	*Number of assignments*	*Brief description*
Weekly Video Assignment:	8 points	9	Watch video lecture before assigned course period and prepare questions
Weekly Pop Quiz:	10 points	1	Pop quiz review questions to be asked at the beginning of every class
Homework Assignment:	12 points	9	Written response to comprehension question
Professionalism:	10 points	1	Participation, timeliness, and effort
Midterm Exam:	80 points	1	Exam with multiple choice and short answer questions
Final Exam:	120 points	1	Set of applied research questions
Ethical Violation:			Will result in significant loss of points & possible failure

Grading Scale

90 – 100%	A	360-400 points
80 – 89%	B	320-359 points
70 – 79%	C	280-319 points
60 – 69%	D	240-279 points
0 – 59%	F	0-239 points

Teaching Strategy: This course will use a "flipped" format in which most of the lectures will be recorded and posted as videos on Canvas. You will be expected to watch all posted videos before the designated week and prepare questions to bring to the in-person class period. By completing the lecture portion between classes, this will allow us to spend scheduled meeting times focusing on answering questions, experiential activities with R/RStudio, problem solving any issues, and engaging in discussions about the analyses and interpretation of results. The flipped format will be used to facilitate comprehension for presented topics. Graded assignments will be used to create opportunities for experiential learning for select a range of analytic strategies and further support comprehension along with the flipped format.

In all aspects of your transition from student to professional, I will be supporting you and challenging you to expand your knowledge base, to increase your breadth and depth of skill, and to improve your attitudes and dispositions related to your work. To provide structure to this assessment the following points have been assigned to portions of your performance. It is my expectation that you can earn an "A" in this class if you demonstrate mastery of the appropriate skills, complete assignments in a timely

fashion, demonstrate an awareness and adherence to ethical decision-making processes, and demonstrate an attitude of seeking excellence in your analytic skills.

Weekly Video Assignment: Video lectures will be posted approximately one week before the designated week when that topic will be covered. You will be expected to watch the full video in advance and prepare any questions beforehand. This is essential to keep pace with the course schedule and to maximize the in-person class meeting times. You will also be expected to write any code demonstrated in the video on your own computer. You will submit your replicated code each week on Canvas as proof that you viewed and engaged with the video (6 points per week; 10 total).

Weekly Pop Quizzes: Weekly Pop Quizzes will be used to assess comprehension of the topics covered in last week's lecture and class discussion. At the beginning of each class, 4 students will be selected at random to answer 1 question each and engage in a discussion about the topic with the instructor during the class period. Every student will be selected a total of 2 times across the semester. These questions will focus on assessing full comprehension of each topic and students will not be notified in advance, so all students should come to class prepared to be called on.

Homework Assignments: Homework will be assigned for each core topic (10 total) that will involve conducting a statistical analysis covered in that lecture. Students will be provided with prompts and will be expected to submit their assignment as a rendered word document or pdf that includes the code for analysis (written in RStudio) and an APA style write-up of results.

Professionalism: You are expected to attend all classes, complete all assignments in a timely manner, participate in all activities and discussions, and follow instructions and guidelines (e.g., AI policy). Additionally, ethical violations and/or unprofessional behavior will result in course failure, an incomplete grade, or other appropriate action. Remediation will be determined by the instructor who will consult with a peer and meet with the student to determine the appropriate response.

Midterm Exam: The midterm exam will include multiple choice questions and short answer questions on the topics covered up to the date of the exam.

Final Exam: The final exam will be a set of applied problems that will involve using learned concepts to identify the appropriate analyses to test a series of hypotheses, produce code for all analyses using RStudio, and produce a report of results and interpretation.

Tentative Topical Outline (subject to change):

Calendar	Week	Topic
8/26	1	Introduction: R and Measurement • In-class Lecture: RStudio & Measurement • Readings: Chapter 2.1 & 2.2 • DUE: Download/install R & RStudio
9/2	2	Exploring Data and Descriptive Statistics • Video Lecture #1 • Readings: Chapter 5.1–5.4, & 5.10 • DUE: Initial dataset collection

9/9	3	Computing Scores and Reliability • Video Lecture #2 • Readings: Chapter 2.3 & Chapter 5.6 • DUE: Homework Assignment #1 – Descriptives
9/16	4	Intro to Graphs: ggplot2 • Video Lecture #3 • DUE: Homework Assignment #2 – Computing Scores and Reliability
9/23	5	Research Designs and Tests of Differences • Video Lecture #4 • Readings: Chapter 2.5, Chapter 11.1–11.7, Chapter 13.1–13.7 • DUE: Homework Assignment #3 – Graphs
9/30	6	Review and Levene's Test • *No Video Lecture* • DUE: Homework Assignment #4 – Comparing Means
10/7	7	Correlations and Effect Sizes • Video Lecture #5 • Readings: Chapter 5.7, Chapter 11.8.2, Chapter 13.8
10/14	8	Tests for Nominal Data; Midterm Prep • Video Lecture #6 • Readings: Chapter 12.1–12.6 • DUE: Homework Assignment #5 – Correlations
10/21	9	Midterm Exam (in class) • DUE: Homework Assignment #6 – Nominal Data
10/28	10	ANOVA (one-way) and Factorial ANOVA • Video Lecture #7 • Readings: Chapter 14.1–14.7, 16.1–16.5, 16.7, 16.8
11/4	11	ANOVA (one-way) and Factorial ANOVA (continued) • DUE: Homework Assignment #7 – ANOVA
11/11	12	Linear Regression • Video Lecture #8 • Readings: Chapter 15.1, 15.2, 15.4–15.10, Chapter 16.6
11/18	13	Multiple Linear Regression • Video Lecture #9 • Readings: Chapter 15.3 • DUE: Homework Assignment #8 – Linear Regression

11/25	14	OFF (THANKSGIVING BREAK)
12/2	15	Final Project Workshop • DUE: Homework Assignment #9 – Multiple Linear Regression
12/9	16	FINALS WEEK • Final Exam DUE

Course Policies and Requirements

Late Policy: All assignments must be turned in on time to receive full credit. Points will be deducted for everyday a submission is late.

Artificial Intelligence (AI) Policy: UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course, I expect all work students submit for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming and writing R code. Deviations from these guidelines will be considered a violation of UT Tyler's Honor Code and academic honesty values.

**The instructor reserves the right to make any changes to the course schedule, content, or assignments as deemed necessary. Students will be notified of any changes to the course immediately.*