Course Information:
PSYC 6341.001 – Multivariate Statistics
Spring 2026
Wednesday 2:00 – 4:45pm

Instructor Information:
Adam P. McGuire, Ph.D.
Office: HPR 237
Office Hours: 11am-2pm on Wednesdays or by appointments on Fridays.
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Course Catalog Description:
Includes study and application of complex multivariate research designs and multivariate statistical analyses such as moderation, mediation, discriminant function analysis, multilevel modeling, structural equation modeling, and factor analysis. **Prerequisite**: PSYC 6340.

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

- Identify and articulate the theoretical underpinnings of multivariate statistical models and designs.
- Articulate advanced principles of multivariate statistical analyses, including multivariate distributions, hypotheses, and analytic methods.
- Accurately choose and conduct multivariate statistical data analyses, using R software, emphasizing the assumptions, appropriate uses, and the interpretation of each.
- Write about the results of multivariate statistical analyses in journal format.
- Design multivariate research studies for use with clinical populations.

Required Text:

- R for Data Science by Garrett Grolemund and Hadley Wickham (2nd edition). Available for free here: https://r4ds.hadley.nz/

Optional:

- Using R With Multivariate Statistics 1st Edition by Randall E. Schumacker ISBN-13: 978-1483377964; ISBN-10: 1483377962

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.

Sample of Additional Readings:

- Nordmann, E., Mcaleer, P., Toivo, W., Paterson, H., & Debruine, L. M. (2021). Data visualisation using R, for researchers who dont use r. https://doi.org/10.31234/osf.io/4huvw
- Papageorgiou, G., Grant, S. W., Takkenberg, J. J., & Mokhles, M. M. (2018). Statistical primer: How to deal with missing data in scientific research? *Interactive Cardiovascular and Thoracic Surgery, 27*(2), 153–158.

Required Text:

- R (https://www.r-project.org/)
- R Studio (https://posit.co/download/rstudio-desktop/)
- G*Power (https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html)

Grading: 500 points total
Weekly Video Assignments – 10%
Topic Quizzes – 24%
Written Assignments – 16%
Professionalism – 5%
Midterm Exam – 20%
Final Exam – 25%

Assignment type	*Points per assignment*	*Number of assignments*	*Brief description*
Weekly Video Assignment:	5 points	10	Watch video lecture before assigned course period and prepare questions
Topic Quizzes	20 points	6	Individual oral quiz for each separate topic with assigned dataset and problem
Written Assignment:	20 points	4	Written response to comprehension question
Professionalism:	25 points	1	Participation, timeliness, and effort
Midterm Exam:	100 points	1	Submit OSF project covering weeks 1-8
Final Exam:	125 points	1	Submit OSF project covering weeks 1-15
Ethical Violation:			Will result in significant loss of points & possible failure

Grading Scale

90 – 100%	A	450-500 points
80 – 89%	B	400-449 points
70 – 79%	C	350-399 points
60 – 69%	D	300-349 points
0 – 59%	F	0-299 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 issue, 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 multivariate 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 receive 5 points if you watch the video before class, or 0 points if you fail to watch the video.

Topic Quizzes: Quizzes will be used to assess comprehension of 6 core topics across the semester. Quizzes will cover an assigned problem with a designated dataset that will be provided at the introduction of that topic. Each student may elect to initiate the quiz at any point during the in-person class period before the deadline (listed on Canvas for each quiz). All quizzes will be an individual oral exam in which each student will be responsible for verbally describing their analysis and results. The quiz will also include answering a series of questions and engaging in discussion with the instructor, which is aimed to assess full comprehension of each topic.

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.

Written Assignments: You will be assigned 4 written assignments with a new prompt for each assignment, which are designed to assess comprehension of key topics including p-values, MANOVA/MANCOVA, and mediation analysis. Each assignment must be a <u>minimum</u> of 2 pages double-spaced and include APA citations to support your arguments.

Midterm and Final Exams: Both midterm and final exams will be based around submitting a unique OSF project that is based on your own research interests (ideally, your thesis or dissertation project). For each exam, you will be expected to upload 1) a dataset, 2) a series of specified Rmd files that will include all the code for cleaning, preparing, and running your data analysis, and 3) a results section written in APA format. In each Rmd file, you will need to provide a description or dictation for all your code that explains what is being done and provide additional text that interprets all results. All Rmd files must be clear, easy to follow, and replicate when downloaded and run by the instructor.

<u>Tentative Topical Outline (subject to change):</u>

Calendar	Week	Topic
1/14	1	Introduction: R Review and Qualtrics • In-class Lecture: RStudio & Qualtrics • Readings: Chapter 1: R Installation and Usage

- Rmd: Intro

1/21 2 Introduction: Dirty Data, Data Cleaning, & tidyverse
- Video Lecture #1: Data Cleaning & tidyverse
- Readings: Chapter 6 Schumacker (2015); Nordmann et al. (2021)
- Rmd: Data Cleaning

1/28 3 Introduction: Multivariate Statistics Assumptions & Data Screening
- Video Lecture #2: Assumptions & Data Screening
- Readings: Chapter 2 Schumacker (2015); Papageorgiou et al. (2018)
- Rmd: Descriptives; Reliabilities

2/4 4 Linear Regression: Review
- Video Lecture #3: Linear Regression Review
- Readings: TBD
- Topic Quiz #1 DUE: Data Cleaning

2/11 5 Linear Regression: Pre-post
- Video Lecture #4: Linear Regression Pre-Post
- Readings: TBD
- Rmd: Regression Analyses

2/18 6 Linear Regression: Mediation, Moderation, and Assumptions
- Video Lecture #5: Mediation and Moderation
- Readings: TBD
- Rmd: Regression Analyses
- Topic Quiz #2 DUE: Linear Regression Pre-Post

2/25 7 Structural Equation Modeling: Path Analysis
- Video Lecture #6: Path Analysis
- Readings: TBD
- Rmd: SEM
- Topic Quiz #3 DUE: Mediation

3/4 8 Structural Equation Modeling: Path Analysis
- Readings: TBD
- Rmd: SEM
- Topic Quiz #4 DUE: Structural Equation Modeling Path Analysis

3/11 9 Brief Overview: Hotelling's T^2, MANOVA, MANCOVA
- Midterm Exam OSF Project DUE on Wed, 3/11
- Video Lecture #7: Multivariate Analyses Overview
- Readings: TBD
- Rmd: Regression Analyses

3/18 10 OFF (SPRING BREAK)

3/25	11	Multilevel Modeling: Intro and Basics • Video Lecture #8: Multilevel Modeling Introduction • Readings: TBD • Rmd: Regression Analyses
4/1	12	Multilevel Modeling: Growth Models • Video Lecture #9: Multilevel Modeling Growth Models • Readings: TBD • Rmd: Regression Analyses
4/8	13	Multilevel Modeling: Growth Models • Readings: TBD • Rmd: Regression Analyses • Topic Quiz #5 DUE: Multilevel Modeling Growth Models
4/15	14	Multilevel Modeling: Concurrent and Prospective Analyses • Video Lecture #10: Multilevel Modeling Analyses • Readings: TBD • Rmd: Regression Analyses
4/22	15	Multilevel Modeling: Concurrent and Prospective Analyses • Readings: TBD • Rmd: Regression Analyses • Topic Quiz #6 DUE: Multilevel Modeling Concurrent/Prospective
4/29	16	FINALS WEEK • Final Exam OSF Project DUE on Fri, 5/1.

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.*

University Policies

UT Tyler Honor Code: Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities: To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php

Campus Carry: We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php

UT Tyler a Tobacco-Free University: All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quit lines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies: Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. (For Fall, the Census Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.
The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.

- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy: Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services: In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at http://www.uttyler.edu/disabilityservices, the SAR office located in the University Center, #3150 or call 903.566.7079.

Student Absence due to Religious Observance: Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities: If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement: It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation: Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Student Standards of Academic Conduct: Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. "Cheating" includes, but is not limited to:
   - copying from another student's test paper;
   - using, during a test, materials not authorized by the person giving the test;
   - failure to comply with instructions given by the person administering the test;
   - possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
   - using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
   - collaborating with or seeking aid from another student during a test or other assignment without authority;
   - discussing the contents of an examination with another student who will take the examination;
   - divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
   - substituting for another person, or permitting another person to substitute for one self to take a course, a test, or any course-related assignment;
   - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, home work solution, or computer program or information about an unadministered test, test key, home solution or computer program;
   - falsifying research data, laboratory reports, and/or other academic work offered for credit;
   - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
   - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

ii. "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.

iii. "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

iv. All written work that is submitted will be subject to review by plagiarism software.

Recording of Class Sessions: Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students

enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)