



Analytical Techniques

PA 3311 / PS 3315 (Quantitative Research in Political Science)

Department of Political Science • Texas State University

Fall 2026 • Full 16-Week Semester • Face-to-Face

Tuesdays & Thursdays, 9:30–10:50 a.m. • Trauth Huffman Hall 342

Dr. W. Scott Langford • scottlangford@txstate.edu

Course Overview

In this course I introduce you to the quantitative tools of public and nonprofit administration and political science, and show you how analytical reasoning informs real decisions. Over the full sixteen-week semester you will move deliberately from foundational concepts to applied techniques, building your skills in twice-weekly in-class sessions that pair concise instruction with hands-on practice. We begin with the logic of empirical inquiry—how analysts and administrators frame research questions, tell descriptive patterns apart from causal claims, and use data to guide programmatic and fiscal decisions. You will learn to recognize which questions quantitative methods can answer, and how the question you ask shapes the tool you choose.

Microsoft Excel is our analytical platform. Through regular hands-on exercises you will explore descriptive statistics, data visualization, probability, hypothesis testing, t-tests, and simple and multiple linear regression. You will build these skills across eight two-week modules that blend readings, in-class demonstrations, guided lab work, and applied problem sets. I emphasize practical competence: you will routinely work with **real Texas datasets**—each with a documented source and a reproducible build—interpret the output, and communicate your results in the clear writing and graphics that professional public-service and research settings expect.

A central theme of this course is the role of evidence in public administration and political analysis. You will learn not just to calculate statistics but to interpret them responsibly—identifying limitations, weighing assumptions, and turning findings into actionable insight. I emphasize ethical data use throughout: the responsibilities that come with handling, analyzing, and presenting information. We close with a cumulative final project in which you bring everything together to analyze a dataset, build the right visuals, and write a concise, professional report. By the end of the term you will be ready to apply quantitative analysis to policy questions, management challenges, and administrative or political research across public and nonprofit settings.

Prerequisite

MATH 1312, 1315, 1316, 1317, 1319, 1329, 2321, 2417, or 2471, or HON 2302A or 2302B, any with a grade of “C” or better. This course carries three lecture contact hours and no lab contact hours.

Course Learning Objectives (CLOs)

By the end of the course, you will be able to:

- Distinguish among major statistical methods used in public administration, nonprofit management, and political science.
- Calculate and interpret descriptive statistics, including measures of central tendency and variability.
- Apply inferential methods including t-tests, correlation, and simple and multiple regression.
- Use Microsoft Excel to perform, visualize, and interpret quantitative analyses.
- Communicate analytical results clearly through writing and graphics.
- Uphold ethical standards in data handling, interpretation, and reporting.
- Integrate evidence-based reasoning into administrative, policy, and political decisions.

Required Materials

- **Textbook (required, free):** Langford, W. Scott, *Analytical Techniques* — the free online course textbook, read alongside the modules. Available on Canvas and at <https://scottlangford.com/pa3311/>.
- **Software:** Microsoft Excel (use the latest version you can; install the Analysis ToolPak add-in). As a Texas State student, you can get Microsoft 365, including Excel, at no cost.
- **Technology & support:** Bring a laptop with Excel installed to class. If you need help with Excel, Canvas, or campus logins, contact the IT Assistance Center (ITAC) at itac.txst.edu.
- **Course materials access:** The required textbook is free and posted on Canvas, so you do not need to buy any course materials (no BookSmart @ TXST charge).

Instructor Contact Information

- **Name:** Dr. W. Scott Langford.
- **Email:** scottlangford@txstate.edu
- **Office:** Trauth Huffman Hall 355
- **Office Hours:** Tuesdays & Thursdays, 1:00–3:00 p.m., and by appointment.
- **Communication:** Email responses within 24 hours (M–F).

Course Format

We meet in person on Tuesdays and Thursdays from 9:30 to 10:50 a.m. in Trauth Huffman Hall 342. Each two-week module pairs conceptual instruction with hands-on Excel lab work, so bring a laptop with Excel installed to every class. I run all readings, datasets, templates, and submissions through Canvas. Unless I note otherwise, your weekly online components (quizzes and problem sets) are due Sundays at 11:59 p.m. Central Time, and you take the exams in class on the dates below.

Key Dates

(Texas State Fall 2026, Full Term)

Milestone	Date
First Day of Classes	Wednesday, August 19 (first T/R meeting Thursday, August 20)
Last Day to Add a Course	Wednesday, August 26
Census Date / Last Day to Drop (No Record)	Thursday, September 3
Labor Day Holiday (No Classes)	Monday, September 7
Fall Break (No Classes)	Thursday–Friday, October 8–9
Automatic W Deadline / Last Day to Drop	Thursday, October 22
Last Day to Withdraw from the University	Wednesday, November 18
Thanksgiving Break (No Classes)	Wednesday–Sunday, November 25–29
Last Day of Classes	Wednesday, December 2
Reading Day	Thursday, December 3
Final Exam Period	December 4–10
Final Project Due	Tuesday, December 8, 8:00–10:30 a.m. (registrar-assigned slot)

Course Calendar

(subject to change)

Wk	Dates (T/R)	Module	CLOs	Topics & In-Class Activities	Assessments
1	Thu Aug 20	M1: Research Questions & Excel Foundations	1,4,5,6,7	Course orientation; logic of empirical inquiry; descriptive vs. causal questions; drafting testable hypotheses.	Syllabus Quiz
2	Aug 25, 27	M1 (cont.)	1,4	Excel foundations: data entry, formatting, formulas/functions, cell references, basic charts.	Problem Set (PS) 1
3	Sep 1, 3	M2: Distributions & Graphs	1,2,4,5	Frequency tables; histograms; bar/column charts; reading distributions. <i>(No class Mon Sep 7 — Labor Day.)</i>	
4	Sep 8, 10	M2 (cont.)	1,2,4,5	Mean, median, mode; range, variance, standard deviation; skewness and outliers.	Quiz 1; PS 2
5	Sep 15, 17	M3: Normal Curve & Probability	1,2,4	The normal curve; z-scores; converting raw and standardized scores; Excel normal-curve tools.	
6	Sep 22, 24	M3 (cont.)	1,2,4	Probability rules; proportions under the normal curve; applied probability in administrative contexts.	Quiz 2; PS 3
7	Sep 29, Oct 1	M4: Hypothesis Testing	1,3,4,7	Sampling distributions; Central Limit Theorem; confidence intervals.	
8	Tue Oct 6 <i>(no class Thu Oct 8 — Fall Break)</i>	M4 (cont.)	1,3,4,7	Null/alternative hypotheses; p-values; statistical significance.	Quiz 3; PS 4

Wk	Dates (T/R)	Module	CLOs	Topics & In-Class Activities	Assessments
9	Oct 13, 15	M4 wrap-up / M5: t-Tests (Part I)	1,3,4,5	Tue: Exam 1 review and Thu: one-sample t-test; logic of mean comparisons.	Exam 1 (in class, Tue Oct 13; covers M1–M4)
10	Oct 20, 22	M5 (cont.)	1,3,4,5	Independent-samples t-test; assump- tions; interpreting and reporting re- sults.	Quiz 4; PS 5
11	Oct 27, 29	M6: t-Tests (Part II)	1,3,4,5	Paired-samples t-test; matched obser- vations; applied case study.	
12	Nov 3, 5	M6 (cont.)	1,3,4,5	Choosing the right t-test; integrated practice; Exam 2 review.	Quiz 5; PS 6
13	Nov 10, 12	M6 wrap-up / M7: Regression	1,3,4,5,7	Tue: Exam 2 review and Thu: correlation, scatterplots, simple linear regression.	Exam 2 (in class, Tue Nov 10; covers M5–M6)
14	Nov 17, 19	M7 (cont.)	1,3,4,5,7	Simple and multiple linear regression; interpreting coefficients; model fit; re- sults memo draft.	PS 7; Project Proposal (Pass/Fail)
15	Tue Nov 24 (no class Thu Nov 26 — Thanks- giving)	M8: Final Project	3,4,5,6,7	Final-project workshop; individual analysis time; instructor check-ins.	
16	Tue Dec 1 (Dec 2 last day; Dec 3 Reading Day)	M8 (cont.)	3,4,5,6,7	Peer-feedback workshop; interpreta- tion and presentation; course wrap- up.	Final Project draft / peer review

Final Exam Period (Dec 4–10): Final Project due **Tuesday, December 8, 8:00–10:30 a.m.** (registrar-assigned slot)

Assignments and Grading

Component	Weight
Weekly Quizzes	10%
Excel-Based Problem Sets	20%
Exam 1 (In Class)	15%
Exam 2 (In Class)	15%
Final Project (Report + Visuals)	40%

Quizzes: I give short quizzes to reinforce key concepts, check your comprehension, and provide timely feedback as you work through the modules. Each quiz focuses on the content, skills, and Excel techniques from the current module. You will usually see short multiple-choice items, interpretation questions built on brief data scenarios, and the occasional Excel prompt that asks you to read output or spot the right formula. I keep them brief (usually 5–10 questions, 10–15 minutes), and you submit them through Canvas by Sunday at 11:59 p.m. Central Time. Complete each quiz on your own, without AI tools or outside help. I do not accept late quizzes, but I drop your lowest quiz score at the end of the term. Quizzes are worth 10% of your grade.

Excel-Based Problem Sets: The Excel problem sets are the applied core of the course—your main way to build and show real competency with quantitative methods. For each one, you will download a dataset and work through a structured set of tasks tied to the module: computing descriptive statistics, building graphs, applying probability rules, running t-tests, or estimating regressions. I expect both correct calculations *and* a clear interpretation of what they mean for a public, nonprofit, or political decision. You will work directly in Excel—formulas, functions, spreadsheet organization, and visual tools—to produce tables, figures, and short written explanations. My instructions, templates, and in-class demonstrations are there to help, but you are responsible for getting the formulas, cell references, and output right. You submit through Canvas by Sundays at 11:59 p.m. Central Time. Because the material is cumulative I cannot accept late work, but I drop your lowest problem-set grade. Together the problem sets are worth 20% of your grade.

Exams: You will take two in-class exams that check your command of the major concepts. Exam 1 covers descriptive statistics, distributions, probability, and the logic of hypothesis testing; Exam 2 covers t-tests and applied interpretation. I use them to confirm that you can both run the calculations in Excel and understand—and apply—the reasoning behind them in real administrative and political contexts. Expect a mix of multiple-choice questions, short written responses interpreting statistical output, and applied tasks you perform in a provided Excel file. You may not use any outside assistance during an exam—no AI tools, websites, or communication with others. Together the two exams are worth 30% of your grade (15% each). I do not give make-up exams except for documented, university-approved emergencies.

Final Project: Your final project is the capstone of the course. Working with a real dataset—one of our Texas city or county panels, or another real dataset you propose—you will run a complete analysis in Microsoft Excel, interpret your findings, and present them in a concise, professional report for a public, nonprofit, or research audience. I want you to show what you can do across the whole toolkit: data preparation, descriptive statistics, visualization, hypothesis testing, t-tests, regression, and the clear communication of quantitative findings. You will submit a draft proposal in Week 14 (Sunday, November 22) so I can confirm your question is sound and your planned analysis is feasible, and a peer-feedback workshop in Week 16 helps you sharpen your presentation and interpretation. Your final submission has two parts: (1) an Excel workbook with all of your calculations, and (2) a polished report that presents your findings clearly. It is due during the scheduled final exam slot. Because it is the fullest demonstration of what you have learned, the final project is worth 40% of your grade.

University Statements and Required Policies

Class Instruction Modes and Substantive Interaction. This class is fully implemented in the instruction mode that appears on the Fall 2026 Schedule of Classes in Catsweb (face-to-face). In all courses, faculty members provide regular and substantive interaction with students that is instructor-driven, content-oriented, frequent, and consistent throughout the semester. In this section, that interaction includes twice-weekly in-class instruction and hands-on Excel lab work, individualized feedback on your problem sets and final project, and availability during office hours.

Attendance, Participation, and Record-Keeping. This course meets in person on Tuesdays and Thursdays. Because the material is cumulative and skills-based, regular attendance and active participation are expected and contribute to your success; I keep attendance and participation records. Contact me as soon as possible if you must miss class. For absences related to university-sponsored events or religious holy days, see [UPPS 02.06.03](#) and [02.06.01](#); if I request documentation, complete the form on the [Absence Notifications](#) page.

Academic Integrity and Student Conduct. You are responsible for upholding the university's Academic Honor Code. Plagiarism—including submitting another's work, or uncited or improperly cited AI-generated text—will be reported to the Honor Code Council. To support integrity, quizzes and both exams are completed individually with no outside assistance, the Excel problem sets must be your own work, and the final project must reflect your own analysis and writing. See the [Code of Student Conduct](#) and [The Honor Code](#).

Artificial Intelligence (AI) Use. *Definition.* For this class, “AI” means any program or browser extension that can generate or edit content—text, images, code, or data—for example ChatGPT, Gemini, Microsoft Copilot, and Grammarly. *Level of use: limited (restrictive).* **The default in this course is that you do not use AI.** The skills this course builds—computing, running, reading, and interpreting statistics in Excel—are exactly what you are here to learn, so I expect you to do this work yourself. *The only permitted uses, and each must be documented.* You **may** (1) ask an AI tool to *explain* a statistical concept or an Excel function you are trying to learn—the way you would ask a tutor, not to solve your specific assignment; and (2) use an AI tool to *proofread the grammar and clarity of writing you have already drafted yourself* (for example, your final-project report). *Prohibited—no exceptions.* You may **not** use AI to produce or check any numbers, formulas, Excel steps, charts, analyses, or interpretations; to write or rewrite your problem-set answers or your interpretations; or in any form during quizzes or exams. *Required AI Use Statement.* On **every problem set and on the final project**, include a brief **AI Use Statement** that says *either* “I did not use AI on this assignment,” *or* a disclosure listing: the tool and version, the date(s) used, the exact prompt(s) you entered, how you used the output, and one sentence confirming you verified its accuracy. You are fully responsible for everything you submit—if an AI tool is wrong, that error is yours. Missing, false, or improper disclosure, and any prohibited use, is a violation of the Academic Honor Code and will be reported to the Honor Code Council. If you are unsure whether something is allowed, ask me first.

Statement on Civility in the Classroom and Instructional Settings. Civility in instructional settings is fundamental to an effective educational process and is everyone's responsibility. The university's shared values, sense of community, and collective commitment to respect, civil dialogue, and the free exchange of ideas are the cornerstones of successful teaching and learning. If you have questions about appropriate behavior in this class, address them with me first. Although rare, disciplinary procedures may be implemented for refusing to follow an instructor's directive, disrupting class activities, or disregarding university policies. See [AA/PPS 02.03.01](#), Section 03: Courteous and Civil Learning Environment, and the Code of Student Conduct, number II, Section 2.02: Conduct Prohibited.

Disability Services and Accommodations. If you are managing ADHD, a learning difference, a health condition, or any disability, [Disability Services](#) (DS) can work with you to set up accommodations that support your learning. Reach out early—both DS staff and I are here to support your success. You can contact DS at 512-245-3451 or via email at ods@txstate.edu.

Health and Well-being Support. If you feel overwhelmed, are worried about a friend, or just need someone to talk to, several resources are available: the **CARE Team** (submit a [Here to Help](#) form for 1-on-1 support); the [Counseling Center](#) (short-term individual, group, and crisis counseling, in person and virtual); the [Student Health Center](#) (medical, mental-health, and wellness care); and [TimelyCare](#) (free 24/7 virtual mental-health support, including immediate TalkNow chats and scheduled sessions).

Instructor Absences. If I am absent, I coordinate with my department chair to ensure continuity of instruction, which in a brief absence may include delivering content remotely via Zoom, Teams, or Canvas. For an extended absence, another faculty member may be asked to assume responsibility for the course.

Emergency Management. In the event of an emergency, monitor the [Safety and Emergency Communications](#) web page, which is updated with the latest information and links to safety resources and emergency procedures. I encourage you to sign up for the [TXState Alert](#) system.

Diversity, Equity, and Inclusion (SB 17). During the 88th Regular Session of the Texas Legislature, Senate Bill 17 was passed and signed into law, effective January 1, 2024. SB 17 addresses diversity, equity, and inclusion initiatives at public higher education institutions. For an explanation of SB 17's provisions along with questions and answers, please visit the [Texas State University System's General Counsel Guidance on Implementation of Senate Bill 17](#).

Sexual Misconduct Reporting (SB 212). Effective January 2, 2020, state law (SB 212) requires all university employees, acting in the course and scope of employment, who witness or receive information concerning an incident of sexual misconduct involving an enrolled

student or employee to report all relevant information known about the incident to the university's Title IX office. This means I cannot keep such information confidential. Employees who knowingly fail to report, or who knowingly file a false report, shall be terminated in accordance with university and system policy. See the [Office of Equal Opportunity and Title IX](#) for more information.

Additional Student Support. Support is also available for first-generation students and for those facing food or housing insecurity (e.g., Bobcat Bounty and the Dean of Students Office). If you are unsure where to start, undergraduates can use the Hand Raise feature in NavigateTXST, and any student may contact me and I will help connect you to the right resource.