

# Applied Statistics for Public Administration

Fall 2024

PAD 5351, CRN 12908

T 6-8:50 p.m., classroom TBD

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Office Hours: By appointment

## Course Objectives

This course is an advanced introduction to quantitative tools pertinent in policy analysis and management. The primary emphasis is to foster analytic and critical thinking behind descriptive and inferential statistics. Upon successful completion of this course, students will be comfortable applying the logic and skills learned to policy relevant problems and decision-making. Graduate students who wish to continue polishing their skills will also be prepared to take further sections of more advanced empirical methods and foundations that are multidisciplinary in nature.

This course assumes that students have a basic familiarity with rudiments of probability (likelihood of events) and descriptive statistics (mean, median, mode, standard deviation, etc.), although an overview will be provided since they are the foundations to statistical inference and methods. It also assumes that students are comfortable with elementary algebra (at minimum know how to interpret a slope coefficient in a linear mathematical expression) and are able to work with symbolic notation (summation and product operators, subscripts, elements of the Greek alphabet, etc.).

The approach taken is more conceptual than that found in a typical introductory course in econometrics, but is complemented by an emphasis on applied statistical practice. The learning process in this course is driven by a combination of: 1) theoretical research foundations; 2) descriptive, hypothesis testing and regression estimation methods; and 3) database management and use of the *Stata* statistical software. Developing and managing datasets as well as spreadsheet and basic programming skills to conduct analysis will be a major component of this class.

## Course Requirements

Students are responsible for material and content covered in class and are required to complete all assignments, as well as actively participate in class discussions in a manner that is respectful. The University provides free student licenses of the Stata software. Log in to the following link with your UTEP credentials, download and install the application, and then place a Service Desk call with the UTEP Helpdesk to have the Stata license activated.

[https://www.utep.edu/technologysupport/ServiceCatalog/SOFTWARE\\_PAGES/soft\\_stata.html](https://www.utep.edu/technologysupport/ServiceCatalog/SOFTWARE_PAGES/soft_stata.html)

**Please switch your cell phone to vibrate or turn it off prior to the start of class and bring a laptop for in-class work.** Late assignments will be downgraded automatically and make-up exams

will not be allowed unless a valid reason is provided. Grading is based on the student's contribution to the course and quality of work in the following areas:

- 5% – Class participation
- 40% – Problem sets (4)
- 40% – Exams (3)
- 15% – Semester project presentation (develop database, hypothesis and statistical test/model)

### **Scholastic Dishonesty Policy**

Students are expected to respect the University's standards on academic dishonesty. You owe it to yourself, your fellow students, and the institution to maintain the highest standards of integrity and ethical behavior. A discussion of academic integrity, including definitions of plagiarism and unauthorized collaboration, as well as helpful information on citations, note taking, and paraphrasing, can be found at the Office of Student Conduct and Conflict Resolution web page [www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html](http://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html).

### **Students with Disabilities**

The University provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Center for Accommodations and Support Services at 915-747-5148 ([cass@utep.edu](mailto:cass@utep.edu)). **Please communicate with me as soon as possible if you require disability accommodations.**

### **Syllabus Disclaimer**

The syllabus provides an outline of what will be covered in this course. It is subject to change in case of extenuating circumstances and according to the instructional needs and interests of the class as the topics progress. Any changes will be announced in class.

### **Textbook**

The class does not require a textbook. Lectures will be based on PowerPoint content and selected readings organized around empirical research that students are expected to be able to summarize and interpret. It is through empirical practice that students will develop or strengthen their analytic skills as well as substantive understanding of statistical inference and regression logic.

### **Course Outline**

#### **Class 1: Research Methods Review (Aug. 27)**

Class and course introductions

PPT1 topics: Scientific method, measurement and variables, measurement error, reliability, validity

**Class 2: Descriptive Statistics (Sept. 3)**

PPT2 topics: Measures of central tendency and dispersion

PPT3 topics: Frequency distributions

**Pset 1: Measures and frequencies**

**Class 3: Descriptive Statistics in Stata (Sept. 10)**

PPT4 topics: Boxplots, correlations, scatterplots, other descriptives

Stata basics video < <https://www.youtube.com/watch?v=H6d0FK2Z-1I> > (review before class)

Stata – Introduction, coding and descriptives

**Pset 1 due**

**Class 4: Research Designs and Student Survey in Stata (Sept. 17)**

PPT5 topics: Random selection and assignment, experimental and non-experimental designs

Stata – Student survey

**Exam 1 part 1 – Research and descriptive concepts (take-home)**

**Class 5: Normal Distribution (Sept. 24)**

**Exam 1 part 2 – (in-class)**

PPT6 topics: Probability, normal curve, standard Z-scores

Coin flip example – Bernoulli process, binomial distribution and sample size

**Class 6: Z-Scores (Oct. 1)**

PPT7 topics: Practice Z-scores

**Pset 2: Z-scores**

**Class 7: Hypothesis and Significance (Oct. 8)**

Null and alternative hypothesis video < <https://www.youtube.com/watch?v=VK-rnA3-41c> >

PPT8 topics: Hypothesis testing, hypothesis in experimental, non-experimental and regression designs

PPT9 topics: Statistical significance, Type I vs. Type II errors

**Pset 2 due**

**Class 8: Z-test, T-test and Significance in Stata (Oct. 15)**

PPT10 topics: Alpha, p-values, critical value, rejection region, Z-test

PPT11 topics: T-test single sample, degrees of freedom, confidence intervals

Stata – Chi-square and Fisher's test statistic

**Exam 2 part 1 – Normal curve, hypothesis, significance, and Z-scores (take-home)**

**Class 9: T-test (Oct. 22)**

**Exam 2 part 2 – (in-class)**

PPT12 topics: Practice t-tests single sample

PPT13 topics: T-test paired samples

Practice t-tests paired samples

**Class 10: T-tests (Oct. 29)**

**Pset 3: T-tests**

Stata – T-test single, paired and two-mean samples  
Practice t-test scenarios and datasets

**Class 11: Comprehensive Overview (Nov. 5)**

**Exam 3 part 1 – Comprehensive up to T-tests (take-home)**

Stata exercise – t-tests

**Pset 3 due**

**Class 12: Linear Regression (Nov. 12)**

**Exam 3 part 2 – (in-class)**

PPT14 topics: Response and predictor variables, OLS assumptions, regression models, diagnostics  
Lecture topics: Univariate and multivariate linear regression, OLS assumptions, diagnostics  
Stata – Linear regressions (for continuous dependent variables)

**Class 13: Linear Continued and Logistic Regression (Nov. 19)**

**Pset 4: Regression model**

Lecture: Model estimates and statistical significance  
Stata – Linear and logistic regressions (for dichotomous dependent variable)

**Class 14: Thanksgiving Holiday (Nov. 26)**

**Class 15: Student Project In Class Q&A (Dec. 3)**

**Pset 4 due**

**Class 16: Student Project Presentations (Dec. 10)**