



### MTE 580 Statistical Reasoning Course Syllabus

**Course Description:** Concepts of random variables, probability distributions, functions of random variables, convergence concepts, and statistical inference.

**Credit Hours:** 3

**Course Prerequisites:** MTE 578

**Course Outline:**

Approximate time spent

• Statistical experiments as tools to investigate real-world problems	10%
• Validity	5%
• Random samples and sample statistics	15%
• Binomial, normal, and geometric distributions	15%
• Bivariate data	5%
• Law of Large Numbers	5%
• Central Limit Theorem	5%
• Principles of hypothesis testing	10%
• Categorical data	10%
• Connections to the secondary classroom	20%

**Student Learning Outcomes (SLO):** At the end of MTE 580, successful students will be able to:

1. Apply knowledge of designing, conducting, analyzing, and interpreting statistical experiments to investigate real-world problems. [PLO 1,2,3,4,5]
2. Analyze and interpret statistical information and recognize misleading as well as valid uses of statistics. [PLO 1,2,3,4,5]
3. Demonstrate an understanding of random samples and sample statistics. [PLO 1,2,3,4,5]
4. Make inferences about a population using binomial, normal, and geometric distributions. [PLO 1,2,3,5]
5. Describe and analyze bivariate data using various techniques. [PLO 1,2,3,5]
6. State the law of large numbers and the central limit theorem and identify their connections to the process of statistical inference. [PLO 1,2,3,4,5]
7. Apply the principles of hypothesis testing and analyze categorical data. [PLO 1,2,3,4,5]
8. Provide examples/nonexamples from statistics that are appropriate to the secondary classroom. [PLO 1,2,3,4,5,6]

**Program Learning Outcomes (PLO):** Students graduating from SFASU with an M.S. degree and a major in school mathematics teaching will demonstrate:

1. Conceptual understanding and procedural fluency necessary for teaching the core areas of school mathematics (number/operation (N&O), patterns/algebra (P&A), geometry/measurement (G&M), and probability/statistics (P&S)). [*Concepts & Skills*]
2. Competency in using various mathematical tools (including technology) to formulate, represent, and solve problems. (N&O tools, P&A tools, G&M tools, and P&S tools applied to basic and multi-step computational and application problems) [*Problem Solving*]
3. The ability to use mathematical reasoning to develop conjectures, design sound arguments, and analyze student thinking. (pattern recognition/conjecture development, examples/non-examples, deductive/inductive reasoning, argument analysis) [*Critical Thinking*]
4. An understanding of the development and connectedness of mathematical ideas – historically, between content areas, and across grade levels. [*Connections*]
5. Effective communication of mathematical ideas in oral, visual, and written forms. [*Communication*]
6. Leadership skills in facilitating collaboration, mentoring teachers, making appropriate instructional decisions, and delivering professional development. [*Leadership*]