Course Proposal: Modify Course

This proposal will change the following elements of the course. **Course Description**

- 1. Course prefix and number: MTE 562
- 2. Effective Term/Year: FALL 2013
- 3. CIP CODE/10 digit program code: 13131100 No Change
- 4. Short Course Title: Probability and Statistical Reasoning

Modified Short Course Title:

5. What is the primary reason you are modifying this course?

This modified course description and title more accurately represents the course content and the function of the course in the proposed consolidated graduate major.

6. Enter course description exactly as it now appears in the general/graduate bulletin.

Descriptive statistics, probability, random variables, binomial and normal distributions, statistical inference, and linear regression.

Enter modified course description exactly as it will appear in the general/graduate bulletin?

Descriptive statistics, probability, random variables, binomial and normal distributions, and inferential thinking. Special attention will be given to the existence and implementation of these concepts in the middle and high school classroom.

7. Current Prerequisites:

MTE 552 and 554

Modified Course Prerequisites:

8. College: College of Science and Mathematics

Department Teaching Course: Mathematics and Statistics
Instruction Type: Lecture No Change

10b. Credit Hours: No ChangeCurrent - Maximum: 3 Minimum: 3 Maximum Hours counted toward degree: 3Modified- Maximum: Minimum: Maximum Hours counted toward degree:

11a. Second Instruction Type: ns

11b. Second Credit Hours:Current - Maximum: Minimum: Maximum Hours counted toward degree:Modified- Maximum: Minimum: Maximum Hours counted toward degree:

12. Maximum contact hours each week fall semester: **No Change** Lecture: **3** Lab: Other:

13. May this course be taken more than one time each semester: No

14. Grade Type: Regular: A-F No Change

15. Describe the place of the modified course within your current curriculum. Will it be elective or required? Part of a major or a minor? (Enter NA if no change is being made.)

We are proposing a consolidation of existing graduate majors, School Mathematics Teaching: Middle Level and School Mathematics Teaching: Secondary Level, into a single major in School Mathematics Teaching with a 24 credit hour core and emphases in middle or secondary levels. This course is currently required for both the middle level and secondary level majors and there is no change in the placement of the course. It is one of the 24 credit hour core courses required in the new consolidated major.

16. How does the modified course differ from similar courses being offered at Stephen F. Austin? (Enter NA if no change is being made.) **NA**

17. Syllabus: Course Learning Goals

List course objectives; describe what students who complete the course will know or be able to do. (Enter NA if no change is being made.) **NA**

18. Syllabus: Course Outline

List the topics that the modified course will cover and indicate the approximate proposed amount of time to be devoted to each, either by percent of course time or number of weeks. Please indicate which topics will be required in all sections of the course and which may vary. (Enter NA if no change is being made.) **NA**

19. Syllabus: Modified Textbook/Assigned Reading Materials for course. See attached syllabus.

20. Any Other Information		
Dept. Chair	Date:	
College Curriculum Chair	Date:	
College Dean	Date:	

Grad Dean/Univ Curr Chair _____ Date: _____



Department of Mathematics and Statistics

MTE 562 – Probability and Statistical Reasoning Course Syllabus

Course description: Descriptive statistics, probability, random variables, binomial and normal distributions, and inferential thinking. Special attention will be given to the existence and implementation of these concepts in the middle and high school classroom.

Credit hours: 3

Course Prerequisites and Corequisites: MTE 552 and MTE 554

Outline of Suggested Topics: The following is a list of suggested topics to accompany the text. The topics can be augmented or diminished, as long as the objectives for the course are practiced. Decisions concerning order of presentation are left to individual instructors.

Course outline:

Descriptive Statistics

- Recognize and use appropriate graphical displays and descriptive statistics for categorical and naturally numeric data.
- Investigate and answer questions by collecting, orgainzing, and displaying data from real world situations.
- Communicate the results of a statistical investigation using appropriate language.
- o Investigate real-world problems by designing, administering, analyzing and interpreting surveys.
- Investigate real-world problems by designing, conducting, analyzing, and interpreting statistical experiments.
- Organize, display, and interpret data in a variety of formats (e.g., tables, frequency tallies, box plots, stem-and-leaf plots, histograms) and discuss the advantages, disadvantages, and appropriateness of the representation.
- Develop and justify concepts based on summary statistics such as measures of central tendency (e.g., mean, median, mode) measures of dispersion (e.g., range, interquartile range, variance, standard deviation) and various percentiles. Additionally, use these measures to describe a set of data.
- Explore, describe, and analyze bivariate data using techniaques such as scatter plots and lines of best fit, including the use of technology.

• Inferential Thinking

- Make inferences about a population using the binomial distribution.
- Describe and apply the characteristics of a well-designed and well-conducted survey or experiment.
- Explain and use probability language to make observations and draw conclusions from univariate data and to describe the level of confidence in the conclusion, including the appropriate use of technology.
- Identify and understand the selection of a measurement scale (i.e., nominal, ordinal, interval, ratio) used to answer research questions and analyze data.
- Describe and analyze bivariate data using various techniques (e.g., scatterplots, regression lines, outliers, residual analysis and correlation coefficients), including the appropriate use of technology.
- Analyze and interpret statistical information from the media, such as the results of polls and surveys, and recognize valid and misleading uses of statistics.

Approximate time spent

20%

30%

• Probability

- Use the concepts and principles of probability to describe the outcome of simple and compound events, including constructing sample spaces to model situations.
- Explore concepts of probability through data collection, experiments, and simulations.
- Generate, simulate, and use probability models to represent a situation.
- o Explain and use probability language to make observations and draw conclusions.
- Calculate probabilities using the axioms of probability and related theorems and concepts such as the complement rule, addition rule, conditional probability, multiplication rules, and independence.
- Apply concepts and properties of discrete and continuous random variables to model and solve a variety of problems involving probability and probability distributions.
- Probability and Statistics to the classroom
 - Demonstrate an understanding of how probability and statistics are developmental and connected across and between grade levels;
 - Communicate the vertical alignment of probablity and statistics across the grade levels.
 - Communicate with students the importance of using statistical inference in decision making.
 - Recognize that assumptions are made when solving problems and assist middle level students in identifing and evaluating those assumptions.
 - Plan classroom activities that emphasize how technology (e.g., spreadsheets, statistical software) affects the use of mathematics in various careers.

<u>Student Learning Outcomes (SLO)</u>: At the end of MTE 562, a student who has studied and learned the material should be able to:

- 1. Demonstrate understanding of the theory of probability and its relationship to sampling and Inferential thinking. [PLO: 1, 2, 3, 5]
- 2. Design experiments and surveys to answer questions and solve problems. [PLO: 1, 2, 3, 4, 5]
- 3. Demonstrate understanding in the use of graphical and numerical techniques to explore data, characterize patterns, and describe departures from patterns. [PLO: 1, 2, 3, 5]
- 4. Demonstrate understanding of inferential thinking and how it is used in making and evaluating predictions. [PLO: 1, 3, 4, 5, 6]
- 5. Recognize common misuses of probability and statistics. [PLO: 1, 3, 5, 6]
- 6. Model, construct, and solve probability and statistics problems, including real world applications when appropriate. [PLO: 1, 2, 4, 5, 6]
- 7. Make appropriate connections from probability and statistics to the middle level mathematics classroom. [PLO: 1, 4, 6]

30%

20%

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]
- Competences 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*]

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