University of Houston College of Education
COLLABORATION FOR LEARNING & LEADING

CUIN 6342: Teaching Probability and Statistics for Grades 6 – 12

Standard IV: Probability and Statistics: The Master Mathematics Teacher understands probability and statistics, their applications, and the vertical alignment of probability and statistics to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]).

Standard VI: Instruction: The Master Mathematics Teacher applies knowledge of mathematical content, uses appropriate theories for learning mathematics, implements effective instructional approaches for teaching mathematics, including teaching students who are at-risk, and demonstrates effective classroom management techniques.

Standard VII: Creating and Promoting a Positive Learning Environment: The Master Mathematics Teacher demonstrates behavior that reflects high expectations for every student, promotes positive student attitudes towards mathematics, and provides equitable opportunities for all students to achieve at a high level.

Standard VIII: Assessment: The Master Mathematics Teacher selects, constructs, and administers appropriate assessments to guide, monitor, evaluate, and report student progress to students, administrators, and parents, and develops these skills in other teachers.

Standard IX: Mentoring and Leadership: The Master Mathematics Teacher facilitates appropriate standards-based mathematics instruction by communicating and collaborating with educational stake-holders; mentoring, coaching, exhibiting leadership, and consulting with colleagues; providing professional development opportunities for faculty; and making instructional decisions based on data and supported by evidence from research.

T.E.K.S. addressed: (4.13); (5.12); (5.13); **(**6.9); **(**6.10); (7.10 - 7.12); (8.11 – 8.13); (2A.1.B); (M.2 - M.4)

Description of course and Assessment Methodology for Course Objectives

CUIN 6342, Teaching Probability and Statistics for Grades 6-12, is designed for Curriculum and Instruction M.Ed and Ed.D students seeking an emphasis in mathematics education. It is designed to help students gain expertise and leadership regarding how children develop probability and statistics concepts and the corresponding instructional and assessment practices that facilitate this development. Students will learn basic theories and concepts in both descriptive and inferential statistics, and they will learn to use probability and its distributions as a tool for providing the basis for sampling, testing hypotheses and validity attainment. Small-group probability and statistics-related activities involving appropriate uses of technology, electronic discussions, student presentations, and analysis of practice-related artifacts are important instructional strategies that will be utilized in this course.

The Student of CUIN 6342 will	Key Course Assignments
Understand how to use graphical and numerical techniques to explore data, characterize patterns, and calculate measures of central tendency and dispersion.	Graded HW 3-5 Mathematics Assessments Midterm Exam Final Exam
Understand and apply the concepts of probability to model and solve a variety of problems involving probability and its distributions (e.g., binomial, geometric, normal).	
Understand the relationship among probability theory, sampling, and statistical inference and how statistical inferences using binomial, geometric, and normal distributions (including the appropriate use of technology) are used in making and evaluating predictions.	

Plan and design effective instruction and assessment based on knowledge of how all students, including students who are at risk, learn and develop probability and statistics concepts, skills, and procedures.	TEKS Alignment Lesson Plan Analysis Unit Exam Analysis Task-based Interview Video Analysis (Fall & Spring semesters only) Midterm Exam/Final Exam
Implement a variety of instruction and assessment techniques to guide, evaluate, and improve students' learning of probability and statistics concepts, skills, and procedures.	
Plan a professional development activity	Preliminary Proposal Writing

Mathematics Assessments (Competencies 19-21, 24 & 25): 3-5 mathematics assessments

Mathematics Education Assignments (Competencies 22 & 23)

TEKS Alignment: In collaborative teams, teachers examine and critique the K-12 TEKS regarding probability and statistics concepts in light of 1) recommendations by the National Council of Teachers of Mathematics *Principles and Standards*, 2) current research about how children develop probability and statistics concepts and 3) as it relates to the development of proportional reasoning concepts. In addition, where applicable, they participate in activities of examining TAKS items designed to measure said TEKS (e.g., Chauvot & Benson, 2008).

> Criteria to assess the TEKS Alignment Assignment: This assignment is evaluated on the extent to which the MMT candidates accurately identify strengths and weaknesses of the TEKS, provide rationales supported by relevant research, and to correctly identify proportional reasoning concepts.

Lesson Plan Analysis: MMT candidates will submit and exchange their own lesson plans from practice. They then collaboratively analyze submissions in light of course readings about how children develop probability and statistics concepts.

> Criteria to assess the Lesson Plan Analysis Assignment: This assignment is evaluated on the extent to which the MMT candidates accurately identify strengths and weaknesses of the lesson plans and to which they provide rationales supported by relevant research.

Unit Exam Analysis: MMT candidates submit and exchange unit exams from practice. They examine and apply frameworks (e.g., Kastberg (2003)) for analyzing classroom assessments. They submit the analysis, the test and suggested revisions.

> Criteria to assess the Unit Exam Analysis Assignment: This assignment is evaluated on the extent to which the MMT candidates accurately classify the items and to which they provide appropriate revisions.

Task-Based Interview: Drawing from the TEKS Alignment Assignment (above), MMT candidates conduct and analyze an audio-taped task-based interview with a grade 4-8 child that relates to both development of proportional reasoning concepts and probability and statistics concepts. Equipment for this assignment is available in the College of Education CITE lab.

Criteria to assess the Task-Based Interview Assignment: This assignment is evaluated on the extent to which the MMT candidates support claims about the child's thinking with evidence from the interview and the extent to which the MMT connects the child's thinking to relevant literature.

Video Analysis: The MMT candidate captures 20-40 minutes of his or her instructional practices and analyzes his or her teaching in terms of criteria brought forward in the respective course. Equipment for this assignment is available in the College of Education CITE lab.

Criteria to assess the Video Analysis Assignment: This assignment is evaluated on the extent to which the MMT candidates address relevant criteria and support claims about the instruction with evidence from the video.

Preliminary Proposal Writing: With his or her campus administrator or supervisor, the MMT candidate explores internal and external funding and professional development opportunities for his or her campus. The MMT candidate will maintain a log and submit a brief report of recommendations for the upcoming year, including an in-service training for his or her campus.