BED 4310 & ELED 4310

Teaching Math in Elementary School & Dual-Language Classroom
Spring 2014 (Jan 21 to May 8) – Syllabus

University of Texas at El Paso
College of Education, Department of Teacher Education

<table>
<thead>
<tr>
<th>Instructor</th>
<th>E-mail</th>
<th>Office Phone</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Song An</td>
<td><a href="mailto:saan@utep.edu">saan@utep.edu</a></td>
<td>915-747-7616</td>
<td>W &amp; T 1:00 pm–2:45 pm</td>
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<tr>
<td>Office Phone</td>
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<td>Other time by appointment</td>
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<tr>
<td>Office</td>
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<tr>
<td>Class Time</td>
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<tr>
<td>8:30-11:20 in Education Building 402</td>
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<td>W &amp; T 1:00 pm–2:45 pm</td>
<td>Other time by appointment</td>
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<tr>
<td>Session 1: Wednesday &amp; Session 2: Thursday</td>
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<tr>
<td>On-line discussions throughout the semester</td>
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<tr>
<td>This syllabus is subject to change as needed. Any changes to the syllabus will be announced in class.</td>
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</table>

Course Description

This course analyzes contemporary curricula; implementation of methods relevant for active, authentic learning, and culture relevant teaching of mathematics to elementary grade learners. Course instruction and activities include opportunities to understand state and national standards related to teaching and learning mathematics. The course will investigate how children learn mathematics and what is meant by deep understanding of mathematics as well as how to teach mathematics so that learners see relationships and connections within and between mathematics ideas. The course will also discuss equity principle and develop conceptual understanding of elementary grade mathematics contents.

Required Textbook


Recommended Resources

1. NCTM Illuminations: http://illuminations.nctm.org/
3. Early Algebra: www.ase.tufts.edu/education/earlyalgebra/default.asp
7. Texas Education Agency (TAKS Released Tests): http://www.tea.state.tx.us/
Course Objectives/Student Learning Outcomes

<table>
<thead>
<tr>
<th>Students enrolled in this section will have multiple academic goals to achieve:</th>
<th>Instructor will use following assessments to evaluate students’ learning outcomes</th>
</tr>
</thead>
</table>
| 1. Develop a positive belief in teaching and learning mathematics; understand the role of the teacher as a reflective practitioner. | a. Course graded assignments  
 b. Surveys |
| 2. Design mathematics lessons aligned with the NCTM and TEKS with emphasis of mathematics processes and conceptual understanding | a. Course graded assignments  
 b. Group projects  
 c. Online discussions |
| 3. Identify and use curricular materials and resources that support learner-centered teaching practices. | a. Course graded assignments  
 b. Group projects |
| 4. Create differentiated lessons effective for the diverse mathematics classroom. | a. Chapter quizzes  
 b. Group presentations  
 c. Online discussions |
| 5. Explore and develop skills in instructional methods (i.e., use of mathematics manipulatives) appropriate for the teaching and learning of elementary mathematics concepts. | a. Course graded assignments  
 b. Final Exam  
 c. Class discussion and presentation on specific math contents |
| 6. Create assessments appropriate for the Elementary school students | a. Course graded assignments  
 b. In class discussions  
 c. Final exam |

Attendance, Participation and Professionalism

Attendance of individuals in the class is required and unexcused absences will result in a grade reduction. University rules regarding absences will be followed for the required class meetings. There will be a student sign-in sheet at the beginning of each class. If a student misses a session, it is the responsibility of the student for knowing and completing all work required. Each attendance will count towards the final grade. Two tardies (including early leaves) will count as one absence. More than two absences may result in a student earning one-letter grade lower in the course.

Students are expected that students will attend all classes and actively participate in working on projects and class discussions. Students are expected to prepare for each class session. Lateness to class is strongly discouraged. With the emphasis on collegiality it is important that all group members be in class to contribute to the group’s effort in developing an understanding of what it means to teach mathematics effectively.

All teaching candidates are expected to demonstrate the ethical and professional values associated with Elementary Level Education. It is critical teaching candidates adopt and exhibit a professional demeanor at each point in their teacher preparation. Evidence of professional dedication will be expected through all work during classes and practicum, seminar, internship, and clinical experiences. Credit for participation and professionalism will be part of the evaluation. *Wireless phone usage is strictly prohibited in class.*
Assignment Format and Late Assignments

All assignments must be submitted electronically unless specified. It is highly recommended you save all your work electronically and possibly a hardcopy for your records before turning it in. The following format is required for every assignment submitted. Deviating from the format may result in reduced points, returned paper, or rejection of the assignment completely. All assignments should be double spaced and typed with 12-point font; page numbers should be included if more than one pages. **You must label your assignment as you save it containing your name and the assignment name.** Only assignments submitted complete and on time will be considered for full credit. Without evidence that you were unavailable (sick) for the entire range of days, the assignment will be given a zero. Any assignments turned more than one week late (or the range of dates for submission) will receive zero points.

Policy on Academic Dishonesty

The University of Texas at El Paso prides itself on its standards of academic excellence. In all matters of intellectual pursuit, UTEP faculty and students must strive to achieve based on the quality of work produced by their individual. In the classroom and in all other academic activities, students are expected to uphold the highest standards of academic integrity. Any form of scholastic dishonesty is an affront to the pursuit of knowledge and jeopardizes the quality of the degree awarded to all graduates of UTEP. It is imperative, therefore, that all faculty, insist on adherence to these standards.

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are not attributable in whole or in part to another person, taking an examination for another person, and any act designed to give unfair advantage to a student or the attempt to commit such acts. Proven violations of the detailed regulations, as printed in the Handbook of Operating Procedures (HOP) and available in the Office of the Dean of Students, may result in sanctions ranging from disciplinary probation, to failing grades on the work in question, to failing grades in the course, to suspension or dismissal among others.

Students with Special Needs

If you have or believe that you have a disability, you may wish to self-identify. You can do this by contacting the Center for Accommodations and Support Services (CASS) to show documentation of a disability or to register to receive testing and services. CASS provides the following services: note taking, sign language, interpreter, reader and/or scribe services, priority registration, adaptive technology, diagnostic testing for learning disabilities, assistance with learning strategies/tutoring, alternative testing location and format, and advocacy. All information provided to CASS is kept with the strictest rules of confidentiality. The website for this office is [http://sa.utep.edu/cass/](http://sa.utep.edu/cass/)
Course Requirement

Attendance and Class Participation

Your active participation in each class session is vital to your learning as well as to the learning of other students in the class. I expect you to attend all class meetings prepared for active, collaborative, participation during the session, whether it is whole group discussion, small group activity, or individual reflection. Preparation for class involves completion of assigned readings and tasks. If you are unable to attend a particular class session, please let me know beforehand. You are responsible for contacting someone in the class to find out what transpired in your absence. Late work will not be accepted. Make-up quizzes or tests may be scheduled only in the event of documented illness or emergency.

Project Development and Demonstration

Working in groups, you will design and conduct an interdisciplinary project to explore mathematics and/or other school subjects through your project experiences. For example, you can use mathematics concepts to compose a piece of music, write your own mathematics related lyrics, make your own music videos, designing musical instruments based on mathematical relationships and statistically analyze your own musical works. As the final demonstration of your project, you will make a comprehensive and/or interactive video (4 minutes) to show what are specific mathematical concepts and procedures and knowledge from other school subjects that your group explored.

Surveys and Summative Take Home Exam

The surveys will be 7 points each, and the summative exam will be 40 points. The summative exam will cover teacher certification tests contents, class discussions, assignments, activities, and readings. Some parts of the survey and exam will be completed during class time as scheduled in the syllabus, and some are take-home parts.

Online Discussion

Participate in online discussion 2-3 times in specified weeks. Your posts should be meaningful, well thought-out, and articulate. Post your first response by the due days and post your follow up responses in the following two days. Read all the postings of your peers, and interact with your peers in a positive manner. You will reply at least three of your classmates’ posts in a meaningful way.

Assignment 1: NCTM Review (Two pages double spaces)

You will read NCTM standards for PreK-2 and 3-5. You will compare the standards between the grade PreK-2 & 3-5 in NCTM and discuss about the key differences between the two grade levels for a specific of content areas in teaching mathematics.
Assignment 2: TEKS Review (Two pages double spaces)

You will read the TEKS in mathematics for grade K-5; you will also identify and discuss some key differences between the TEKS and the NCTM standards on one or more specific mathematics content area.

Assignment 3: Activity Evaluation (Three pages, double spaces)

You will examine and evaluate a series of mathematics activities via a list of teaching journals (e.g. Teaching Children Mathematics). You will summarize the main structure of the activities and describe which mathematical contents that students may learn from the activities. You will also discuss the strengths and possible weaknesses of the activities and explain how you may revise them.

Assignment 4: Project Reflection (Three pages, double spaces)

After you finished your project, you will write up a reflection essay of your project that includes the (a) description of the effectiveness of the project in developing understanding of the mathematical content as a teacher, (b) discuss the things you might do differently the next time you teach the lesson to promote understanding of the mathematics content, and discuss what you learned from the project designing and development process.

Assignment 5: Lesson Plan Development (Four pages, double spaces)

Working in groups, you will prepare a series of five lessons based on the project you designed and tested. You will select a specific topic area for your lesson. Your goal is for the lesson to develop concepts from the topic, specifically the content standards and the five process standards. This lesson plan needs to follow the lesson plan template and fit the lesson plan evaluation criteria.

Assignments and Grades

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>Timeframe</th>
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</thead>
<tbody>
<tr>
<td>Attendance and Class Participation</td>
<td>5 Pts×8</td>
<td>Throughout Semester</td>
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<tr>
<td>Weekly Discussion</td>
<td>10 Pts×7</td>
<td>Throughout Semester</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>10 Pts</td>
<td>(Week2)</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>10 Pts</td>
<td>(Week4)</td>
</tr>
<tr>
<td>Assignment 3</td>
<td>10 Pts</td>
<td>(Week6)</td>
</tr>
<tr>
<td>Assignment 4</td>
<td>10 Pts</td>
<td>(Week8)</td>
</tr>
<tr>
<td>Assignment 5</td>
<td>10 Pts</td>
<td>(Week10)</td>
</tr>
<tr>
<td>Assignment 6</td>
<td>10 Pts</td>
<td>(Week15)</td>
</tr>
<tr>
<td>Project Development &amp; Demonstration</td>
<td>40 Pts</td>
<td>(Week6-9)</td>
</tr>
<tr>
<td>Surveys</td>
<td>10 Pts×4</td>
<td>Throughout Semester</td>
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<tr>
<td>Summative Exam</td>
<td>30 Pts</td>
<td>(Week 15)</td>
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Total 250 Pts

Grade Distribution:

- A 90% - 100% of point total
- B 80% - 89.9% of point total
- C 70% - 79.9% of point total
- D 60% - 69.9% of point total
# General Calendar

Changes may be made in this syllabus when judged appropriate by the instructor

<table>
<thead>
<tr>
<th>Date</th>
<th>Class Topics/Activities</th>
<th>Assignments and Due dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Chapter 1-3 Foundation of Math Teaching Part I</td>
<td>Online Discussions 1</td>
</tr>
<tr>
<td>Jan 22/23</td>
<td></td>
<td>Due Jan 26</td>
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<tr>
<td>Week 2</td>
<td>Chapter 4-7 Foundation of Math Teaching Part II</td>
<td>Assignment 1</td>
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<td>Jan 29/30</td>
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<td>Due Jan 30</td>
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<td>Week 3</td>
<td>Innovative Math Teaching Approach (Part 1)</td>
<td></td>
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<td>Feb 5/6</td>
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<tr>
<td>Week 4</td>
<td>Innovative Math Teaching Approach (Part 2)</td>
<td>Online Discussions 2</td>
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<td>Feb 12/13</td>
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<td>Due Feb 9</td>
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<tr>
<td>Week 5</td>
<td>Chapter 8-13 Number and Operation</td>
<td>Assignment 2</td>
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<tr>
<td>Feb 19/20</td>
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<td>Due Feb 12</td>
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<tr>
<td>Week 6</td>
<td>Math Activity Development (Part 1)</td>
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<td>Feb 26/27</td>
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<td>Week 7</td>
<td>Math Activity Development (Part 2)</td>
<td>Online Discussions 3</td>
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<td>Mar 5/6</td>
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<td>Due Mar 9</td>
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<tr>
<td>Week 8</td>
<td>Chapter 19 &amp; 20 Geometry and Measurement</td>
<td>Assignment 3</td>
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<tr>
<td>Mar 12/13</td>
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<td>Due Mar 12</td>
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<tr>
<td>Week 9</td>
<td>Spring Break</td>
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<tr>
<td>Mar 19/20</td>
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<tr>
<td>Week 10</td>
<td>Chapter 14, 18, 21, 22 Algebra, Data Analysis &amp; Probability</td>
<td>Online Discussions 4</td>
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<td>Mar 26/27</td>
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<tr>
<td>Week 11</td>
<td>Chapter 15-17 Fraction and Decimal</td>
<td>Assignment 4</td>
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<td>Apr 2/3</td>
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<td>Due Apr 9</td>
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<tr>
<td>Week 12</td>
<td>Project Presentation &amp; Demonstration</td>
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<td>Apr 9/10</td>
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<tr>
<td>Week 13</td>
<td>Project Presentation &amp; Demonstration</td>
<td>Online Discussions 5</td>
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<td>Apr 16/17</td>
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<td>Due Apr 20</td>
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<tr>
<td>Week 14</td>
<td>Project Presentation &amp; Demonstration</td>
<td>Assignment 5</td>
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<tr>
<td>Apr 23/24</td>
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<td>Due Apr 23</td>
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<tr>
<td>Week 15</td>
<td>Project Presentation &amp; Demonstration</td>
<td>Online Discussions 6</td>
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<tr>
<td>Apr 30/May 1</td>
<td></td>
<td>Due May 4</td>
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<tr>
<td>Week 15</td>
<td>Take Home Final Exam</td>
<td>Due May 16</td>
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<tr>
<td>May 7/8</td>
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TEExES Standards and Competencies for Mathematics (EC-6, BIL EC-6, Generalist 4-8)

competency 013 / 017 (mathematics instruction)
THE TEACHER UNDERSTANDS HOW STUDENTS LEARN MATHEMATICAL SKILLS AND USES THAT KNOWLEDGE TO PLAN, ORGANIZE AND IMPLEMENT INSTRUCTION AND ASSESS LEARNING.
The beginning teacher:

A. Plans appropriate instructional activities for all students by applying research-based theories and principles of learning mathematics.
B. Employs instructional strategies that build on the linguistic, cultural and socioeconomic diversity of students and that relate to students’ lives and communities.
C. Plans and provides developmentally appropriate instruction that establishes transitions between concrete, symbolic and abstract representations of mathematical knowledge and that builds on students’ strengths and addresses their needs.
D. Understands how manipulatives and technological tools can be used appropriately to assist students in developing, comprehending and applying mathematical concepts.
E. Creates a learning environment that motivates all students and actively engages them in the learning process by using a variety of interesting, challenging and worthwhile mathematical tasks in individual, small-group and large-group settings.
F. Uses a variety of tools (e.g., counters, standard and nonstandard units of measure, rulers, protractors, scales, stopwatches, measuring containers, money, calculators, software) to strengthen students’ mathematical understanding.
G. Implements a variety of instructional methods and tasks that promote students’ ability to do the mathematics described in the Texas Essential Knowledge and Skills (TEKS).
H. Develops clear learning goals to plan, deliver, assess and reevaluate instruction based on the mathematics in the Texas Essential Knowledge and Skills (TEKS).
I. Helps students make connections between mathematics and the real world, as well as between mathematics and other disciplines such as art, music, science, social science and business.
J. Uses a variety of questioning strategies to encourage mathematical discourse and to help students analyze and evaluate their mathematical thinking.
K. Uses a variety of formal and informal assessments and scoring procedures to evaluate mathematical understanding, common misconceptions and error patterns.
L. Understands the relationship between assessment and instruction and knows how to evaluate assessment results to design, monitor and modify instruction to improve mathematical learning for all students, including English-language learners.
M. Understands the purpose, characteristics and uses of various assessments in mathematics, including formative and summative assessments.
N. Understands how mathematics is used in a variety of careers and professions and plans instruction that demonstrates how mathematics is used in the workplace.

competency 014 / 018 (number concepts and operations)
THE TEACHER UNDERSTANDS CONCEPTS RELATED TO NUMBERS, OPERATIONS AND ALGORITHMS AND THE PROPERTIES OF NUMBERS.
The beginning teacher:

A. Analyzes, describes and models relationships between number properties, operations and algorithms for the four basic operations involving integers, rational numbers and real numbers.
B. Demonstrates an understanding of equivalency among different representations of rational numbers.
C. Selects appropriate representations of real numbers (e.g., fractions, decimals, percents) for particular situations.
D. Demonstrates an understanding of ideas from number theory (e.g., prime factorization, greatest common divisor) as they apply to whole numbers, integers and
rational numbers, and uses those ideas in problem situations.

E. Understands the relative magnitude of whole numbers, integers, rational numbers and real numbers.

F. Demonstrates an understanding of a variety of models for representing numbers (e.g., fraction strips, diagrams, patterns, shaded regions, number lines).

G. Uses a variety of concrete and visual representations to demonstrate the connections between operations and algorithms.

H. Applies knowledge of counting techniques, including combinations, to quantify situations and solve problems.

I. Applies knowledge of place value and other number properties to perform mental mathematics and computational estimation.

Competency 015 / 19 (patterns and algebra)
THE TEACHER UNDERSTANDS CONCEPTS RELATED TO PATTERNS, RELATIONS, FUNCTIONS AND ALGEBRAIC REASONING.
The beginning teacher:
A. Illustrates relations and functions using concrete models, tables, graphs and symbolic and verbal representations.

B. Demonstrates an understanding of the concept of linear function using concrete models, tables, graphs and symbolic and verbal representations.

C. Understands how to use algebraic concepts and reasoning to investigate patterns, make generalizations, formulate mathematical models, make predictions and validate results.

D. Formulates implicit and explicit rules to describe and construct sequences verbally, numerically, graphically and symbolically.

E. Knows how to identify, extend, and create patterns using concrete models, figures, numbers and algebraic expressions.

F. Uses properties, graphs, linear and nonlinear functions and applications of relations and functions to analyze, model and solve problems in mathematical and real-world situations.

G. Translates problem-solving situations into expressions and equations involving variables and unknowns.

H. Models and solves problems, including those involving proportional reasoning, using concrete, numeric, tabular, graphic and algebraic methods.

I. Determines the linear function that best models a set of data.

J. Understands the concept of and relationships among variables, expressions, equations, inequalities and systems in order to analyze, model and solve problems.

competency 016 / 020 (geometry and measurement)
THE TEACHER UNDERSTANDS CONCEPTS AND PRINCIPLES OF GEOMETRY AND MEASUREMENT.
The beginning teacher:
A. Applies knowledge of spatial concepts such as direction, shape and structure.

B. Identifies, uses and understands the development of formulas to find lengths, perimeters, areas and volumes of basic geometric figures.

C. Uses the properties of congruent triangles to explore geometric relationships.

D. Understands concepts and properties of points, lines, planes, angles, lengths and distances.

E. Analyzes and applies the properties of parallel and perpendicular lines.

F. Uses a variety of representations (e.g., numeric, verbal, graphic, symbolic) to analyze and solve problems involving two- and three-dimensional figures such as circles, triangles, polygons, cylinders, prisms and spheres.

G. Uses symmetry to describe tessellations and shows how they can be used to illustrate geometric concepts, properties and relationships.

H. Understands measurement as a process, including methods of approximation and estimation, and the effects of error on measurement.
I. Explains, illustrates, selects and uses appropriate units of measurement to quantify and compare time, temperature, money, mass, weight, area, capacity, volume, percent and speed.
J. Uses translations, rotations and reflections to illustrate similarities, congruencies and symmetries of figures.
K. Develops, justifies and uses conversions within and between measurement systems.
L. Understands logical reasoning, justification and proof in relation to the axiomatic structure of geometry and uses reasoning to develop, generalize, justify and prove geometric relationships.

**competency 017 / 021 (probability and statistics)**

**THE TEACHER UNDERSTANDS CONCEPTS RELATED TO PROBABILITY AND STATISTICS AND THEIR APPLICATIONS.**

The beginning teacher:

A. Investigates and answers questions by collecting, organizing and displaying data in a variety of formats as described in the Texas Essential Knowledge and Skills (TEKS).
B. Demonstrates an understanding of measures of central tendency (e.g., mean, median, mode) and range and uses those measures to describe a set of data.
C. Explores concepts of probability through data collection, experiments and simulations.
D. Uses the concepts and principles of probability to describe the outcome of simple and compound events.
E. Determines probabilities by constructing sample spaces to model situations.
F. Applies knowledge of the use of probability to make observations and draw conclusions.
G. Solves a variety of probability problems using combinations and geometric probability (i.e., probability as the ratio of two areas).
H. Supports arguments, makes predictions and draws conclusions using summary statistics and graphs to analyze and interpret one-variable data.
I. Applies knowledge of designing, conducting, analyzing and interpreting statistical experiments to investigate real-world problems.
J. Generates, simulates and uses probability models to represent situations.
K. Uses the graph of the normal distribution as a basis for making inferences about a population.

**competency 018 / 022 (mathematical processes)**

**THE TEACHER UNDERSTANDS MATHEMATICAL PROCESSES AND KNOWS HOW TO REASON MATHEMATICALLY, SOLVE MATHEMATICAL PROBLEMS AND MAKE MATHEMATICAL CONNECTIONS WITHIN AND OUTSIDE OF MATHEMATICS.**

The beginning teacher:

A. Understands the role of logical reasoning in mathematics and uses formal and informal reasoning to explore, investigate and justify mathematical ideas.
B. Applies correct mathematical reasoning to derive valid conclusions from a set of premises.
C. Applies principles of inductive reasoning to make conjectures and uses deductive methods to evaluate the validity of conjectures.
D. Evaluates the reasonableness of a solution to a given problem.
E. Understands connections among concepts, procedures and equivalent representations in areas of mathematics (e.g., algebra, geometry).
F. Recognizes that a mathematical problem can be solved in a variety of ways and selects an appropriate strategy for a given problem.
G. Expresses mathematical statements using developmentally appropriate language, standard English, mathematical language and symbolic mathematics.
H. Communicates mathematical ideas using a variety of representations (e.g., numeric, verbal, graphic, pictorial, symbolic, concrete).
I. Demonstrates an understanding of the use of visual media such as graphs, tables,
diagrams and animations to communicate mathematical information.
J. Demonstrates an understanding of estimation and evaluates its appropriate uses.
K. Knows how to use mathematical manipulatives and a wide range of appropriate technological tools to develop and explore mathematical concepts and ideas.
L. Demonstrates knowledge of the history and evolution of mathematical concepts, procedures and ideas.
M. Recognizes the contributions that different cultures have made to the field of mathematics and the impact of mathematics on society and cultures.