Math 4305-115, 60020, Concepts of Elementary Mathematics III
Summer 2020
Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION
June 1st – July 24th
This is a 100% online course, and uses the A&M-Central Texas Canvas Learning Management System 
https://tamuct.instructure.com/
and mymathlab
https://www.pearsonmylabandmastering.com/northamerica/mymathlab/

INSTRUCTOR AND CONTACT INFORMATION
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Student-instructor interaction
I will check messages once a day on the CANVAS inbox system and reply within 24 hours. Students are expected to check their CANVAS email and announcements on a daily basis.

WARRIOR SHIELD
Emergency Warning System for Texas A&M University-Central Texas
Warrior Shield is an emergency notification service that gives Texas A&M University-Central Texas the ability to communicate health and safety emergency information quickly via email, text message, and social media. All students are automatically enrolled in Warrior Shield through their myCT email account.

Connect to Warrior Shield by 911Cellular [https://portal.publicsafetycloud.net/Account/Login] to change where you receive your alerts or to opt out. By staying enrolled in Warrior Shield, university officials can quickly pass on safety-related information, regardless of your location.
COURSE INFORMATION
Course Overview and description
This course is intended for prospective teachers who want to review key concepts, principles, and strategies for teaching Mathematics in EC-6 and 4-8 classrooms. Technology and teaching methods will be incorporated where appropriate. Prerequisites: Math 305 (Math 1351).

Course Objective or Goal
Student Learning Outcomes
The goal of this course is to deepen your conceptual understanding of the underlying mathematics covered in the EC-6 and 4-8 school curriculum. In addition to strengthening your content knowledge, you will engage in the pedagogy pertaining to the learned mathematics by using manipulatives to explain abstract mathematical concepts. The mathematics in the course emphasizes topics relevant to teaching children from prekindergarten to grade 8 according to guidelines as outlined by the Texas Education Agency and the National Council for Teachers of Mathematics.

Competency Goals Statements (certification or standards)
After completing this course, students should be able to:

- Solve open-ended elementary school problems in areas such as patterns, algebra, ratios, and percents,
  (Covered in homework assignments, midterm, final)

- Justify the use of our numeration system by comparing it to historical alternatives and other bases, and describe the development of the system and its properties as it expands from the set of natural numbers to the set of real numbers,
  (Covered in homework assignments, midterm, final)

- Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and relationships,
  (Covered in all assignments)

- Display mastery of basic computational skills and recognize the appropriate use of technology to enhance those skills,
  (Covered in presentations)

- Demonstrate and justify standard and alternative algorithms for addition, subtraction, multiplication and division of whole numbers, integers, fractions, and decimals,
  (Covered in homework assignments, midterm, final)
• Identify, explain, and evaluate the use of elementary classroom manipulatives to model sets, operations, and algorithms, and

  (Covered in presentations)

• Use number-theory arguments to justify relationships involving divisors, multiples and factoring.

  (Covered on all assignments)

• Solve open-ended elementary school problems in using visualization and statistical reasoning,

  (Covered on all assignments)

• Use the GeoGebra software to explain abstract mathematical concepts,

  (Covered in Presentations)

• Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and relationships,

  (Covered in all assignments)

• Identify, explain, and evaluate the use of elementary classroom manipulatives to model geometry, probability and statistics,

  (Covered in Presentations)

• Explain relationships among measurable attributes of objects and determine measurements,

  (Covered in homework assignments, presentations, midterm, final)

• Analyze characteristic and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,

  (Covered on all assignments)

• Apply transformations and use symmetry to analyze mathematical situations,

  (Covered on all assignments)

• Explain and apply basic concepts of probability, and

  (Covered on all assignments)
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

(Covered on all assignments)

4-8 Mathematics TEA standards and competencies:

The Standards Mathematics Standard I Number Concepts:

The mathematics teacher understands and uses numbers, number systems and their structure, operations and algorithms, quantitative reasoning and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to prepare students to use mathematics.

Mathematics Standard II Patterns and Algebra:

The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis and technology appropriate to teach the statewide curriculum (TEKS) to prepare students to use mathematics.

Mathematics Standard III Geometry and Measurement:

The mathematics teacher understands and uses geometry, spatial reasoning, measurement concepts and principles and technology appropriate to teach the statewide curriculum (TEKS) to prepare students to use mathematics.

Mathematics Standard IV Probability and Statistics:

The mathematics teacher understands and uses probability and statistics, their applications and technology appropriate to teach the statewide curriculum (TEKS) to prepare students to use mathematics.

Mathematics Standard V Mathematical Processes:

The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.

Mathematics Standard VI Mathematical Perspectives:

The mathematics teacher understands the historical development of mathematical ideas, the relationship between society and mathematics, the structure of mathematics and the evolving
nature of mathematics and mathematical knowledge.

Mathematics Standard VII Mathematical Learning and Instruction:

The mathematics teacher understands how children learn and develop mathematical skills, procedures and concepts; knows typical errors students make; and uses this knowledge to plan, organize and implement instruction to meet curriculum goals and to teach all students to understand and use mathematics.

Mathematics Standard VIII Mathematical Assessment:

The mathematics teacher understands assessment, and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

Domains and Competencies

The content covered by this test is organized into broad areas of content called domains. Each domain covers one or more of the educator standards for this field. Within each domain, the content is further defined by a set of competencies. Each competency is composed of two major parts: 1. The competency statement, which broadly defines what an entry-level educator in this field in Texas public schools should know and be able to do. 2. The descriptive statements, which describe in greater detail the knowledge and skills eligible for testing.

Domain I — Number Concepts

Competency 001: The teacher understands the structure of number systems, the development of a sense of quantity and the relationship between quantity and symbolic representations. The beginning teacher:

A. Analyzes the structure of numeration systems and the roles of place value and zero in the base ten system.

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

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

D. Demonstrates an understanding of equivalency among different representations of rational numbers.

E. Selects appropriate representations of real numbers (e.g., fractions, decimals, percents, roots, exponents, scientific notation) for particular situations.

F. Understands the characteristics of the set of whole numbers, integers, rational numbers, real
numbers and complex numbers (e.g., commutativity, order, closure, identity elements, inverse elements, density).

G. Demonstrates an understanding of how some situations that have no solution in one number system (e.g., whole numbers, integers, rational numbers) have solutions in another number system (e.g., real numbers, complex numbers).

Competency 002: The teacher understands number operations and computational algorithms. The beginning teacher:

A. Works proficiently with real and complex numbers and their operations.

B. Analyzes and describes relationships between number properties, operations and algorithms for the four basic operations involving integers, rational numbers and real numbers.

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

D. Justifies procedures used in algorithms for the four basic operations with integers, rational numbers and real numbers and analyzes error patterns that may occur in their application.

E. Relates operations and algorithms involving numbers to algebraic procedures (e.g., adding fractions to adding rational expressions, division of integers to division of polynomials).

F. Extends and generalizes the operations on rationals and integers to include exponents, their properties and their applications to the real numbers.

Competency 003: The teacher understands ideas of number theory and uses numbers to model and solve problems within and outside of mathematics. The beginning teacher:

A. 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 these ideas in problem situations.

B. Uses integers, rational numbers and real numbers to describe and quantify phenomena such as money, length, area, volume and density.

C. Applies knowledge of place value and other number properties to develop techniques of mental mathematics and computational estimation.

D. Applies knowledge of counting techniques such as permutations and combinations to quantify situations and solve problems.
E. Applies properties of the real numbers to solve a variety of theoretical and applied problems.

**Domain II — Patterns and Algebra**

Competency 004: The teacher understands and uses mathematical reasoning to identify, extend and analyze patterns and understands the relationships among variables, expressions, equations, inequalities, relations and functions. The beginning teacher:

A. Uses inductive reasoning to identify, extend and create patterns using concrete models, figures, numbers and algebraic expressions.

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

C. Makes, tests, validates and uses conjectures about patterns and relationships in data presented in tables, sequences or graphs.

D. Gives appropriate justification of the manipulation of algebraic expressions.

E. Illustrates the concept of a function using concrete models, tables, graphs and symbolic and verbal representations.

F. Uses transformations to illustrate properties of functions and relations and to solve problems.

Competency 005: The teacher understands and uses linear functions to model and solve problems. The beginning teacher:

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

B. Demonstrates an understanding of the connections among linear functions, proportions and direct variation.

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

D. Analyzes the relationship between a linear equation and its graph.

E. Uses linear functions, inequalities and systems to model problems.

F. Uses a variety of representations and methods (e.g., numerical methods, tables, graphs,
algebraic techniques) to solve systems of linear equations and inequalities.

G. Demonstrates an understanding of the characteristics of linear models and the advantages and disadvantages of using a linear model in a given situation.

Competency 006: The teacher understands and uses nonlinear functions and relations to model and solve problems. The beginning teacher:

A. Uses a variety of methods to investigate the roots (real and complex), vertex and symmetry of a quadratic function or relation.

B. Demonstrates an understanding of the connections among geometric, graphic, numeric and symbolic representations of quadratic functions.

C. Analyzes data and represents and solves problems involving exponential growth and decay.

D. Demonstrates an understanding of the connections among proportions, inverse variation and rational functions.

E. Understands the effects of transformations.

F. Applies properties, graphs and applications of nonlinear functions to analyze, model and solve problems.

G. Uses a variety of representations and methods (e.g., numerical methods, tables, graphs, algebraic techniques) to solve systems of quadratic equations and inequalities.

H. Understands how to use properties, graphs and applications of nonlinear relations including polynomial, rational, radical, absolute value, exponential, logarithmic, trigonometric and piecewise functions and relations to analyze, model and solve problems.

Competency 007: The teacher uses and understands the conceptual foundations of calculus related to topics in middle school mathematics. The beginning teacher:

A. Relates topics in middle school mathematics to the concept of limit in sequences and series.

B. Relates the concept of average rate of change to the slope of the secant line and instantaneous rate of change to the slope of the tangent line.

C. Relates topics in middle school mathematics to the area under a curve.

D. Demonstrates an understanding of the use of calculus concepts to answer questions about
rates of change, areas, volumes and properties of functions and their graphs.

**Domain III — Geometry and Measurement**

Competency 008: The teacher understands measurement as a process. The beginning teacher:

A. Selects and uses appropriate units of measurement (e.g., temperature, money, mass, weight, area, capacity, density, percents, speed, acceleration) to quantify, compare and communicate information.

B. Develops, justifies and uses conversions within measurement systems.

C. Applies dimensional analysis to derive units and formulas in a variety of situations (e.g., rates of change of one variable with respect to another) and to find and evaluate solutions to problems.

D. Describes the precision of measurement and the effects of error on measurement.

E. Applies the Pythagorean theorem, proportional reasoning and right triangle trigonometry to solve measurement problems.

Competency 009: The teacher understands the geometric relationships and axiomatic structure of Euclidean geometry. The beginning teacher:

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

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

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

D. Describes and justifies geometric constructions made using a compass and straight edge and other appropriate technologies.

E. Applies knowledge of the axiomatic structure of Euclidean geometry to justify and prove theorems.

Competency 010: The teacher analyzes the properties of two- and three-dimensional figures. The beginning teacher:

A. Uses and understands the development of formulas to find lengths, perimeters, areas and
volumes of basic geometric figures.

B. Applies relationships among similar figures, scale and proportion and analyzes how changes in scale affect area and volume measurements.

C. 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.

D. Analyzes the relationship among three-dimensional figures and related two-dimensional representations (e.g., projections, cross-sections, nets) and uses these representations to solve problems.

Competency 011: The teacher understands transformational geometry and relates algebra to geometry and trigonometry using the Cartesian coordinate system. The beginning teacher:

A. Describes and justifies geometric constructions made using a reflection device and other appropriate technologies.

B. Uses translations, reflections, glide-reflections and rotations to demonstrate congruence and to explore the symmetries of figures.

C. Uses dilations (expansions and contractions) to illustrate similar figures and proportionality.

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

E. Applies concepts and properties of slope, midpoint, parallelism and distance in the coordinate plane to explore properties of geometric figures and solve problems.

F. Applies transformations in the coordinate plane. G. Uses the unit circle in the coordinate plane to explore properties of trigonometric functions.

Domain IV — Probability and Statistics

Competency 012: The teacher understands how to use graphical and numerical techniques to explore data, characterize patterns and describe departures from patterns. The beginning teacher:

A. Organizes and displays data in a variety of formats (e.g., tables, frequency distributions, stem-and-leaf plots, box-and-whisker plots, histograms, pie charts).
B. Applies concepts of center, spread, shape and skewness to describe a data distribution.

C. Supports arguments, makes predictions and draws conclusions using summary statistics and graphs to analyze and interpret one-variable data.

D. Demonstrates an understanding of measures of central tendency (e.g., mean, median, mode) and dispersion (e.g., range, interquartile range, variance, standard deviation).

E. Analyzes connections among concepts of center and spread, data clusters and gaps, data outliers and measures of central tendency and dispersion.

F. Calculates and interprets percentiles and quartiles.

Competency 013: The teacher understands the theory of probability. The beginning teacher:

A. Explores concepts of probability through data collection, experiments and simulations.

B. Uses the concepts and principles of probability to describe the outcome of simple and compound events.

C. Generates, simulates and uses probability models to represent a situation.

D. Determines probabilities by constructing sample spaces to model situations.

E. Solves a variety of probability problems using combinations, permutations and geometric probability (i.e., probability as the ratio of two areas).

F. Uses the binomial, geometric and normal distributions to solve problems.

Competency 014: The teacher understands the relationship among probability theory, sampling and statistical inference and how statistical inference is used in making and evaluating predictions. The beginning teacher:

A. Applies knowledge of designing, conducting, analyzing and interpreting statistical experiments to investigate real-world problems.

B. Demonstrates an understanding of random samples, sample statistics and the relationship between sample size and confidence intervals.

C. Applies knowledge of the use of probability to make observations and draw conclusions from single variable data and to describe the level of confidence in the conclusion.
D. Makes inferences about a population using binomial, normal and geometric distributions.

E. Demonstrates an understanding of the use of techniques such as scatter plots, regression lines, correlation coefficients and residual analysis to explore bivariate data and to make and evaluate predictions.

**Domain V — Mathematical Processes and Perspectives**

Competency 015: The teacher understands mathematical reasoning and problem solving. The beginning teacher:

A. Demonstrates an understanding of proof, including indirect proof, in mathematics.

B. Applies correct mathematical reasoning to derive valid conclusions from a set of premises.

C. Demonstrates an understanding of the use of inductive reasoning to make conjectures and deductive methods to evaluate the validity of conjectures.

D. Applies knowledge of the use of formal and informal reasoning to explore, investigate and justify mathematical ideas.

E. Recognizes that a mathematical problem can be solved in a variety of ways and selects an appropriate strategy for a given problem.

F. Evaluates the reasonableness of a solution to a given problem.

G. Applies content knowledge to develop a mathematical model of a real-world situation and analyzes and evaluates how well the model represents the situation.

H. Demonstrates an understanding of estimation and evaluates its appropriate uses.

Competency 016: The teacher understands mathematical connections within and outside of mathematics and how to communicate mathematical ideas and concepts. The beginning teacher:

A. Recognizes and uses multiple representations of a mathematical concept (e.g., a point and its coordinates, the area of circle as a quadratic function in r, probability as the ratio of two areas).

B. Uses mathematics to model and solve problems in other disciplines, such as art, music,
science, social science and business.

C. Expresses mathematical statements using developmentally appropriate language, standard English, mathematical language and symbolic mathematics.

D. Communicates mathematical ideas using a variety of representations (e.g., numeric, verbal, graphic, pictorial, symbolic, concrete).

E. Demonstrates an understanding of the use of visual media such as graphs, tables, diagrams and animations to communicate mathematical information.

F. Uses the language of mathematics as a precise means of expressing mathematical ideas.

G. Understands the structural properties common to the mathematical disciplines.

H. Explores and applies concepts of financial literacy as it relates to teaching students (e.g., describe the basic purpose of financial institutions, distinguish the difference between gross income and net income, identify various savings options, define different types of taxes, identify the advantages and disadvantages of different methods of payments).

I. Applies mathematics to model and solve problems to manage financial resources effectively for lifetime financial security as it relates to teaching students (e.g., distinguish between fixed and variable expenses, calculate profit in a given situation develop a system for keeping and using financial records, describe actions that might be taken to balance a budget when expenses exceed income and balance a simple budget.)

Domain VI — Mathematical Learning, Instruction and Assessment

Competency 017: The teacher understands how children learn and develop mathematical skills, procedures and concepts. The beginning teacher:

A. Applies theories and principles of learning mathematics to plan appropriate instructional activities for all students.

B. Understands how students differ in their approaches to learning mathematics with regard to diversity.

C. Uses students’ prior mathematical knowledge to build conceptual links to new knowledge and plans instruction that builds on students’ strengths and addresses students’ needs.

D. Understands how learning may be assisted through the use of mathematics manipulatives and technological tools.
E. Understands how to motivate students and actively engage 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. Understands how to provide instruction along a continuum from concrete to abstract.

G. Recognizes the implications of current trends and research in mathematics and mathematics education.

Competency 018: The teacher understands how to plan, organize and implement instruction using knowledge of students, subject matter and statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to teach all students to use mathematics. The beginning teacher:

A. Demonstrates an understanding of a variety of instructional methods, tools and tasks that promote students’ ability to do mathematics described in the TEKS.

B. Understands planning strategies for developing mathematical instruction as a discipline of interconnected concepts and procedures.

C. Develops clear learning goals to plan, deliver, assess and reevaluate instruction based on the TEKS.

D. Understands procedures for developing instruction that establishes transitions between concrete, symbolic and abstract representations of mathematical knowledge.

E. Applies knowledge of a variety of instructional delivery methods, such as individual, structured small-group and large-group formats.

F. Understands how to create a learning environment that provides all students, including English-language learners, with opportunities to develop and improve mathematical skills and procedures.

G. Demonstrates an understanding of a variety of questioning strategies to encourage mathematical discourse and to help students analyze and evaluate their mathematical thinking.

H. Understands how technological tools and manipulatives can be used appropriately to assist students in developing, comprehending and applying mathematical concepts.

I. Understands how to relate mathematics to students’ lives and a variety of careers and professions.
Competency 019: The teacher understands assessment and uses a variety of formal and informal assessment techniques to monitor and guide mathematics instruction and to evaluate student progress. The beginning teacher:

A. Demonstrates an understanding of the purpose, characteristics and uses of various assessments in mathematics, including formative and summative assessments.

B. Understands how to select and develop assessments that are consistent with what is taught and how it is taught.

C. Demonstrates an understanding of how to develop a variety of assessments and scoring procedures consisting of worthwhile tasks that assess mathematical understanding, common misconceptions and error patterns.

D. Understands how to evaluate a variety of assessment methods and materials for reliability, validity, absence of bias, clarity of language and appropriateness of mathematical level.

E. 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.

**EC-6 TEA Standards and Competencies:**

Mathematics Standard I

Number Concepts: The mathematics teacher understands and uses numbers, number systems and their structure, operations and algorithms, quantitative reasoning and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard II Patterns and Algebra:

The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard III Geometry and Measurement:

The mathematics teacher understands and uses geometry, spatial reasoning, measurement concepts and principles and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.
Mathematics Standard IV Probability and Statistics:

The mathematics teacher understands and uses probability and statistics, their applications and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

Mathematics Standard V Mathematical Processes:

The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.

Mathematics Standard VI Mathematical Perspectives:

The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics and the evolving nature of mathematics and mathematical knowledge.

Mathematics Standard VII Mathematical Learning and Instruction:

The mathematics teacher understands how children learn and develop mathematical skills, procedures and concepts; knows typical errors students make; and uses this knowledge to plan, organize and implement instruction; to meet curriculum goals; and to teach all students to understand and use mathematics.

Mathematics Standard VIII Mathematical Assessment:

The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

Mathematics Standard IX Professional Development:

The mathematics teacher understands mathematics teaching as a profession, knows the value and rewards of being a reflective practitioner and realizes the importance of making a lifelong commitment to professional growth and development.

Subject Test II — Mathematics (802) Competencies:

Competency 001 (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 002 (Number Concepts and Operations):

The teacher understands concepts related to numbers, operations and algorithms and the properties of numbers. The beginning teacher:

A. Analyzes, creates, describes, compares and models relationships between number properties, operations and algorithms for the four basic operations involving integers, rational numbers and real numbers, including real-world situations.

B. Demonstrates an understanding of equivalency among different representations of rational numbers and between mathematical expressions.

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, divisibility rules) 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 including the use of comparative language and sets of objects.

F. Identifies and demonstrates an understanding of and uses of a variety of models and objects 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. Identifies, demonstrates and applies knowledge of counting techniques, including combinations, to quantify situations and solve math problems (e.g., to include forward, backward and skip counting, with or without models).

I. Identifies, represents and applies knowledge of place value (e.g., to compose and decompose numbers), rounding and other number properties to perform mental mathematics and computational estimation with automaticity.

J. Demonstrates a thorough understanding of fractions, including the use of various representations to teach fractions and operations involving fractions.

K. Uses a variety of strategies to generate and solve problems that involve one or more steps, with fluency.
Competency 003 (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, including real-world applications.

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 (e.g., using ratios and percents with fractions and decimals).

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

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

K. Applies algebraic methods to demonstrate an understanding of whole numbers using any of the four basic operations.

Competency 004 (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, understands and models the development of formulas to find lengths, perimeters, areas and volumes of geometric figures.

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

D. Identifies, uses and 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 angles and 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 concepts and principles, 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, speed and degrees of an angle.

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.

M. Understands attributes of various polygons, including names and how sides and angles of the polygon affect its attributes.

N. Partitions or decomposes polygons to express areas as fractions of a whole or to find areas of nonstandard polygons.

O. Demonstrates the value and relationships of United States coins and bills and uses appropriate symbols to name the value of a collection.

P. Identifies, uses and understands the concepts and properties of geometric figures and their relationships.

Q. Describes the key attributes of the coordinate plane and models the process of graphing ordered pairs.
Competency 005 (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) and draws conclusions from any data graph.

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 deep knowledge of the use of probability, in different scenarios, to make observations, draw conclusions and create relationships.

G. Solves a variety of probability problems using combinations and geometric probability (e.g., 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 006 (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, including the use of compatible numbers, 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.

N. Demonstrates an understanding of financial literacy concepts and their application as these relate to teaching students (e.g., describes the basic purpose of financial institutions; distinguishes the difference between gross and net income; identifies various savings options; defines different types of taxes; identifies the advantages and disadvantages of different methods of payments, savings and credit uses and responsibilities).

O. Applies mathematics to model and solve problems to manage financial resources effectively for lifetime financial security, as it relates to teaching students (e.g., distinguishes between fixed and variable expenses, calculates profit in a given situation, develops a system for keeping and using financial records, describes actions that might be taken to develop and balance a budget.
when expenses exceed income).

**Required Reading and Textbook(s)**
No text is required for this course. Students are required to sign up for an access code to mymathlab. All homework assignments, test, lecture videos and an online text will be available on mymathlab. Here are the instructions:

![Pearson | MyLab | Math](Image)

**Student Registration Instructions for Canvas**

**First, enter your Canvas course**

1. Sign in to Canvas and enter your Canvas course.
2. Do one of the following:
   - Select any Pearson link from any module.
   - Select a MyLab and Mastering link in the Course Navigation. Next, select Open MyLab and Mastering or a content link.

**Next, get access to your Pearson course content**

1. Enter your Pearson account **username** and **password** to Link Accounts. You have an account if you have ever used a MyLab or Mastering product.
   - If you don’t have a Pearson account, select Create and follow the instructions.
2. Select an access option:
   - Enter the access code that came with your textbook or that you purchased separately from the bookstore.
   - If available for your course, you can purchase:
     - Buy access using a credit card or PayPal.
     - Get temporary access.
   - If you’re taking another semester of a course, you skip this step.
3. From the You’re Done page, select Go to My Courses.

**Note:** We recommend you always enter your MyLab Math course through Canvas.

**Get your computer ready**
For the best experience, check the system requirements for your product at [https://www.pearsonmylabandmastering.com/system-requirements/](https://www.pearsonmylabandmastering.com/system-requirements/)

**Need help?**
For help with MyLab Math for Canvas, go to [https://help.pearsoncmg.com/integration/cg/canvas/student/en/content/get_started.htm](https://help.pearsoncmg.com/integration/cg/canvas/student/en/content/get_started.htm)
COURSE REQUIREMENTS
Course Requirements: (include point values for each- not just a percentage)

The student will be responsible for homework assignments, online discussions, midterm (proctored), final exam(proctored), and presentations.

Grading Criteria Rubric and Conversion
Homework                    (100 points)
Presentations (10 x 20)              (200 points)
Online Discussions (5 x 20)  (100 points)
Midterm                           (300 points)
Final                     (300 points)
Total:                                                 1000 Points

Rubric for presentations:

<table>
<thead>
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<th>Excellent</th>
<th>Average</th>
<th>Poor</th>
<th>Score</th>
</tr>
</thead>
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R

Roberts, Mienie (Primary Instructor)
Instructor
Instructor
May 30, 2020 01.17 PM ET
roberts75887
Student Course
Canvas
May 28 – Jul 24, 2020
May 28, 2020
Aug 26, 2022
No
Copied From: Math 4305 (roberts74295)
Author(s): Billstein, Rick | Boschmans, Barbara | Libeskind, Shlomo | Lott, Johnny
Understanding of mathematical concept (10 points) |  
Use of technology/manipulatives (6 points) |  
Interaction with class/audience (4 points) |  

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<thead>
<tr>
<th>Rubric for online discussions:</th>
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<tbody>
<tr>
<td>Understanding of mathematical concept (10 points)</td>
</tr>
<tr>
<td>Grammar (6 points)</td>
</tr>
<tr>
<td>Spelling (4 points)</td>
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<thead>
<tr>
<th>Posting of Grades</th>
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<tbody>
<tr>
<td>Student will receive instant feedback on progress on mymathlab for the homework assignments and tests (midterm and final exams). The other assignments’ grades will also be posted on mymathlab and Canvas.</td>
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<table>
<thead>
<tr>
<th>Grading Policies</th>
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<tbody>
<tr>
<td>No late assignments will be accepted in this class. There will be NO exceptions.</td>
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<tr>
<td>Week</td>
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<td>Week 1</td>
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<td>Week 8</td>
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**Important University Dates**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>June 1, 2020</td>
<td>Add, Drop, and Late Registration Begins for 10-, 8- and First 5-Week Classes. $25 Fee assessed for late registrants</td>
</tr>
<tr>
<td>June 1, 2020</td>
<td>Classes Begin for First 5-, 10-, and 8-Week Session</td>
</tr>
<tr>
<td>June 4, 2020</td>
<td>Deadline to Drop First 5-Week Classes with No Record</td>
</tr>
<tr>
<td>June 8, 2020</td>
<td>Deadline to Drop 8-Week Classes with No Record</td>
</tr>
<tr>
<td>June 16, 2020</td>
<td>Deadline to Drop 10-Week Classes with No Record</td>
</tr>
<tr>
<td>June 19, 2020</td>
<td>Deadline to Drop First 5-Week Classes with a Quit (Q) or Withdraw (W)</td>
</tr>
<tr>
<td>July 1, 2020</td>
<td>Deadline for Teacher Education and Professional Certification Applications</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
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<tr>
<td>July 3, 2020</td>
<td>Classes End for First 5-Week Session</td>
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<tr>
<td>July 3, 2020</td>
<td>Deadline for Graduation Application</td>
</tr>
<tr>
<td>July 3, 2020</td>
<td>Deadline to Withdraw from the University for First 5-Week Classes</td>
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<tr>
<td>July 6, 2020</td>
<td>Add, Drop, and Late Registration Begins for Second 5-Week Classes. $25 Fee assessed for late registrants.</td>
</tr>
<tr>
<td>July 6, 2020</td>
<td>Classes Begin Second 5-Week Session</td>
</tr>
<tr>
<td>July 7, 2020</td>
<td>Deadline for Faculty Submission of First 5-Week Final Class Grades (due by 3pm)</td>
</tr>
<tr>
<td>July 9, 2020</td>
<td>Deadline to Drop Second 5-Week Classes with No Record</td>
</tr>
<tr>
<td>July 10, 2020</td>
<td>Deadline to Drop 8-Week Classes with a Quit (Q) or Withdraw (W)</td>
</tr>
<tr>
<td>July 17, 2020</td>
<td>Deadline to Drop 10-Week Classes with a Quit (Q) or Withdraw (W)</td>
</tr>
<tr>
<td>July 24, 2020</td>
<td>Classes End for 8-Week Session</td>
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<tr>
<td>July 24, 2020</td>
<td>Deadline to Drop Second 5-Week Classes with a Quit (Q) or Withdraw (W)</td>
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<tr>
<td>July 24, 2020</td>
<td>Deadline to Withdraw from the University for 8-Week Classes</td>
</tr>
<tr>
<td>July 28, 2020</td>
<td>Deadline for Faculty Submission of 8-Week Final Class Grades (due by 3pm)</td>
</tr>
<tr>
<td>August 7, 2020</td>
<td>Classes End for 10- and Second 5-Week Sessions</td>
</tr>
<tr>
<td>August 7, 2020</td>
<td>Deadline for Applications for Tuition Rebate for Summer Graduation (5pm)</td>
</tr>
<tr>
<td>August 7, 2020</td>
<td>Deadline for Degree Conferral Applications to the Registrar's Office. $20 Late Application Fee</td>
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<tr>
<td>August 7, 2020</td>
<td>Deadline to Withdraw from the University for 10- and Second 5-Week Classes</td>
</tr>
<tr>
<td>August 7, 2020</td>
<td>Summer Commencement Ceremony</td>
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