Texas A&M University-Central Texas
Math 4305: Concepts of Elementary Mathematics III 60217
Online

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COURSE INFORMATION

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.

1.0 Course overview and description:

Program Goal
Texas A&M University-Central Texas students, upon completion of certification requirements, will be reflective professional educators who make effective educational decisions that support the creation of dynamic learning environments.

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).
Student learning outcomes as per the Core Subjects 7-12 Mathematics Math 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 quizzes, 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 quizzes, 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 quizzes, 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 quizzes, 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)

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.

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.
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 a 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.

---

**4.0 Required Reading and Textbook:**

All required materials and resources will be available on the Canvas LMS. Student needs access to the GeoGebra platform at:  
www.geogebra.org
Students will be assigned tests from:
www.examedge.com

5.0 Course Requirements:

Quiz 1: Domain I/Standard 1 20 points
Quiz 2: Domain 1/Standard 1 20 points
Quiz 3: Domain 2/Standard 2 20 points
Quiz 4: Domain 2/Standard 2 20 points
Quiz 5: Domain 3/Standard 3 20 points
Quiz 6: Domain 3/Standard 3 20 points
Quiz 7: Domain 4/Standard 4 20 points
Quiz 8: Domain 4/Standard 4 20 points
Quiz 9: Domain 5/Standard 5 20 points
Quiz 10: Domain 5/Standard 5 20 points
Quiz 11: Domain 6/Standard 6 20 points
Quiz 12: Domain 6/Standard 6 20 points
Quiz 13: All domains and standards 20 points
Quiz 14: All domains and standards 20 points
Midterm: Domains and Standards 1, 2, 3, 4 300 points
Final: Comprehensive 300 points
Project 1: Domains and Standards 1,2 20 points
Project 2: Domains and Standards 3,4 20 points
Project 3: Domains and Standards 5,6 20 points
Project 4: All Domains and Standards 20 points
Discussions (4 x 10): All Domains and Standards 40 points

Total: 1000 points
Projects/ Presentations:

1. Student needs to complete courses on the GeoGebra platform and submit a lecture video with screen capturing software.
2. No credit will be given if the recording does not include audio and explanation of the concepts.

Rubric for Projects:

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Average</th>
<th>Poor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of mathematical concepts (30%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Understanding of coding concepts (50%)</td>
<td></td>
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<tr>
<td>Professional decorum (Presentation/Audio/Quality of video, etc.) (20%)</td>
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Readings/ Discussions:

Readings should be completed on Canvas. Discussions will be posted on the Canvas LMS.

Rubric for online discussions:

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<tr>
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<th>Excellent</th>
<th>Average</th>
<th>Poor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of mathematical concept (50%)</td>
<td></td>
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<td></td>
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<tr>
<td>Grammar (25%)</td>
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<tr>
<td>Spelling (25%)</td>
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Technology requirements:

Every student is required to have access to a laptop/desktop and download the webex application in order to have online meetings with the instructor. Students should use the GeoGebra software which can be found at:

www.geogebra.org
## Weekly Schedule:

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>June 7&lt;sup&gt;th&lt;/sup&gt; Reading Module 1</td>
<td>June 8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>June 9&lt;sup&gt;th&lt;/sup&gt; Quiz 1 due</td>
<td>June 10&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Week 2</td>
<td>June 14&lt;sup&gt;th&lt;/sup&gt; Quiz 2 due Reading Module 2 Discussion 1 due</td>
<td>June 15&lt;sup&gt;th&lt;/sup&gt;</td>
<td>June 16&lt;sup&gt;th&lt;/sup&gt; Quiz 3 due</td>
<td>June 17&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Week 3</td>
<td>June 21&lt;sup&gt;st&lt;/sup&gt; Reading Module 3 Quiz 4 due Reading Module 3 due Discussion 2 due Project 1 due</td>
<td>June 22&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>June 23&lt;sup&gt;rd&lt;/sup&gt; Quiz 5 due</td>
<td>June 24&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Week 4</td>
<td>June 28&lt;sup&gt;th&lt;/sup&gt; Project 2 due Reading Module 4 due Quiz 6 due</td>
<td>June 29&lt;sup&gt;th&lt;/sup&gt;</td>
<td>June 30&lt;sup&gt;th&lt;/sup&gt; Quiz 7 due Midterm due</td>
<td>July 1&lt;sup&gt;st&lt;/sup&gt;</td>
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<tr>
<td>Week 5</td>
<td>July 5&lt;sup&gt;th&lt;/sup&gt; Reading Module 5 due Project 3 due Quiz 8 due Discussion 3 due</td>
<td>July 6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>July 7&lt;sup&gt;th&lt;/sup&gt; Quiz 9 due</td>
<td>July 8&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Week 6</td>
<td>July 12&lt;sup&gt;th&lt;/sup&gt; Reading Module 6 due Project 4 due Quiz 10 due Discussion 4 due</td>
<td>July 13&lt;sup&gt;th&lt;/sup&gt;</td>
<td>July 14&lt;sup&gt;th&lt;/sup&gt; Quiz 11 due</td>
<td>July 15&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Week 7</td>
<td>July 19&lt;sup&gt;th&lt;/sup&gt; Quiz 12 due Reading Module 7 due</td>
<td>July 20&lt;sup&gt;th&lt;/sup&gt;</td>
<td>July 21&lt;sup&gt;st&lt;/sup&gt; Quiz 13 due</td>
<td>July 22&lt;sup&gt;nd&lt;/sup&gt;</td>
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<tr>
<td>Week 8</td>
<td>July 26&lt;sup&gt;th&lt;/sup&gt; Quiz 14 due</td>
<td>July 27&lt;sup&gt;th&lt;/sup&gt;</td>
<td>July 28&lt;sup&gt;th&lt;/sup&gt; Final due</td>
<td>July 29&lt;sup&gt;th&lt;/sup&gt;</td>
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</table>

## Course Modality:

### Canvas Support

Use the Canvas Help link, located at the bottom of the left-hand menu, for issues with Canvas. You can select “Chat with Canvas Support,” submit a support request through “Report a Problem,” or call the
Canvas support line: 1-844-757-0953.

For issues related to course content and requirements, contact your instructor.

**Online Proctored Testing**

A&M-Central Texas uses Proctorio for online identity verification and proctored testing. This service is provided at no direct cost to students. If the course requires identity verification or proctored testing, the technology requirements are: Any computer meeting the minimum computing requirements, plus webcam, speaker, and microphone (or headset). Proctorio also requires the Chrome web browser with their custom plug-in.

**Other Technology Support**

For log-in problems, students should contact Help Desk Central

24 hours a day, 7 days a week

Email: helpdesk@tamu.edu
Phone: (254) 519-5466
Web Chat: [http://hdc.tamu.edu](http://hdc.tamu.edu)

*Please let the support technician know you are an A&M-Central Texas student.*

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**Important University Dates**

[https://www.tamuct.edu/registrar/academic-calendar.html](https://www.tamuct.edu/registrar/academic-calendar.html)

**UNIVERSITY RESOURCES, PROCEDURES, AND GUIDELINES**

**Drop Policy**

If you discover that you need to drop this class, you must complete the Drop Request Dynamic Form through Warrior Web.

[https://dynamicforms.ngwebsolutions.com/casAuthentication.ashx?InstID=eaed95b9-f2be-45f3-a37d-46928168bc10&targetUrl=https%3A%2F%2Fdynamicforms.ngwebsolutions.com%2FSubmit%2FForm%2FStart%2F53b8369e-0502-4f36-be43-f02a4202f612].

Faculty cannot drop students; this is always the responsibility of the student. The Registrar’s Office will provide a deadline on the Academic Calendar for which the form must be completed. Once you submit the completed form to the Registrar’s Office, you must go into Warrior Web and confirm that you are no longer enrolled. If you still show as enrolled, FOLLOW-UP with the Registrar’s Office immediately. You are to attend class until the procedure is complete to avoid penalty for absence. Should you miss the drop deadline or fail to follow the procedure, you will receive an F in the course, which may affect your financial aid and/or VA educational benefits.

**Academic Integrity**

Texas A&M University -Central Texas values the integrity of the academic enterprise and strives for the
highest standards of academic conduct. A&M-Central Texas expects its students, faculty, and staff to support the adherence to high standards of personal and scholarly conduct to preserve the honor and integrity of the creative community. Academic integrity is defined as a commitment to honesty, trust, fairness, respect, and responsibility. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. Academic misconduct is any act that improperly affects a true and honest evaluation of a student’s academic performance and includes, but is not limited to, working with others in an unauthorized manner, cheating on an examination or other academic work, plagiarism and improper citation of sources, using another student’s work, collusion, and the abuse of resource materials. All academic misconduct concerns will be referred to the university’s Office of Student Conduct. Ignorance of the university’s standards and expectations is never an excuse to act with a lack of integrity. When in doubt on collaboration, citation, or any issue, please contact your instructor before taking a course of action.

For more information regarding the Student Conduct process, [https://www.tamuct.edu/student-affairs/student-conduct.html].

If you know of potential honor violations by other students, you may submit a report, [https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0].

Academic Accommodations

At Texas A&M University-Central Texas, we value an inclusive learning environment where every student has an equal chance to succeed and has the right to a barrier-free education. The Office of Access and Inclusion is responsible for ensuring that students with a disability receive equal access to the university’s programs, services and activities. If you believe you have a disability requiring reasonable accommodations please contact the Office of Access and Inclusion, WH-212; or call (254) 501-5836. Any information you provide is private and confidential and will be treated as such.

For more information please visit our Access & Inclusion Canvas page (log-in required) [https://tamuct.instructure.com/courses/717]

Important information for Pregnant and/or Parenting Students

Texas A&M University-Central Texas supports students who are pregnant and/or parenting. In accordance with requirements of Title IX and related guidance from US Department of Education’s Office of Civil Rights, the Dean of Student Affairs’ Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. Students should seek out assistance as early in the pregnancy as possible. For more information, please visit Student Affairs [https://www.tamuct.edu/student-affairs/index.html]. Students may also contact the institution’s Title IX Coordinator. If you would like to read more about these requirements and guidelines online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].

Title IX of the Education Amendments Act of 1972 prohibits discrimination on the basis of sex and gender—including pregnancy, parenting, and all related conditions. A&M-Central Texas is able to provide flexible and individualized reasonable accommodation to pregnant and parenting students. All pregnant and parenting students should contact the Associate Dean in the Division of Student Affairs at (254) 501-5909 to seek out assistance. Students may also contact the University’s Title IX Coordinator.
Tutoring
Tutoring is available to all A&M-Central Texas students, on a remote online basis. Visit the Academic Support Community in Canvas to view schedules and contact information. Subjects tutored on campus include Accounting, Advanced Math, Biology, Finance, Statistics, Mathematics, and Study Skills. Student success coaching is available online upon request.

If you have a question regarding tutor schedules, need to schedule a tutoring session, are interested in becoming a tutor, success coaching, or have any other question, contact Academic Support Programs at (254) 501-5836, visit the Office of Student Success at 212F Warrior Hall, or by emailing studentsuccess@tamuct.edu.

Chat live with a tutor 24/7 for almost any subject from on your computer! Tutor.com is an online tutoring platform that enables A&M-Central Texas students to log in and receive online tutoring support at no additional cost. This tool provides tutoring in over 40 subject areas except writing support. Access Tutor.com through Canvas.

University Writing Center
The University Writing Center (UWC) at Texas A&M University–Central Texas (TAMUCT) is a free service open to all TAMUCT students. For the Summer 2021 semester, all services will be online as a result of the COVID-19 pandemic. The hours of operation are from 10:00 a.m.-5:00 p.m. Monday thru Thursday with satellite hours Monday thru Thursday from 6:00-9:00 p.m. The UWC is also offering hours from 12:00-3:00 p.m. on Saturdays.

Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. By providing a practice audience for students’ ideas and writing, our tutors highlight the ways in which they read and interpret students’ texts, offering guidance and support throughout the various stages of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. Whether you need help brainstorming ideas, organizing an essay, proofreading, understanding proper citation practices, or just want a quiet place to work, the UWC is here to help!

Students may arrange a one-to-one session with a trained and experienced writing tutor by making an appointment via WCOnline [https://tamuct.mywconline.com/]. In addition, you can email Dr. Bruce Bowles Jr. at bruce.bowles@tamuct.edu if you have any questions about the UWC and/or need any assistance with scheduling.

University Library
The University Library provides many services in support of research across campus and at a distance. We offer over 200 electronic databases containing approximately 250,000 eBooks and 82,000 journals, in addition to the 85,000 items in our print collection, which can be mailed to students who live more than 50 miles from campus. Research guides for each subject taught at A&M-Central Texas are available through our website to help students navigate these resources. On campus, the library offers technology including cameras, laptops, microphones, webcams, and digital sound recorders.
Research assistance from a librarian is also available 24 hours a day through our online chat service, and at the reference desk when the library is open. Research sessions can be scheduled for more comprehensive assistance, and may take place on Skype or in-person at the library. Assistance may cover many topics, including how to find articles in peer-reviewed journals, how to cite resources, and how to piece together research for written assignments.

Our 27,000-square-foot facility on the A&M-Central Texas main campus includes student lounges, private study rooms, group work spaces, computer labs, family areas suitable for all ages, and many other features. Services such as interlibrary loan, TexShare, binding, and laminating are available. The library frequently offers workshops, tours, readings, and other events. For more information, please visit our Library website [http://tamuct.libguides.com/index].

For Summer 2021, all reference service will be conducted virtually. Please go to our Library website [http://tamuct.libguides.com/index] to access our virtual reference help and our current hours.

OPTIONAL POLICY STATEMENTS

A Note about Sexual Violence at A&M-Central Texas

Sexual violence is a serious safety, social justice, and public health issue. The university offers support for anyone struggling with these issues. University faculty are mandated reporters, so if someone discloses that they were sexually assaulted (or a victim of Domestic/Dating Violence or Stalking) while a student at TAMUCT, faculty members are required to inform the Title IX Office. If you want to discuss any of these issues confidentially, you can do so through Student Counseling (254-501-5955) located on the second floor of Warrior Hall (207L).

Sexual violence can occur on our campus because predators often feel emboldened, and victims often feel silenced or shamed. It is incumbent on ALL of us to find ways to actively create environments that tell predators we don’t agree with their behaviors and tell survivors we will support them. Your actions matter. Don’t be a bystander; be an agent of change. For additional information on campus policy and resources visit the Title IX webpage [https://www.tamuct.edu/compliance/titleix.html].

Behavioral Intervention

Texas A&M University-Central Texas cares about the safety, health, and well-being of its students, faculty, staff, and community. If you are aware of individuals for whom you have a concern, please make a referral to the Behavioral Intervention Team. Referring your concern shows you care. You can complete the referral online [https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2].

Anonymous referrals are accepted. Please see the Behavioral Intervention Team website for more information [https://www.tamuct.edu/student-affairs/bat.html]. If a person’s behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5800.

OTHER POLICIES

NO LATE ASSIGNMENTS WILL BE ACCEPTED.

Copyright Notice

Students should assume that all course material is copyrighted by the respective author(s). Reproduction
of course material is prohibited without consent by the author and/or course instructor. Violation of copyright is against the law and Texas A&M University-Central Texas’ Code of Academic Honesty. All alleged violations will be reported to the Office of Student Conduct.

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