**COLLEGE PREPARATORY MATHEMATICS**

**Course Syllabus**

**Fall 2014/Spring 2015**

1. **COURSE DESCRIPTION**

College Preparatory Mathematics is a **full credit** course designed for students at the Grade 12 level whose performance on an end-of course assessment instrument or coursework, a college entrance examination, or a Texas Success Initiative assessment instrument, indicate that the student is not ready to perform entry-level college coursework. In accordance with TAC, 74.26 and local district policy, students who are able to successfully complete only one semester of a two-semester course can be awarded credit proportionately. Consequently, a student may be awarded a half credit for successful completion of half of the college preparatory course. This half credit, when paired with another half credit from the list of allowable advanced mathematics courses, may satisfy the advanced mathematics requirement for students pursuing an endorsement.

1. **PREREQUISITES**

To be eligible for course participation, students must demonstrate successful completion of Algebra I, Geometry, and one additional foundation mathematics credit **and** meet the passing standard on the Algebra I EOC. With principal approval, Grade 11 students who have met the above requirements may enroll in the course.

1. **TEXT AND OTHER SUPPLIES**

Recommended textbooks include the following:

*Developmental Mathematics –* Elayn Martin-Gay

*Beginning & Intermediate Algebra –* Lial, Hornsby, McGinnis

*Elementary and Intermediate Algebra –* Bittenger, Ellenbogen, and Johnson

*Introductory & Intermediate Algebra for College Students -* Blitzer

Recommended technology:

*MyLabsPlus*

*Khan Academy*

*ALEKS*

*Math XL* (Pearson Education)

*My Math Lab* (Pearson)

1. **STUDENT LEARNING TOPICS AND OBJECTIVES:**
2. **Elementary Algebra and Functions:**
   1. Perform basic operations with real numbers
   2. Round numbers to a given place value
   3. Convert between decimal numbers, fractions and percents
   4. Evaluate expressions using the order of operations
   5. Factor numbers and algebraic expressions: determine GCF and LCM
   6. Solve equations and inequalities using the addition and multiplication principles, including literal equations
   7. Solve word problems using a variety of techniques
   8. Relate the properties of real numbers to algebraic expressions (zero, ones, commutative, associative, inverse, distributive and identity properties)
   9. Simplify algebraic expressions using addition, subtraction, multiplication and division
   10. Graph a line from an equation by determining two points
   11. Recognize and graph vertical and horizontal lines
   12. Give the slope of a line given two points on a graph
   13. Determine if a point is a solution given the equation of a line
   14. Interpret and simplify integral and rational exponents
   15. Use the properties of exponents to simplify algebraic expressions
   16. Use addition, subtraction, multiplication and division with order of operations to simplify monomials, binomials and polynomials
   17. Use properties to simplify radicals, including rationalizing the denominator
   18. Use properties of fractions and factoring to simplify rational expressions
   19. Solve linear equations and inequalities, which include real numbers, parenthesis, multiple-terms with the variable and have conditional, no solution or infinite solutions
   20. Solve equations that are classified as rational, radical or absolute value
   21. Represent graphically the solution(s) of equations and inequalities in one and two variables
   22. Solve systems of linear equations and two variables using elimination and substitution methods
   23. Understand the relationship between the slopes of two equations and the intercepts to determine if lines are parallel, perpendicular, or just intersecting
   24. Write equations for lines that are parallel or perpendicular to a given equation and passing through a specific point using point slope formula
   25. Convert from standard form to slope-intercept form and vice versa
   26. Write equations for lines in slope-intercept, point-slope and standard form given a graph, two points or a slope and point
   27. Solve problems with direct and inverse variation
   28. Name and graph points in a plane or on a number line
3. **Intermediate Algebra and Functions**
   1. Use factoring techniques and the zero principle or the quadratic formula to solve quadratic equations for real or complex solutions
   2. Find the linear, rational, radical or quadratic equations to model or solve application problems including age problems, consecutive number problems, area problems, and motion problems
   3. Write equations in one or two variables to solve or model application problems including mixture and motion problems
   4. Given a graph or a quadratic equation determine the x- and y- intercepts, vertex, maximum/minimum
   5. Represent functions in multiple ways (tabular, graphical, symbolic, verbal). Determine domain and range of functions
   6. Use exponential equations to solve problems and represent situations
   7. Perform long division of polynomials
   8. Factor differences of squares and cubes
4. **Geometry and Measurement**
   1. Determine angles or sides for and relate parallel line properties to similar and congruent figures
   2. Determine interior angles, exterior angles and lengths of sides for plane or composite figures
   3. Convert measurements within the metric and customary systems
   4. Convert between scientific and standard notation and use scientific notation in problem solving
   5. Evaluate formulas for area, perimeter, circumference or volume for triangles, rectangles, squares, parallelograms, circles, composite figures, pyramids, prisms, spheres and cylinders
   6. Develop and verify attributes of lines and parts of lines in a plane and in space: parallel, intersecting, perpendicular, and skew lines; and angle relationships associated with transversals on parallel lines.
   7. Develop and verify angle relationships: vertical, complementary, supplementary, angles on parallel lines, angle-side relations in a triangle, interior/exterior angles on polygons, and angles on circles.
   8. Develop, verify, and extend properties of circles, including properties of angles, arcs, chords, tangents, secants, and spheres.
   9. Develop and verify properties of triangles and quadrilaterals (e.g., triangle congruence conditions, properties of a parallelogram).
   10. Develop and verify properties of parts of prisms, cylinders, pyramids, and cones.
   11. Apply properties of geometric figures to solve problems.
   12. Apply the Pythagorean Theorem and its converse to solve real-life situations in two and three dimensions.
   13. Apply Pythagorean triples and special right triangle relationships to solve problems.
   14. Solve right triangle situations using sine, cosine, and tangent.
   15. Use congruence transformations to justify congruence among triangles and to identify congruent corresponding parts.
   16. Use dilations and scale factors to investigate similar figures and determine missing image or pre-image dimensions.
   17. Identify symmetries in design situations and describe transformations used to create the symmetry and design (e.g., tiling problems).
   18. Describe lines in the coordinate plane using slope-intercept and point-slope form.
   19. Use slopes to describe the steepness and direction of lines in the coordinate plane and to determine if lines are parallel, perpendicular, or neither.
   20. Relate geometric and algebraic representations of lines, segments, simple curves, and conic sections [e.g., describe algebraically a circle centered at (h, k) with radius (r)].
   21. Investigate and justify properties of triangles and quadrilaterals using coordinate geometry.
   22. Relate the number of solutions to a system of equations of lines to the number of intersections to two or more graphs.
5. **Data Analysis, Statistics, and Probability**
   1. Read charts and graphs
   2. Solve inequalities and report answers as graphs, sets or intervals
   3. Solve problems with geometric probability
   4. Solve basic problems with conditional probability and independence
   5. Make lists, tables, and tree diagrams to represent all possible outcomes in determining specifics of the sample space.
   6. Determine the number of ways an event may occur using combination and permutation formulas and the Fundamental Counting Principle.
   7. Compute and interpret the theoretical probability of a simple event and its complement.
   8. Compare the empirical and theoretical probabilities of an event (e.g., experimental probabilities converge to theoretical probability as the number of trials increases).
   9. Distinguish between independent and dependent events.
   10. Compute the probability of compound events using tree diagrams, tables, and other methods.
   11. Recognize and describe the differences between quantitative and qualitative data.
   12. Recognize and describe univariate and bivariate data.
   13. Organize and construct graphical displays of data (e.g., line plots, bar graphs, histograms, box plots, scatter plots) to describe the distribution of data.
   14. Read and interpret graphical displays of data.
   15. Calculate, describe, and use the appropriate measure of center (e.g., mean, median, mode) and spread (e.g., range, IQR, percentiles, variance, standard deviation).
   16. Select, compute, and justify measurements of variation (e.g., range, IQR, percentiles, variance, standard deviation) based on the data set and other influential information.
   17. Describe the effect of outliers on summary statistics.
   18. Make a prediction about long-run behavior (e.g., coin toss).
   19. Draw conclusions from analyzing a set of data.
   20. Analyze and describe similarities and differences by comparing graphical distributions (e.g., parallel box plots, back-to-back stem-leaf plots) within and between data sets.
   21. Describe relationship and trend of paired data observed from scatter plots in the context of the situation.
   22. Choose an appropriate linear or non-linear regression model to fit paired data based on graphical analysis.
   23. Make a prediction using the appropriate regression model and describe any limitations to the calculated prediction.
   24. Identify and explain misleading uses of data.
   25. Justify decisions made from probability measures from a set of data.
   26. Interpret given probability measures in a problem.
   27. Use and interpret a normal distribution as a mathematical model of measurement for summarizing some sets of data.
6. **EVALUATION AND GRADE ASSIGNMENT:**

Homework/Daily Work 15%

Quizzes 15%

4 Major Exams (two exams each semester) 40%

Semester 1 Exam 15%

Semester 2 Exam 15%

Major exams are cumulative and teacher-generated. Semester exams will be provided to all participating districts and will be developed with the assistance of higher education math faculty. Semester exams are not optional and must be given as provided.

**Grading Scale**

A = 90 – 100 C = 70 – 79.99 F = below 59.99

B = 80 – 89.99 D = 60 – 69.99

**Course Credit**

Students must receive a **70 or higher** in the course to be recognized as eligible for Non-Course Based Options (NCBO) and **80 or higher** to meet “college-readiness” standards by partnering institutions (CBC, DMC, TAMUCC, TAMUK). Students will retain their eligibility for a period of two years. College readiness will be denoted on the high school transcript with a “T” designation next to the accompanying PEIMS course code.

1. **TENTATIVE COURSE SCHEDULE:**

**Semester 1**

Symbols and sets of numbers

Exponents, order of operations and variable expressions

Adding, subtracting, multiplying and dividing real numbers

Properties of real numbers

Simplifying expressions

The addition property of equality

Further introduction to problem solving

The rectangular coordinate system

Graphing Linear Equations

Intercepts

Slope and rate of change

Equations of lines

Introductions to Functions

Graphing linear inequalities in two variables

Solving systems of linear equations by graphing, substitution, and addition

Systems of linear equations and problem solving

Exponents

Introduction to polynomials

Adding, subtracting, multiplying and dividing polynomials

Greatest common factor

Factoring trinomials of the form x² =+ bx + c; ax² + bx + c; ax² + bx + c by grouping

Factoring perfect square trinomials and the difference of two squares

Solving quadratics by factoring

Quadratic equations and problem solving

Simplifying rational expressions

Multiplying and dividing rational expressions

Adding and subtracting like and unlike rational expressions

Solving equations containing rational expressions

Rational equations and problem solving

Introduction to radicals

Simplifying complex fractions

Simplifying radicals

Adding, subtracting, multiplying and dividing radicals

Solving equations containing radicals

Radical equations and problem solving

Solving quadratic equations by the square root property, completing the square, and the quadratic formula

Graphing Quadratic equations in two variables

Interval notation, finding domains and ranges from graphs

Absolute value equations and inequalities

Nonlinear inequalities in on variable

Rational Exponents

Review and Semester Exam

**Semester 2**

Parallel line properties

Interior and exterior angles

Metric and customary systems of measurement

Scientific and standard notation

Formulas for area, perimeter, circumference or volume for triangles, rectangles, squares, parallelograms, circles, composite figures, pyramids, prisms, spheres and cylinders

Attributes of lines and parts of lines in a plane and in space

Angle relationships

Properties of circles, including properties of angles, arcs, chords, tangents, secants, and spheres

Properties of triangles and quadrilaterals

Properties of prisms, cylinders, pyramids, and cones

Properties of geometric figures

Pythagorean Theorem and its converse

Right triangle situations using sine, cosine, and tangent

Congruence transformations

Dilations and scale factors

Symmetries in design situations

Coordinate plane using slope-intercept and point-slope form

Geometric and algebraic representations of lines, segments, simple curves, and conic sections

Charts and graphs

Inequalities reported as graphs, sets or intervals

Geometric probability, conditional, empirical, and theoretical probability

Conditional probability and independence

Lists, tables, and tree diagrams

Independent and dependent

Quantitative, qualitative, univariate and bivariate data

Graphical displays of data (line plots, bar graphs, histograms, box plots, scatter plots)

Appropriate measures of center (mean, median, mode) and spread (range, IQR, percentiles, variance, standard deviation)

Measurements of variation (range, IQR, percentiles, variance, standard deviation)

Outliers and the effect on summary statistics

Predictions and conclusions

Review and Semester Exam