COURSE NUMBER: MATH 2412

COURSE TITLE: Pre-Calculus Math

CREDIT HOURS: 4    LECTURE HOURS: 3    LAB HOURS: 2

ASSESSMENTS: Prior to enrolling in this course, the student must demonstrate eligibility to enroll in the following: MATH 2412 or higher.

PREREQUISITE: MATH 1314

COREQUISITE: None

COURSE DESCRIPTION: In-depth combined study of algebra, trigonometry, and other topics for calculus readiness.

COLLEGE REPEAT POLICY: A student may repeat this course only once after receiving a grade, including “W”.


SUPPLIES: Graphing calculator required

STUDENT LEARNING OUTCOMES:

Upon completion of this course the students should be able to do the following:

1. Demonstrate and apply knowledge of properties of functions. (Communication)
2. Recognize and apply algebraic and transcendental functions and solve related equations. (Empirical/Quantitative)
3. Apply graphing techniques to algebraic and transcendental functions. (Critical Thinking)
4. Compute the values of trigonometric functions for key angles in all quadrants of the unit circle measured in both degrees and radians. (Empirical/Quantitative)
5. Prove trigonometric identities. (Critical Thinking and Communication)
6. Solve right and oblique triangles. (Empirical/Quantitative)
7. Perform operations on vectors (Empirical/Quantitative)
8. Analyze and graph conic sections (Empirical/Quantitative)
9. Analyze and graph parametric and polar equations (Empirical/Quantitative)
COURSE REQUIREMENTS: Attending lectures, completing assignments, completing required exams, and knowledge of calculator use are all required.

COURSE FORMAT: The format will be lecture, lab and guided practice.

METHOD OF EVALUATION: There will be a minimum of four written exams, a lab component grade, and a comprehensive final exam. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including take-home exams, home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of exams given in the class or testing center, and no student may retake any of these exams.

ATTENDANCE POLICY: Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw from the course with a grade of W.

RELIGIOUS HOLY DAYS: In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office. Please refer to the current Collin Student Handbook.

ADA STATEMENT: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student’s responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current Collin Student Handbook for additional information.

ACADEMIC ETHICS: Please see section 7-2.2 of the Collin Student Handbook. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures.

COURSE CONTENT: Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definition and statements of theorems for each section outlined in the following modules.

MODULE 1: ALGEBRA TOPICS
The student will be able to:
1. Factor expressions with rational exponents
2. Simplify complex fractions
3. Rationalize numerators
4. Find and simplify a function’s difference quotient
5. Form composite functions
6. Write functions as compositions
7. Verify inverse functions
8. Find the inverse of a function  
9. Use the horizontal line test to determine if a function has an inverse function  
10. Use the graph of a one-to-one function to graph its inverse function  
11. Find the domain and range of rational functions  
12. Use arrow notation  
13. Identify vertical, horizontal, and slant asymptotes  
14. Graph rational functions  
15. Solve quadratic and rational inequalities  
16. Solve exponential and logarithmic equations

MODULE 2: PARTIAL FRACTIONS AND NONLINEAR SYSTEMS
The student will be able to:
1. Find the partial fraction decomposition of a rational expression  
2. Recognize systems of nonlinear systems in two variables  
3. Solve nonlinear systems by substitution  
4. Solve nonlinear systems by addition  
5. Solve problems using systems of nonlinear equations

MODULE 3: TRIGONOMETRY
The student will be able to:
1. Convert radian and degree measure  
2. Use Special Triangles and the Unit Circle to find the Trigonometric values of special angles  
3. Solve Right Triangles of any angle  
4. Analyze the graphs and variations of the sine, cosine, and tangent functions  
5. Solve problems involving the inverse sine, cosine, and tangent functions  
6. Inverse trig functions  
7. Find exact values of composite functions with inverse trig functions  
8. Use power reducing formulas  
9. Find all solutions to a trigonometric equation  
10. Solve equations with multiple angles  
11. Solve trigonometric equations in quadratic form  
12. Use factoring to separate different functions in trigonometric equations  
13. Use identities to solve trigonometric equations

MODULE 4: ADDITIONAL TOPICS IN TRIGONOMETRY
The student will be able to:
1. Trigonometric Applications and Models  
2. Law of Sines and Law of Cosines  
3. Plot points in the polar coordinate system  
4. Find multiple sets of polar coordinates of a given point  
5. Convert a point or equation from polar to rectangular coordinates  
6. Convert a point or equation from rectangular to polar coordinates  
7. Graph polar equations  
8. Use magnitude and direction to show vectors are equal  
9. Visualize scalar multiplication, vector addition and subtraction as geometric vectors
10. Represent vectors in the rectangular coordinate system
11. Perform operations with vectors in terms of i and j, and i, j and k
12. Find a unit vector in the direction of v
13. Solve applied problems involving vectors
14. Find the dot product of two vectors
15. Find the angle between two vectors
16. Use the dot product to determine if two vectors are orthogonal
17. Find the cross product of two vectors
18. Solve problems involving applications of the cross product

MODULE 5: CONIC SECTIONS AND ANALYTIC GEOMETRY
The student will be able to:
1. Graph ellipses centered at the origin and not centered at the origin
2. Write equations of ellipses in standard form
3. Solve applied problems involving ellipses
4. Locate a hyperbola’s vertices and foci
5. Write equations of hyperbolas in standard form
6. Graph hyperbolas centered at the origin and not centered at the origin
7. Solve applied problems involving hyperbolas
8. Graph parabolas with vertices at the origin and not at the origin
9. Write equations of parabolas in standard form
10. Solve applied problems involving parabolas
11. Identify conics without completing the square
12. Use point plotting to graph plane curves described by parametric equations
13. Eliminate the parameter
14. Find parametric equations for functions
15. Describe the advantages of parametric representations
16. Define conics in terms of focus and directrix
17. Graph the polar equations of conics

MODULE 6: SEQUENCES AND SERIES
The student will be able to:
1. Determine the terms and sum of an arithmetic sequence
2. Determine the terms and sum of a finite and infinite geometric sequence
3. Find the terms of a binomial expansion