Course Outline for Mathematics 20

PRE-CALCULUS MATHEMATICS

Catalog Description:

MTH 20 - Pre-Calculus Mathematics 5.00 units
Rational functions and relations with emphasis on logical development and graphing. Solutions of polynomial equations and inequalities, the binomial theorem, strengthening of skills in working with exponential, logarithmic, and trigonometric functions, equations, graphs, and applications.

Prerequisite: MTH 36 (completed with a grade of "C" or higher) or , MTH 37 (completed with a grade of "C" or higher) or an appropriate skill level demonstrated through the Mathematics Assessment Process.

Grading Option: Letter Grade

Discipline:

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Prerequisite Skills:

None

Measurable Objectives:

Upon completion of this course, the student should be able to:
1. apply the methods of the Theory of Equations (Fundamental Theorem of Algebra and Rational Roots Theorem) to factor polynomials and to solve algebraic equations;
2. solve equations involving logarithmic, exponential and trigonometric functions;
3. use sign graphs to solve polynomial and rational inequalities;
4. solve inequalities and equations involving absolute values;
5. create mathematical models using algebraic or transcendental functions;
6. identify and use the trigonometric functions in problem solving;
7. identify and use logarithmic and exponential functions in problem solving;
8. rewrite expressions using trigonometric substitutions;
9. develop and use exponential, logarithmic and trigonometric formulas;
10. graph exponential and trigonometric functions and their inverses;
11. graph algebraic functions and relations;
12. prepare detailed graphs of conic sections;
13. graph polar equations;
14. graph using translations and reflections;
15. use summation notation;
16. use the Binomial Theorem to expand an expression;
17. find the terms and partial sums of sequences, including arithmetic and geometric sequences;
18. find the sum of the infinite geometric series;
19. perform basic vector algebra in R^2 and R^3 and interpret the results geometrically.

Course Content:

1. Functions, relations and their graphs
   A. Algebraic functions, including polynomial and rational
   B. Algebraic relations
   C. Conic Sections
   D. Graphing techniques
   E. Algebra of functions
   F. Inverse functions
   G. Modeling and applications
2. Inequalities
   A. Review linear
   B. Absolute value
   C. Non-linear
   D. Solutions
   E. Graphs
3. Sequences and Series
   A. Summation notation
B. Summations algebra
C. Arithmetic and geometric series

4. The Binomial Theorem

5. Roots of polynomial equations
   A. Division of polynomials
   B. Fundamental theorem of algebra
   C. Remainder theorem
   D. Rational roots theorem
   E. Complex roots

6. Exponents and logarithms
   A. Exponential and logarithmic functions and graphs
   B. Properties of exponents and logarithms
   C. Solving equations
   D. Modeling and applications

7. Trigonometry
   A. Trigonometric functions and graphs
   B. Inverse trigonometric functions and their graphs
   C. Trigonometric formulas and identities
   D. Solving equations
   E. Modeling and applications

8. Polar coordinates and graphs

9. Introduction to vectors in two and three dimensions

Methods of Presentation

1. Lecture/Discussion
2. Demonstration/Exercise
3. Problem solving sessions

Assignments and Methods of Evaluating Student Progress

1. Typical Assignments
   A. Exercises from the textbook: The population of a certain city was 112,000 in 1994, and the observed relative growth rate is 4% per year. 1) Find a function that models the population after t years. 2) Find the projected population in the year 2000. 3) In what year will the population reach 200,000?
   B. Collaborative: Perform an experiment with view tubes and model with a rational function

2. Methods of Evaluating Student Progress
   A. Exams/Tests
   B. Homework
   C. Quizzes
   D. Final Examination

3. Student Learning Outcomes
   Upon the completion of this course, the student should be able to:
   A. Critically analyze mathematical problems using a logical methodology.
   B. Communicate mathematical ideas, understand definitions, and interpret concepts.
   C. Increase confidence in understanding mathematical concepts, communicating ideas, and thinking analytically.

Textbook (Typical):

Special Student Materials
1. Either scientific or graphing calculator

Abbreviated Class Schedule Description:
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