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**Alabama
Department of
Postsecondary Education**

Representing Alabama's Public Two-Year College System

Jefferson State Community College

**MTH 112
Precalculus Algebra**

**I. MTH 112 Precalculus Algebra - 3 Semester Hours
Core Area III, TMTH**

II. Course Description

This course emphasizes the algebra of functions – including polynomial, rational, exponential, and logarithmic functions. The course also covers systems of equations and inequalities, quadratic inequalities, and the binomial theorem. Additional topics may include matrices, Cramer's Rule, and mathematical induction.

III. Prerequisite

A minimum prerequisite of high school Algebra I, Geometry, and Algebra II with an appropriate mathematics placement score. An alternative to this is that the student should successfully pass with a C or higher in Intermediate College Algebra.

IV. Textbook

Precalculus: Mathematics for Calculus, Stewart, Redlin, Watson 5th Ed.
Thomson/Brooks/Cole, 2006.

V. Course Objectives

The objective of this course is to provide an understanding of concepts, develop competent skills, and demonstrate applications in the following areas:

1. analytic and geometric interpretation of algebraic, exponential, and logarithmic

functions

2. analytic and geometric interpretation of systems of equations and inequalities
While building on the manipulative skills from algebra this course strives to develop analytic skills as a preparation for further mathematical applications or courses in mathematics requiring knowledge of algebraic and transcendental functions.

VI. Course Outline of Topics

A. This course shall include the following topics as a minimum.

1. Cartesian plane
2. Graphs of equations
3. Lines in the plane
4. Functions
5. Graphs of functions
6. Combinations of functions
7. Inverse functions
8. Variation
9. Quadratic functions
10. Higher degree functions
11. Real zeros
12. Complex numbers
13. Fundamental Theorem of algebra
14. Rational functions
15. Partial fractions
16. Exponential functions
17. Logarithmic functions
18. Properties of logarithms
19. Solving exponential and logarithmic equations
20. Applications
21. Systems of equations
22. Systems in two variables
23. Systems of more than two variables
24. Systems of inequalities
25. Linear programming
26. Quadratic inequalities
27. Binomial Theorem

B. Optional topics may include the following

1. Matrices and systems of equations
2. Operations with matrices
3. Inverse matrices
4. Determinant of a matrix
5. Properties of determinants

6. Applications
7. Sequences, summation notation
8. Arithmetic sequence
9. Geometric sequence
10. Mathematical induction

VII. Evaluation and Assessment

A. College requirements:

Examinations should be given by instructors periodically throughout their courses. Faculty are encouraged to give evaluative work early in the term so that students will have a clear understanding of the progress they are making. Final examinations will be given in all classes, and all students enrolled for academic credit will take the final examination. (College Handbook, section 3.7)

B. Grading system as stated in the college catalog:

- *A - Excellent (90-100%)
- *B - Good (80-89%)
- *C - Average (70-79%)
- D - Poor (60-69%)
- F - Failure (below 60%)
- W - Withdrawal (before midterm)
- WP - Withdrawal passing (after midterm)
- WF - Withdrawal failure (after midterm)
- I - Incomplete
- AU - Audit
- RW - Required withdrawal
- *Satisfactory grades

C. Evaluation and assessment techniques may include any or all of the following:

1. Recitation
2. Daily assignments
3. Written assignments
4. Computer assignments
5. Projects
6. Participation
7. Exams

To receive a grade of "C" or higher, the student must obtain an average of at least 70% on written test(s) and other evaluation criteria as determined by the instructor.

**** Note: A grade of "C" or higher is required in this course for a student to be eligible for MTH 113 or MTH 120.**

VIII. Class Activities

- A. Lecture.
- B. Recitation.
- C. Discussion.
- D. Individual instruction.
- E. Testing.

IX. GENERAL COURSE COMPETENCIES

- A. The student will acquire knowledge of mathematical terminology.
- B. The student will acquire knowledge of inequalities.
- C. The student will acquire knowledge of functions and their graphs.
- D. The student will be able to use concepts of precalculus algebra in problem solving.

X. COURSE OBJECTIVES STATED IN PERFORMANCE TERMS

- A. The student will demonstrate knowledge of mathematical terminology as measured by his/her ability to recall the meaning of the following in order to work problems requiring knowledge of these terms:
 - 1. transformations
 - 2. point-slope form
 - 3. domain
 - 4. range
 - 5. function
 - 6. vertex
 - 7. composite function
 - 8. one-to-one function
 - 9. inverse function
 - 10. polynomial function
 - 11. exponential function
 - 12. logarithmic function
 - 13. base e
 - 14. rational function
 - 15. local extrema
 - 16. roots (zeros)
 - 17. synthetic division
 - 18. asymptotes
 - 19. binomial theorem
 - 20. Fundamental Theorem of Algebra
 - 21. factor Theorem
 - 22. remainder Theorem
 - 23. complex number

B. The student will demonstrate knowledge of inequalities by his/her ability to

1. express given inequalities in interval notation.
2. solve polynomial and rational inequalities.
3. solve inequalities involving absolute value.
4. solve systems of inequalities.

C. The student will demonstrate knowledge of functions and their graphs by his/her ability to

1. find the domain and range of a function.
2. find the composition of functions.
3. find the inverse of a given function.
4. solve equations involving different kinds of functions, including the following:
 - a. linear
 - b. quadratic
 - c. polynomial
 - d. rational
 - e. exponential
 - f. logarithmic
 - g. absolute value
5. write the equation of a linear function in point/slope form.
6. use synthetic division to
 - a. evaluate polynomials.
 - b. factor polynomials.
 - c. find real and complex zeros of a polynomial function.
7. draw graphs of different kinds of functions including the following:
 - a. linear
 - b. quadratic
 - c. polynomial
 - d. rational
 - e. exponential
 - f. logarithmic
 - g. absolute value
 - h. piecewise
 - i. radical
8. graph functions using transformations.
9. draw the inverse graph of a function given the graph of the function.
10. use properties of logarithms/exponents to solve given problems.

D. The student will demonstrate his/her ability to use the following concepts of precalculus algebra to solve applied problems:

1. quadratic functions.
2. exponential functions.
3. logarithmic functions.
4. other function types studied.
5. nonlinear systems of equations.

XI. Attendance

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student's ability to achieve the objectives required in the course. Withdrawal from class can affect eligibility for federal financial aid.

XII. Statement on Discrimination/Harassment

The College and the Alabama State Board of Education are committed to providing both employment and educational environments free of harassment or discrimination related to an individual's race, color, gender, religion, national origin, age, or disability. Such harassment is a violation of State Board of Education policy. Any practice or behavior that constitutes harassment or discrimination will not be tolerated.

XIII. Americans with Disabilities

The Rehabilitation Act of 1973 (Section 504) and the Americans with Disabilities Act of 1990 state that qualified students with disabilities who meet the essential functions and academic requirements are entitled to reasonable accommodations. It is the student's responsibility to provide appropriate disability documentation to the College. The ADA Accommodations office is located in FSC 300 (205-856-7731).