

# GEORGIA PERIMETER COLLEGE

## COMMON COURSE OUTLINE

REVISION DATE: February 2005

COURSE ABBREVIATION: MATH 1113

CREDIT HOURS: 4

COURSE TITLE: Precalculus

PREREQUISITES: Math 1111, with a C or better, or satisfactory placement score (This reflects the prerequisite change approved by the Senate that goes into effect for Fall 2005.)

CATALOG DESCRIPTION This course includes the intensive study of algebraic, exponential, logarithmic, trigonometric, and inverse functions and graphs and their applications. Other topics include triangle trigonometry, analytic geometry (ellipses and hyperbolas), trigonometric representation of complex numbers, and vectors. It is designed to prepare students for calculus, algebra-based physics, and related technical subjects.

### EXPECTED EDUCATIONAL RESULTS

As a result of completing this course, the student will be able to:

1. Graph polynomial, rational, root, exponential, logarithmic and split-domain functions
2. Use concepts including domain and range, intercepts, asymptotes, even or odd definitions, and intervals of increase and decrease to describe the behavior of functions
3. Graph variations of functions using translations, reflections and stretches
4. Write and graph the inverse function for a given function.
5. Define and apply composition of functions
6. Recognize and graph ellipses and hyperbolas from their equations in standard and shifted form.
7. Define and investigate rates of change including average rates of change
8. State and apply the unit circle definitions of the six trigonometric functions
9. Graph and apply functions of the form  $f(x) = a \sin(bx + c) + d$ ,  $g(x) = a \cos(bx + c) + d$ , and  $h(x) = a \tan(bx + c) + d$
10. Graph the six standard trigonometric functions
11. State and apply the definitions of the inverse trigonometric functions
12. Graph the basic inverse trigonometric functions
13. Apply the reciprocal, quotient, Pythagorean, cofunction, even-odd, addition and double-angle identities
14. Prove trigonometric identities
15. Solve equations involving trigonometric functions
16. Solve problems using triangle trigonometry

17. Represent complex numbers in trigonometric form
18. Describe vectors both geometrically and algebraically
19. Solve problems involving vectors
20. Expand sequences, write and find the value of series

## GENERAL EDUCATION OUTCOMES

- I. This course addresses the general education outcome relating to communication by providing additional support as follows:
  - a. Students improve their listening skills by taking part in general class discussion and in small group activities.
  - b. Students improve their reading skills by reading and discussing the text and other materials. Reading mathematics requires skills somewhat different from those used in reading materials for other courses, and these are discussed in class.
  - c. Unit tests, examinations and other assignments provide opportunities for students to practice and improve mathematical writing skills. Mathematics has a specialized vocabulary that students are expected to use correctly.
- II. This course addresses the general education outcome of demonstrating effective individual and group problem-solving and critical skills as follows:
  - a. Students must apply mathematical concepts to non-template problems and situations.
  - b. In applications, students must analyze problems, often through the use of multiple representations, develop or select an appropriate mathematical model, utilize the model, and interpret results.
- III. This course addresses the general education outcome of using mathematical concepts to interpret, understand and communicate quantitative data as follows:
  - a. Students must demonstrate proficiency in problem solving including applications of linear, quadratic, trigonometric, exponential, and logarithmic functions.
  - b. Students must use functions to describe real-world situations and interpret information given by numerical, graphical, verbal or symbolic representations of the function.

## ENTRY LEVEL COMPETENCIES

It is assumed that students entering this course have competency in intermediate algebra at the level of Math 0098. Students should also be able to do the following:

1. Analyze applications for which linear and quadratic equations are mathematical models
2. Solve linear, quadratic, and basic exponential and logarithmic equations
3. Solve systems of linear equations in several unknowns using matrices, solve systems of nonlinear equations in two variables.

4. Identify and graph the following types of functions in two variables: linear, quadratic, exponential, logarithmic, and split domain
5. Identify a function from a rule, a graph, and a set of ordered pairs
6. Identify functions as increasing/decreasing
7. State the domain and range of a function from a rule and from a graph
8. Define exponential and logarithmic functions, emphasizing the relationship between them.
9. Compose functions.
10. Find inverse functions
11. Convert general equations of parabolas and circles to shifted form. Identify and graph circles, horizontal and vertical parabolas.

## COURSE CONTENT

- I. Functions and Graphs (algebraic, trigonometric, exponential, logarithmic, and functions and their inverses, hyperbolas and ellipses)
- II. Trigonometric Equations and Identities
- III. Vectors
- IV. Sequences

## ASSESSMENT OF EXPECTED EDUCATIONAL RESULTS

### A. COURSE GRADE

Exams, assignments, and a final exam prepared by individual instructors will be used to determine the course grade.

### B. DEPARTMENTAL ASSESSMENT

This course will be assessed every five years. An appropriate assessment instrument will be determined by the Math 1113 course committee.

### C. USE OF ASSESSMENT FINDINGS

The Math 1113 committee, or a special assessment committee appointed by the Academic Group, will analyze the results of the assessment and determine implications for curriculum changes. The committee will prepare a report for the Academic Group summarizing its finding.

EFFECTIVE DATE: August, 2005

APPROVED DATE: February, 2005