

GEORGIA PERIMETER COLLEGE
MATHEMATICS ACADEMIC GROUP
COMMON COURSE OUTLINE

COURSE ABBREVIATION MATH 1101

CREDIT HOURS 3 semester hours

COURSE TITLE Introduction to Mathematical Modeling

PREREQUISITES Placement into college-level mathematics

CATALOG DESCRIPTION

This course uses graphical, numerical, symbolic, and verbal techniques to describe and explore real-world data and phenomena. Emphasis is on the use of elementary functions (linear, quadratic, exponential, and logarithmic) to investigate and analyze applied problems and questions, supported by the use of appropriate technology, and on the effective communication of quantitative concepts and results. Functions introduced through applications are the main focus of the course. This course is intended for non-science majors.

EXPECTED EDUCATIONAL RESULTS

As a result of completing this course,

1. Students will be able to identify and represent functions verbally, numerically, graphically, and symbolically, and to convert from one representation to another as appropriate.
2. Students will become familiar with linear, quadratic, exponential, and logarithmic functions. Most functions will be introduced in application settings, on domains natural to the application. Students will use functions to answer questions related to the application.
3. Students will not only learn the standard forms of linear, quadratic, exponential, and logarithmic functions and methods of graphing them, but will also find exact or approximate equations to fit these relationships.
4. Students will identify appropriate input values (domain) and output values (range), determine inputs for which the function values increase, decrease or remain constant, find inputs resulting in a maximum or a minimum output value, and when needed, identify inputs which result in outputs that are less than or greater than a given value.
5. Through applications, students will learn to build piecewise-defined functions.
6. Students will be presented with applications that involve more than one function and will be able to identify appropriate input values for which the functions are equal, as well as, identify an appropriate interval of values for which one function is greater than the others.
7. Students will be able to investigate patterns in the information given. Numerical and graphical representations of functions, sequences derived from applications, and geometric applications may be used to identify patterns.
8. Students will use patterns to predict values, discuss long-term behavior, and develop intuition about rates of change.
9. Extensive use of technology, especially graphing calculators, is an integral part of this course. Students will become familiar with the use of technology to explore mathematical relationships.

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 discussions 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, 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.
 - C. Students must be familiar with simple data analysis tools for building mathematical models.
- IV. This course addresses the general education outcome of organizing information through the use of computer software packages as follows:
- A. Students are required to use a graphing calculator to represent information symbolically, numerically, and graphically.
 - B. Students are required to use basic data analysis functions of a calculator to analyze, represent, and interpret information.

COURSE CONTENT

1. Multiple representations of functions
2. Analyzing function behavior
3. Building and applying simple mathematical models

ENTRY-LEVEL COMPETENCIES

The student is expected to have completed successfully the equivalent of Algebra II. Essential to success in MATH 1101 is mastery of the following:

1. Solving linear equations and inequalities.
2. Solving quadratic equations.
3. Understanding and using integral and rational exponents.
4. Applying basic geometric concepts including the Pythagorean Theorem, the distance formula, areas and perimeters of rectangles, triangles, and circles.
5. Graphing linear relationships.
6. Computing slope.

7. Writing linear equations given appropriate information.
8. Recognizing linear and quadratic relationships graphically and symbolically.
9. Solving two-by-two systems of linear equations.
10. Creating a table of values and using it to graph a function.
11. Carrying out basic arithmetic with polynomials including factoring.

ASSESSMENT OF EXPECTED EDUCATIONAL RESULTS

I. COURSE GRADE

The course grade will be determined by the individual instructor using a variety of evaluation methods. A portion of the course grade will be determined through the use of frequent assessment using such means as tests, quizzes, projects, or homework as developed by the instructor. Some of these methods will require the student to demonstrate ability in problem solving and critical thinking as evidenced by explaining and interpreting solutions. A portion of the evaluation process will require the student to demonstrate skill in writing both correct prose and correct mathematics. A comprehensive final examination is required. The final examination must count at least one-fifth and no more than one-third of the course grade. The final examination should include items which require the student to demonstrate problem solving and critical thinking.

II. DEPARTMENTAL ASSESSMENT

This course will be assessed every five years. An appropriate assessment instrument will be determined by the Math 1101 committee.

III. USE OF ASSESSMENT FINDINGS

The Math 1101 committee, or a special 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 findings.

EFFECTIVE DATE: Fall 2007
Reviewed by Committee: Spring 2009

APPROVED DATE: Spring 2007