GROSSMONT COLLEGE

Official Course Outline

MATHEMATICS 108 – BEGINNING & INTERMEDIATE ALGEBRA FOR BUSINESS, MATH, SCIENCE, AND ENGINEERING MAJORS

1. Course Number Course Title Semester Units Semester Hours

MATH 108 Beginning & Intermediate 6 6 hours lecture: 96-108 hours

 Algebra for Business, 192-216 outside-of-class hours

 Math, Science, and 288-324 total hours

 Engineering Majors OR

 5 hours lecture: 80-90 hours **PLUS**

 2 hours of computer assisted instruction: 24-27 hours

 160-180 outside-of-class hours

 264-297 total hours

 2. Course Prerequisites

 None.

 Corequisite

 None.

 Recommended Preparation

 Placement into Math 90

3. Catalog Description

 A compressed course that covers elementary algebra and in-depth coverage of intermediate algebra intended for the student who has some previous experience with algebra. This course includes topics related to a mathematical foundation for college students who are majoring in business, math, science and engineering and emphasizes the study of the behavior and characteristics of linear, quadratic, rational, radical, exponential, and logarithmic functions from graphic, numeric, analytic and applied perspectives. Graphing calculators are required for this course. This course serves as a prerequisite for Math 120, Math 125, Math 160, Math 170, Math 175, Math 176, and Math 178. A student can earn a maximum of 6 units when taking Math 103 and Math 108. Not open to students with credit in Math 110.

4. Course Objectives

 The student will:

1. Have a strong conceptual understanding of the concept of functions as well as procedural fluency.
2. Model and interpret functions that arise in applications in many different contexts.
3. Evaluate, analyze, and perform algebraic operations on functions within different representations.
4. Solve and graph linear equations and inequalities in one and two variables.
5. Calculate and interpret slope from graphs, two points, and using formulas.
6. Find equations of lines in two variables.
7. Employ various techniques for factoring polynomials.
8. Operate on polynomial, rational, radical, exponential and logarithmic expressions using properties of arithmetic, exponents and logarithms.
9. Solve quadratic, rational, radical, exponential and logarithmic equations.
10. Analyze and solve linear and non-linear systems of equations and inequalities.
11. Use matrices to solve systems of two and three equations.
12. Solve applied problems using linear, quadratic, rational, radical, absolute value, exponential, and logarithmic equations.
13. Graph linear, quadratic, rational, radical, exponential and logarithmic functions.
14. Apply principles of rational exponents.

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4. Course Objectives (continued)

1. Apply critical thinking and mathematical reasoning skills necessary in algebraic problem solving.
2. Observe, interpret, and analyze the behavior of quadratic functions.
3. Articulate and analyze the connection between numerical, graphical, and verbal approaches to solving problems.
4. Recognize and graph elementary conics.
5. Understand and use mathematical notation relative to sequences and series and compute partial sums
6. Use a graphing calculator for basic calculations, graphing, and elementary matrix work.

5. Instructional Facilities

Standard classroom

6. Special Materials Required of Student

 Graphing Calculator.

7. Course Content

1. Linear equations and inequalities in one variable: solve including some literal and conditional equations, identities, and contradictions; number line graphs.
2. Linear equations and inequalities in two variables: graph, slope, x and y intercepts, equation of a line, use of slope-intercept and two points to find the equation of a line, and identification of graphical solutions to linear inequalities.
3. Exponents: basic rules and definitions of integer and rational exponents, scientific notation, multiply and divide numbers in scientific notation.
4. Polynomials: simplify and perform arithmetic operations on polynomial expressions (including synthetic division).
5. Factoring: use distributive property for greatest common factors, factor by grouping, the difference of two squares, trinomials, sum/difference of two cubes, combined factoring techniques.
6. Rational expressions: simplify, arithmetic operations; solve rational equations.
7. Radical expressions: add, subtract, divide, rationalize, simplify more complex expressions; complex numbers; solve radical equations
8. Systems of equations in two and three variables: solve with graphing, substitution, and elimination.
9. Matrices: augmented matrix and elementary row operations
10. Systems of linear and non-linear inequalities in two variables: graph and solve.
11. Absolute value equations and inequalities: solve, interval notation and number line graphs
12. Functions: addition, subtraction, multiplication, division, composition, inverses, domain and range calculations and operations
13. Quadratic functions: graph, identify and find characteristic parts of parabolas, write equations from a graph, solve equations by factoring, the square root property, completing the square and quadratic formula; use graphic, numeric and analytic methods to solve.
14. Distance and midpoint formulas, and related topics
15. Exponential and Logarithmic Functions: properties of, changing base and natural logarithms, graph, solve equations.
16. Application problems: solve problems that demonstrate proficiency with linear, quadratic, exponential and logarithmic equations, linear systems (especially business and economic applications), and conic sections aligned with expected outcomes for the course.
17. Conic sections: properties of, differences among, graph (foci or directrix) and find the equation from a graph; may need to complete the square to analyze the conic.
18. Sequences and Series: introduction, arithmetic and geometric, partial sums.
19. Graphing Calculator: basic operations, graphing, matrices, and other features applicable to course content.

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8. Method of Instruction

 a. Instructor presented examples

 b. Individual and group tutoring and/or daily problem assignments

9. Methods of Evaluating Student Performance

a. Homework, written or online

b. Independent exploration activities.

c. Group activities. Ex: Barbie Bungee Data Collection Activity to graph data and find the equation of the best-fit line.

d. Class participation/problem presentations.

e. Quizzes.

f. Possible take-home tests or online assessments

g. In-class exams.

h. Comprehensive in-class final exam.

10. Outside Class Assignments

 a. Homework, written or online.

 b. Text readings.

 c. Possible take-home tests or online assessments.

 d. Problem sets.

11. Texts

 a. Required Text(s):

 Bittinger, Martin L., and David J. Ellenbogen and Barbara L. Johnson. *Beginning and Intermediate Algebra –Graphs and Models.* Boston, MA: Addison Wesley, 5th ed. 2017.

 b. Supplementary texts and workbooks:

 Student Solutions Manual

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

1. Categorize algebra problems and use appropriate theorems, formulas, and algorithms to solve them.
2. Use the appropriate technology to solve problems requiring algebra.
3. Formulate, analyze, and differentiate mathematical functions numerically, graphically, and symbolically and have the ability to transition between these representations.
4. Communicate the mathematical process and assess the validity of the solution.

Date approved by the Governing Board: May 15, 2018