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Course Outline for MATH 55B

INTERMEDIATE ALGEBRA B

Effective: Fall 2009

I. CATALOG DESCRIPTION:
MATH 55B — INTERMEDIATE ALGEBRA B — 2.50 units

Concepts covered in the second half of Mathematics 55 Intermediate Algebra, including: systems of linear equations in three variables and matrix solutions; inverse of a function; exponential and logarithmic functions; properties of logarithms; exponential and logarithmic equations; conic sections; systems on non-linear equations and inequalities. Multiple representations, applications and modeling with functions are emphasized throughout. May not receive credit if Mathematics 55 or 55Y have been completed.

2.50 Units Lecture

Prerequisite
MATH 55A - Intermediate Algebra for STEM A
with a minimum grade of C
or

MATH 55X - Intermediate Algebra
with a minimum grade of C

Grading Methods:
Letter or P/NP

Discipline:

	MIN
Lecture Hours:	45.00
No Unit Value Lab	18.00
Total Hours:	63.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. MATH55A
B. MATH55X

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Determine whether or not an equation, table or graph represents a function;
B. Use function notation;
C. Given a function, determine the domain and range and express them in interval notation;
D. Sketch the graphs of linear, absolute value, quadratic, rational, radical, exponential and logarithmic functions;
E. Find the inverse of an invertible function, identify its domain and range, and sketch its graph;
F. Solve compound inequalities, sketch the graph of the solution and use appropriate set and interval notation to express the solution;
G. Solve absolute value equations and inequalities and, where appropriate, sketch the graph of the solution and use set or interval notation to express the solution;
H. Simplify, add, subtract, multiply and divide rational expressions;
I. Solve rational equations;
J. Solve systems of linear equations in three variables;
K. Use matrix methods to solve linear systems;
L. Write radical expressions with rational exponents;
M. Simplify, add, subtract, multiply and divide radical expressions;
N. Simplify, add, subtract, multiply and divide expressions with rational exponents;
O. Solve equations involving radicals;
P. Add, subtract, multiply and divide complex numbers;
Q. Solve quadratic equations using either factoring, the square root property, completing the square, or the quadratic formula;
R. Discuss the possible solutions of a quadratic equation and find complex roots;
S. Solve higher order polynomial equations in quadratic form;

T. Find the composition of two functions;
U. Solve exponential equations;
V. Use properties of logarithms to simplify logarithmic expressions and solve logarithmic equations;
W. Use the relationships between exponential and logarithmic functions to solve equations;
X. Sketch the graphs of conic sections and identify key components of the graphs;
Y. Solve non-linear systems of equations and inequalities;
A@. Develop and use equations or function models to analyze and solve applied problems involving linear, quadratic, rational, radical, exponential or logarithmic expressions.

V. CONTENT:
- A. Functions
  1. Composition of functions
  2. Inverse of a function
- B. Quadratic Functions
  1. Representations
  2. Domain and range
  3. Graphs of quadratic functions
     a. Transformations and translation
     b. Vertex form
  4. Min-Max applications with quadratic functions
  5. Solution of quadratic equations
     a. Factoring
     b. Square root property
     c. Completing the square
     d. Quadratic formula
     e. Complex solutions and the discriminant
     f. Quadratic inequalities
- C. Equations in Quadratic Form
- D. Systems of Linear Equations in Three Variables
  1. Review of systems of linear equations in two variables
  2. Types of solutions
  3. Solving by substitution and elimination
  4. Matrix solutions
  5. Using technology (optional)
  6. Applications
- E. Exponential and Logarithmic Functions
  1. Definitions
  2. Representations
  3. Exponential function base e
  4. Common and natural logarithm
  5. Logarithms with other bases
  6. Relationship between exponential and logarithmic functions of the same base
  7. Properties of logarithms
  8. Exponential and logarithmic function models
  9. Exponential and logarithmic equations
- F. Conic Sections
  1. Parabolas with horizontal axes of symmetry
  2. Circles
  3. Ellipses
  4. Hyperbolas
  5. Nonlinear systems of equations and inequalities

VI. METHODS OF INSTRUCTION:
- A. **Lecture** -
- B. Assigned readings in the text
- C. Web-based tutorials
- D. Group and individual activities in class
- E. **Lab** - assignments
- F. Homework

VII. TYPICAL ASSIGNMENTS:

A. Homework 1. Problems from the text should be assigned for each section covered. The number of problems assigned may vary from section to section and from instructor to instructor, but the homework assignments should include a sufficient number and variety of problems to develop both skill and conceptual understanding. A typical assignment should take an average student 1 to 2 hours for each hour in class. 2. The majority of the problems assigned should be those for which answers are readily available (e.g., from the answer appendix in the text), so that students may obtain immediate feedback on their work. 3. Homework assignments may include reading the text. Students may be asked to read sections in advance of the lecture and then to re-read them after the lecture, to reinforce important concepts and skills. An instructor may require written work in conjunction with the reading assignments (e.g., have students complete a Q & A sheet related to the assigned reading). B. Laboratory 1. Lab assignments can be used to reinforce fundamental concepts and skills or to explore certain concepts in more depth than is possible in-class. They may be designated for individual or group work. Lab assignments are completed in the Open Math Lab where students have access to assistance with the assignments. 2. Sample lab assignment: Using multiple representations (tables, graphs and symbolic expressions), students explore the inverse relationship between the exponential and logarithmic functions. C. In-Class 1. Collaborative learning, done in small groups of 2-4 students, can be used to introduce new concepts, build skills, or teach problem solving. Students may be asked to present their results on the board. 2. Sample collaborative learning assignment: Students explore the differences between linear, quadratic and exponential growth by developing graphical and numerical representations of these three types of functions. They create linear and exponential models showing the growth of money over time and determine which model will yield the most money.

VIII. EVALUATION:
- A. **Methods**
  1. Exams/Tests
  2. Quizzes
  3. Projects

4. Group Projects
5. Home Work
6. Lab Activities
7. Other:
    a. Methods
        1. Examinations (in-class)
        2. Comprehensive final examination
        3. Laboratory assignments
        4. Any of all of the following at the discretion of the instructor
            a. Homework
            b. Quizzes (announced or unannounced, in-class or take home)
            c. Collaborative group activities
            d. Projects

B. **Frequency**

1. Frequency
    a. Recommend minimum of three exams plus the final
    b. Homework should be assigned for each section covered
    c. Recommend minimum of seven laboratory assignments over the semester
    d. Number of quizzes and collaborative activities are at the discretion of the instructor

IX. TYPICAL TEXTS:

1. Rockswold, Gary K., and Terry A. Krieger *Beginning and Intermediate Algebra.* 2nd ed., Pearson/Addison- Wesley, 2009.
2. Blitzer, Robert *Introductory & Intermediate Algebra.* 3rd ed., Pearson/Prentice-Hall, 2009.
3. Tussy, Alan S., and R. David Gustafson *Intermediate Algebra.* 4th ed., Brooks/Cole, 2008.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Scientific calculator