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Course Outline for MATH 55B

INTERMEDIATE ALGEBRA FOR STEM B

Effective: Fall 2018

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

Concepts covered in the second half of Intermediate Algebra concepts, in the service of Science, Technology, Engineering and Math (STEM) fields, will be explored in this course including: an introduction to functions; linear and absolute value functions; absolute value equations and inequalities; compound linear inequalities; rational expressions, functions and equations; radical expressions, functions and equations; rational exponents; complex numbers; quadratic functions and equations; inverse of a function; exponential and logarithmic functions; properties of logarithms; exponential and logarithmic equations; conic sections; and systems of equations and inequalities. Multiple representations, applications and modeling with functions are emphasized throughout. May not receive credit if Mathematics 55 has been completed.

2.50 Units Lecture

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

Grading Methods:
Letter or P/NP

Discipline:
- Mathematics

	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

IV. MEASURABLE OBJECTIVES:

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

A. Solve polynomial, rational, absolute value, radical, literal, exponential, and logarithmic equations;
B. Apply basic operations on functions, including composition of functions and finding inverse functions;
C. Solve systems of linear equations in three variables;
D. Develop and use equations or function models to analyze and solve applied problems involving linear, quadratic, rational, radical, exponential or logarithmic expressions. Topics should minimally include growth, decay, geometry, optimization and uniform motion.
E. Use the properties of radicals, complex numbers, exponents and logarithms;
F. Sketch the graphs of nonlinear relations, including parabolas and circles, and identify key components of the graphs.

V. CONTENT:
A. Functions and Relations
1. Review definition and identifying a function and relation
2. Review representations of functions in different representations such as:
a. Verbal - real word examples
b. Symbolic
c. Numerical
d. Graphical
3. Domain and range and representing it using interval notation
4. Types of Functions
a. Polynomial functions
b. Rational functions
c. Exponential functions

d. Logarithmic functions
5. Review operations with functions and function notation
6. Composition of functions
7. Inverse of a function

B. Systems of Linear Equations in Three Variables
1. Types of solutions
2. Solving by substitution and elimination
3. Using technology (optional)
4. Applications involving systems of linear equations with three variables

C. 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. Solving quadratic equations using the following methods:
a. Factoring
b. Square root property
c. Completing the square
d. Quadratic formula
e. Factoring using substitution in order to solve equations in quadratic form
6. Solving quadratic equations that result in complex solutions and the implications of the discriminant
7. Quadratic inequalities
a. Applications involving quadratic functions, including optimization and projectile motion

D. Exponential and Logarithmic Functions
1. Definitions
2. Representations and models, including growth and decay
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. Solving exponential and logarithmic equations
9. Applications involving exponential and logarithmic functions

E. Conic Sections
1. Parabolas with horizontal axes of symmetry
2. Circles

VI. METHODS OF INSTRUCTION:

A. **Lab** - Assignments incorporating modeling real-world STEM applications
B. **Discussion** -
C. **Audio-visual Activity** - online video and tutorials
D. **Lecture** -
E. **Individualized Instruction** -
F. Any of the following at the discretion of the instructor 1. Individual problem solving 2. Group work 3. Student presentations
G. **Classroom Activity** -

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, conceptual understanding and application of the concepts to real world sitations. 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, skills and applications 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: Students explore concepts related to quadratic functions, their graphs, domains and ranges and applications, including optimization, that can be modeled with a quadratic function, find and interept the result.

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. Group Projects
4. Class Work
5. Home Work
6. Lab Activities
7. Other:
Comprehensive final examination

B. **Frequency**

1. Recommend minimum of four exams plus the cumulative final
2. Recommend frequent quizzes or graded homework, to provide regular feedback to the student regarding mastery of concepts.
3. Homework should be assigned for each section covered

4. Recommend minimum of eight laboratory assignments over the semester.
5. Time should be allowed in class for students to apply the concepts being covered. This can be done individually, in groups or as part of projects.
6. Number of quizzes and collaborative activities are at the discretion of the instructor.

IX. TYPICAL TEXTS:

1. Rockswold, Gary, and Terry Krieger. *Beginning and Intermediate Algebra.* 4th ed., Pearson/Addison- Wesley, 2018.
2. Blitzer, Robert. *Introductory and Intermediate Algebra.* 5th ed., Pearson, 2017.
3. Tussy, Alan, and Diane Koenig. *Intermediate Algebra.* 5th ed., Pearson, 2015.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Scientific calculator