Course Outline for Mathematics 55

INTERMEDIATE ALGEBRA

Catalog Description:

MTH 55 - Intermediate Algebra

5.00 units

Concepts involving complex numbers, quadratic equations, parabolas and circles, functions and their graphs, systems of equations, rational exponents, radical equations, absolute value equations and inequalities, exponential and logarithmic functions and equations.

Prerequisite: MTH 53 (completed with a grade of "C" or higher), MTH 53B (completed with a grade of "C" or higher), MTH 65 (completed with a grade of "C" or higher), MTH 65B (completed with a grade of "C" or higher) or an appropriate skill level demonstrated through the Mathematics Assessment process. May not receive credit if MTH 55A and MTH 55B or MTH 55L have been completed.

Grading Option: Optional

Discipline:

<table>
<thead>
<tr>
<th>Units</th>
<th>Contact Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Week</td>
</tr>
<tr>
<td>Lecture</td>
<td>5.00</td>
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<tr>
<td>Laboratory</td>
<td>0.00</td>
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<tr>
<td>Clinical</td>
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<tr>
<td>Total</td>
<td>5.00</td>
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Prerequisite Skills:

Before entry into this course, the student should be able to:

1. interpret and apply formulas involving several variables;
2. solve linear equations involving fractions, decimals, and percents;
3. solve exponential equations using logarithms;
4. apply proportional reasoning appropriately in real-life situations;
5. create, apply, and interpret graphs;
6. create graphs and find equations of linear models;
7. create graphs and find equations of exponential models;
8. represent models using functional notation;
9. apply the models to make estimations;
10. calculate and interpret linear and exponential rates of growth;
11. model real growth and decay situations and data with exponential graphs and functions;
12. apply and interpret linear and exponential models in context of the real data or situations;
13. solve systems of equations using graphing and substitution methods;
14. create graphs and find equations of exponential functions;
15. apply and interpret linear and exponential models in context of the real data or situations;
16. calculate and interpret exponential rates of growth;
17. use scientific notation to perform calculations and make comparisons;
18. model real growth and decay situations and data with exponential graphs and functions;
19. solve exponential equations using logarithms;
20. analyze data and determine the appropriate model for the situation;
21. solve systems of equations using graphing and the substitution methods;
22. use a graphing calculator as a tool in problem solving.

Measurable Objectives:

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

1. solve for a particular variable in a formula;
2. state the domain and range of a given function or given the graph of a function;
3. state domains and ranges of a function in set-builder and interval notation;
4. solve compound inequalities;
5. solve equations and inequalities involving absolute values;
6. graph linear inequalities in two variables;
7. solve linear inequalities in one variable;
8. solve systems of linear equations in three unknowns using elimination and substitution;
9. solve applications involving a system of linear equations;
10. multiply polynomials;
11. factor polynomials by greatest common factor, by grouping and using special forms;
12. solve polynomial equations;
13. problem solve applications that contain polynomials;
14. solve quadratic equations by factoring, completing the square, square root principle and using the quadratic formula;
15. solve equations in quadratic form;
16. perform basic operations on complex numbers;
17. find complex roots of a quadratic equation;
18. sketch the graphs of linear, quadratic, rational, radical, exponential and logarithmic functions;
19. apply translations and reflections to obtain new graphs of quadratic, rational, radical, exponential and logarithmic functions;
20. identify the domains and ranges of linear, quadratic, rational, exponential and logarithmic functions;
21. sketch the graph of a circle and identify domain and range;
22. multiply, divide, add and subtract rational expressions;
23. simplify complex rational expressions;
24. solve rational equations;
25. solve applications that involve rational equations;
26. problem solve applications that use direct and inverse variation;
27. apply the properties of and perform operations with radicals;
28. apply the properties of and perform operations with rational and integer exponents;
29. solve radical equations;
30. find an inverse functions algebraically;
31. given a graph of function, sketch a graph of the inverse function;
32. perform function composition;
33. solve exponential and logarithmic equations;
34. apply properties of logarithms;
35. solve growth and decay applications;
36. find the distance between two points;
37. find the midpoint of a line segment.

Course Content:

1. Functions
   A. Define functions and introduce function notation
   B. Find domain and range from a given function or when given a graph of a function
   C. Review set-builder and interval notation
   D. Algebra of functions, add, subtract, multiply and divide functions
   E. Function composition

2. Systems of Equations
   A. Review solving system of linear equations in two variables by graphing, substitution
   B. Systems of equations by elimination
   C. System of linear equations in three variables
   D. Applications using systems of equations

3. Linear Inequalities and Absolute Values
   A. Linear inequalities in one variable
   B. Compound inequalities
   C. Linear inequalities in two variables by graphing
   D. Equations that contain absolute values
   E. Inequalities that contain absolute values

4. Polynomials and Polynomial Functions
   A. Multiplication of polynomials
   B. Properties of integer exponents
   C. Factor polynomials by the greatest common factors
   D. Factor polynomials by grouping
   E. Factor trinomials by trial and error and “ac” method
   F. Factor special forms (difference of squares, perfect square trinomials)
   G. Polynomial equations
   H. Applications involving polynomials

5. Rational Equations and Rational Functions
   A. Multiply and divide rational expressions
   B. Add and subtract rational expressions
   C. Simplify complex rational expressions
   D. Problem solve using formulas and solve for a variable in a formula
   E. Solve rational equations
   F. Applications that involve rational equations
   G. Introduce vertical and horizontal asymptotes
   H. Domain and range of rational functions
   I. Graph basic reciprocal function, include translations and reflections of the reciprocal function
   J. Direct and inverse variation and combinations
   K. Applications involving direct and inverse variation

6. Radical Expressions and Functions
   A. Properties of rational exponents
   B. Multiply and simplify radicals
   C. Add, subtract, and divide radicals
   D. Multiply with more than one term and rationalizing denominators
   E. Radical equations
   F. Basic operations with complex numbers
   G. Graph radical function and apply translations and reflections to get new graphs (only focus on square root and cube root functions)
   H. State the domain and range of radical functions

7. Quadratic Equations and Functions
   A. The square root property and completing the square
   B. The quadratic formula
   C. Graphs of quadratic functions in standard and vertex-form
   D. Axis of symmetry and end behavior
   E. State the domain and range of radical functions
   F. Equations quadratic in form
   G. Polynomial and rational inequalities

8. Exponential and Logarithmic Equations and Functions
   A. Composite and inverse functions
   B. Relationship of domain and range of a function and its inverse
   C. Compare graphs of a function and its inverse
   D. Logarithmic functions
   E. Properties of logarithms
   F. Exponential and logarithmic equations
   G. Graphs of exponential and logarithmic functions and apply translations and reflections to get new graphs
   H. Domains and ranges of exponential and logarithmic functions
   I. Applications of exponential growth and decay

9. Conic Sections
   A. Distance and midpoint formulas
   B. Circles
   C. Domain and range of circles
Methods of Presentation
1. Lecture/Discussion
2. Class discussion of problems, solutions and student’s questions
3. Audio-visual materials

Assignments and Methods of Evaluating Student Progress
1. Typical Assignments
   A. Exercises from the text book- The half-life of tritium is 12.4 years. How long will it take for 25% of a sample of tritium to decompose?
   B. Collaboratives- Perform an experiment with water and coffee filters and model with an exponential function.

2. Methods of Evaluating Student Progress
   A. Exams/Tests
   B. Quizzes
   C. Homework
   D. Final Examination

3. Student Learning Outcomes
   Upon the completion of this course, the student should be able to:
   A. Critically analyze mathematical problems using a logical methodology.
   B. Communicate mathematical ideas, understand definitions, and interpret concepts.
   C. Increase confidence in understanding mathematical concepts, communicating ideas and thinking analytically.

Textbooks (Typical):

Special Student Materials
1. A graphing calculator may be required
2. Access code to “MyMathLab” software program or another online learning system.

Abbreviated Class Schedule Description:

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