Course Syllabus

Department: Mathematics

Date: December 12, 2014

I. Course Prefix and Number: MAT 145

   Course Name: College Algebra

   Credit Hours and Contact Hours: 3 Credit Hours, 4 Contact Hours

   Catalog Description including pre- and co-requisites: supporting data required for grade prerequisite of ‘C’ or higher.

This course is directed towards the student learning algebraic concepts necessary to enter into Pre-Calculus (MAT 152). Topics included in this course are the concept of a function, linear, quadratic, polynomial and trigonometric functions, average rate of change, solving quadratic equations, properties of exponents, systems of equations, right triangle trigonometry and trigonometry on general triangles. Solutions to equations and inequalities will be found numerically, algebraically, and graphically. Throughout the course, applications are emphasized as a reason for learning algebra.

Prerequisite: MAT 097 or Placement into Math Level 2.

Relationship to Academic Programs and Curriculum including SUNY Gen Ed designation if applicable:

This course is a service course that fulfills mathematics/science course requirements for many A.S., A.A. and A.A.S. degrees.

This course carries SUNY Gen Ed Mathematics credit.

II. Course Student Learning Outcomes: State the student learning outcome(s) for the course (e.g. Student will be able to identify…)

Upon completion of the course the participant will be able to:
   1. Use graphing calculators to graph functions.
   2. Use function notation.
   3. Generate the domain and range of a function.
   4. Recognize and explain the meaning of the solution to an equation.
   5. Find solutions to applied problems using numerical, graphical, and algebraic techniques, including basic right triangle trigonometric problems.
   6. Create and interpret linear, quadratic, polynomial and trigonometric functions.
   7. Create and interpret the graphs of linear and quadratic functions.
   8. Solve linear and quadratic equations by numerical, graphical, or algebraic methods.
   9. Find missing sides and angles of right and general triangles.
  10. Evaluate their results for reasonableness.
College Learning Outcomes Addressed by the Course: (check each College Learning Outcome addressed by the Student Learning Outcomes)

☐ writing  ☐ computer literacy
☐ oral communications  ☐ ethics/values
☒ reading  ☐ citizenship
☒ mathematics  ☐ global concerns
☒ critical thinking  ☐ information resources

III. Assessment Measures (Summarize how the college and student learning outcomes will be assessed): For each identified outcome checked, please provide the specific assessment measure.

<table>
<thead>
<tr>
<th>List identified College Learning Outcomes(s)</th>
<th>Specific assessment measure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Possible evaluation methods include quizzes, tests, portfolios, collected assignments, group activities, et. al. All work throughout the course will involve mathematics.</td>
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<tr>
<td>Reading</td>
<td>On most evaluation methods students will need to read questions carefully. Students will also need to use the textbook to complete homework assignments.</td>
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<tr>
<td>Critical Thinking</td>
<td>On most evaluation methods students will be asked to approach problems in new ways.</td>
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IV. Instructional Materials and Methods

Types of Course Materials:
- Textbook: Selected by department.
- Calculator: TI-83 or TI-84

Methods of Instruction (e.g. Lecture, Lab, Seminar …):
1. Lecture
2. Discussion
3. Demonstration
4. Group activities
5. Labs/projects

V. General Outline of Topics Covered:
- Graphing Calculator usage
  (To be integrated throughout the course)
  a) Evaluating expressions
  b) Using the table function
  c) Graphing functions
1) Functions
   a) Definition of a function
   b) Four forms: verbal, algebraic, tabular, graphical
   c) Function notation
   d) Evaluating functions
   e) Solving for the input of a function given an output
   f) Interpreting the realistic meaning of the inputs and outputs of a function
   g) Domain and range: both abstract and realistic
   h) Piecewise defined functions

2) Linear functions
   a) Average rate of change
   b) The slope of a line (review)
   c) Graphing linear functions (review)
   d) Forms: point-slope (review), slope-intercept, general
   e) Finding the slope and horizontal and vertical intercepts algebraically and graphically
   f) Interpreting the realistic meaning of the slope and horizontal and vertical intercepts
   g) Modeling with linear functions
   h) Solving linear equations algebraically (review) and graphically
   i) Solving systems of linear equations algebraically (review) and graphically

3) Power Functions
   a) Direct and Indirect Variation
   b) Definition of negative exponents (review)
   c) Definition of fractional exponents and relationship to radicals (review)
   d) Solving power functions graphically and algebraically
   e) Modeling with power functions
   f) Recognizing the graphs of power functions
   g) Simplifying and changing the form of power functions

4) Quadratic Functions
   a) Solving quadratic equations graphically and algebraically (review)
   b) Solving applied problems using quadratic equations
   c) Recognizing and telling the difference between linear and quadratic models
   d) Complex roots of quadratic equations
   e) Forms of quadratic functions: standard, vertex and factored
   f) Quadratic functions and graphs: Finding and identifying vertex, axis of symmetry, x-intercepts and y-intercept
   g) Finding the vertex, zeros and y-intercept algebraically and graphically
   h) Interpreting the realistic meaning of the vertex, zeros and y-intercept
   i) Modeling with quadratic functions
   j) Domain and range of quadratic functions: both abstract and realistic
   k) Effects (graphical, algebraic and verbal) of transformations on quadratic function

5) Polynomial Functions
   a) Terminology of polynomials (review)
   b) End behavior of graphs
c) Finding the zeros and y-intercept algebraically and graphically
d) Interpreting the realistic meaning of the zeros and y-intercept

6) Trigonometry
   a) Pythagorean Theorem
   b) Find the sine, cosine, tangent of an angle in a right triangle
   c) Use sine, cosine, tangent to find missing sides and missing angles of a right triangle
   d) Solving applied problems using right angle trigonometry
   e) Law of sines (including the ambiguous case)
   f) Law of cosines

7/12