SYLLABUS

MATH 11009 – Modeling Algebra

(4 Credit Hours)

Catalog Information: Study of algebra arising in the context of real-world applications, including linear, polynomial, exponential and logarithmic models. Intended for students not planning to take calculus. No graduation credit for this course for students who have already passed MATH 11010. Prerequisite: minimum C (2.0) grade in MATH 00007 or MATH 00023; or ALEKS® math assessment minimum score of 45.

Text: Harshbarger & Yocco (2010). College Algebra in Context with applications for the managerial, life, and social sciences, 3rd edition. New York: Addison Wesley

Review and Extension of Basic Skills (14 days)
- Medium level factoring techniques
- Equations and inequalities from function point of view – (Rule of Four- graphing, numerical, verbal, symbolic)
  - Quadratics, including Quadratic Formula and completing the square
  - Basic to moderate absolute value
  - Basic to moderate radical
  - Basic to moderate rational
- Problem solving

General Properties of Functions (6 days)
- Real world scenarios focusing on interdependence between two variable quantities
- Increasing/decreasing
- Inputs/outputs; domain/range
- Interpreting and creating graphs
- Function notation
- Operations on functions
  - Addition, subtraction, multiplication
    - Graphical, numerical, symbolic

Linear Models (6 days)
- Slope in context: students can recognize in a data set or real world scenario when linear model is appropriate
- Review writing equations for lines – in context
- Piecewise linear functions:

- o Writing models
- o Sketching graphs

Systems of Linear Equations (8 days)

- Systems of two equations in context
  - o Writing models
  - o Review algebraic solution
- Introduce determinants and matrices
- Systems of three or four equations

Exponential and Logarithmic Models (15 days)

- Writing exponential models
  - o Recognizing exponential vs. linear – in data tables and real world scenarios
  - o Arbitrary bases
  - o Base e
- Graphs of exponential functions
- Orders of magnitude as introduction to logarithms
- Modeling with logarithms: Richter scale and decibels
- Skills:
  - o Evaluate logarithms using the definitions
  - o Convert exponential equations to equivalent logarithmic equations and vice versa
  - o Properties of logarithms
  - o Solve exponential equations using logarithms
  - o Solve logarithmic equations
- Graphs of logarithmic functions
- Inverse functions in context
  - o relation between exponential and logarithmic functions
- Composition of functions

Polynomial Models (7 days)

- Quadratic functions in context
  - o Review solutions by hand
    - ▪ zeroes, maximum, minimum values
- Cubics and quartics
  - o Regression equations on a calculator
- Polynomial division, synthetic division, Factor Theorem, finding real zeroes

Exams (4 days)