MARION TECHNICAL COLLEGE

COURSE NUMBER & NAME: MTH 1245 College Algebra

DEPARTMENT NAME: Mathematics

TAG/OTM/CTAG[1] COURSE #:   TMM 001 College Algebra

CREDIT HOURS: 3

PREREQUISITE(s):   MTH 0920 Algebraic Literacy or Algebra Placement Test

COURSE DESCRIPTION:

College Algebra emphasizes the use of algebra and functions in problem solving and modeling. Appropriate use of technology and applying mathematics to real-world situations is emphasized. Topics include relations, functions, graphs, polynomial functions, rational functions, exponentials, logarithms, and systems of equations.

TEXTBOOK: Algebra & Trigonometry

AUTHOR(s):   Sullivan, Michael

PUBLISHER: Pearson Education

YEAR/EDITION: 2020/ 11th edition

MAJOR COURSE LEARNING OBJECTIVES

A student completing this course will be able to:

1. Analyze functions. Routine analysis includes discussion of domain, range, zeros, general function behavior (increasing, decreasing, extrema, etc.). In addition to performing rote processes, the student can articulate reasons for choosing a particular process, recognize function families and anticipate behavior, and explain the implementation of a process (e.g., why certain real numbers are excluded from the domain of a given function).
2. Convert between different representations of a function.
3. Perform operations with functions including addition, subtraction, multiplication, division, composition, and inversion; connect properties of constituent functions to properties of the resultant function; and resolve a function into a sum, difference, product, quotient, and/or composite of functions.
4. Recognize function families as they appear in equations and inequalities and choose an appropriate solution methodology for a particular equation or inequality and can communicate reasons for that choice.
5. Use correct, consistent, and coherent notation throughout the solution process to a given equation or inequality.
6. Distinguish between exact and approximate solutions and which solution methodologies result in which kind of solutions.
7. Demonstrate an understanding of the correspondence between the solution to an equation, the zero of a function, and the point of intersection of two curves.
8. Solve for one variable in terms of another.
9. Solve systems of equations using substitution and/or elimination.
10. Purposefully create equivalences and indicate where they are valid.
11. Recognize opportunities to create equivalencies in order to simplify workflow.

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[1] Approved TAG and OTM courses carry the guarantee that the courses and their credits will transfer and apply toward the major at any of Ohio's public institutions of higher education, provided they were taken when the courses were equivalent. Additional Ohio transfer information may be obtained at https://www.ohiohighered.org/

12. Interpret the function correspondence and behavior of a given model in terms of the context of the model.
13. Create linear models from data and interpret slope as a rate of change.
14. Determine parameters of a model given the form of the model and data.
15. Determine a reasonable applied domain for the model as well as articulate the limitations of the model.
16. Anticipate the output from a graphing utility and make adjustments, as needed, in order to efficiently use the technology to solve a problem.
17. Use technology to verify solutions to equations and inequalities obtained algebraically.
18. Use technology to obtain solutions to equations to equations and inequalities which are difficult to obtain algebraically and know the difference between approximate and exact solutions.
19. Use technology and algebra in concert to locate and identify exact solutions.
20. Recognize when a result (theorem) is applicable and use the result to make sound logical conclusions and provide counter-examples to conjectures.

Competencies from Ohio Department of Higher Education's TMM001 College Algebra (December 8, 2015 version)

TEXTBOOK SECTIONS COVERED

2.1 The Distance and Midpoint Formulas
2.2 Graphs of Equations in Two Variables; Intercepts; Symmetry
2.3 Lines
2.4 Circles
2.5 Variation
3.1 Functions
3.2 The Graph of a Function
3.3 Properties of Functions
3.4 Library of Functions; Piecewise-defined Functions
3.5 Graphing Techniques: Transformations
3.6 Mathematical Models: Building Functions
4.3 Quadratic Functions and Their Properties
4.4 Building Quadratic Models from Verbal Descriptions and from Data
5.1 Polynomial Functions
5.2 Graphing Polynomial Functions; Models
5.3 Properties of Rational Functions
5.4 The Graph of a Rational Function
5.5 Polynomial and Rational Inequalities
5.6 The Real Zeros of a Polynomial Function
5.7 Complex Zeros; Fundamental Theorem of Algebra
6.1 Composite Functions
6.2 One-to-One Functions; Inverse Functions
6.3 Exponential Functions
6.4 Logarithmic Functions
6.5 Properties of Logarithms
6.6 Logarithmic and Exponential Equations
6.7 Financial Models
6.8 Exponential Growth and Decay Models; Newton's Law; Logistic Growth and Decay Models
12.1 Systems of Linear Equations: Substitution and Elimination
12.6 Systems of Nonlinear Equations
12.7 Systems of Inequalities

ALTERNATE FREE MATERIALS

Free Textbook: *College Algebra* on OpenStax
https://openstax.org/details/books/college-algebra

Free Videos: Algebra 2 on Khan Academy
https://www.khanacademy.org/math/algebra2