MATH 049: INTERMEDIATE ALGEBRA

Originator
jlearned

Co-Contributor(s)

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Justification / Rationale
A course at the Intermediate Algebra level intended for preparation for the STEM pathway.

Effective Term
Fall 2019

Credit Status
Credit - Degree Applicable

Subject
MATH - Mathematics

Course Number
049

Full Course Title
Intermediate Algebra

Short Title
INTERMEDIATE ALGEBRA

Discipline

Disciplines List
Mathematics

Modality
Face-to-Face

Catalog Description
This course focuses on solving problems using linear, quadratic and exponential models with an introduction to the concept of a function in preparation for the STEM pathway. Topics include solving and graphing linear, quadratic and exponential equations, systems of linear equations, rational exponents, root equations, quadratic inequalities, circles and applications. This course satisfies the Math Competency for an Associate Degree.

Schedule Description
This course covers solving and graphing linear, quadratic and exponential equations, systems of linear equations, rational exponents, root equations, quadratic inequalities, circles and applications of these topics.
Prerequisite: MATH 054
Advisory: ENG 061 & RDG 061

Lecture Units
3

Lecture Semester Hours
54

Lab Units
1

Lab Semester Hours
54

In-class Hours
108

Out-of-class Hours
108

Total Course Units
4

Total Semester Hours
216

Prerequisite Course(s)
MATH 054
Advisory: ENG 061 & RDG 061

Required Text and Other Instructional Materials

Resource Type
Book

Author
Sullivan, Michael; Struve, Kathy

Title
Intermediate Algebra

Edition
4th

Publisher
Pearson Education, Inc

Year
2018

College Level
Yes

ISBN #
9780134555805

Resource Type
Book

Author
Yoshiwara

Title
Intermediate Algebra, A modeling approach

Edition
2nd

Publisher
XYZ Publishing

Year
2013

College Level
Yes

ISBN #
9781936368358

Resource Type
Software

Title
Intermediate Algebra by Sullivan and Stuve

Edition
3rd

Publisher
Pearson Prentice Hall

Year
2018

Description
My MathLab software

Class Size Maximum
35

Entrance Skills
Know the Real Number System, including the following subsets of the Reals: integers, rationals, and irrationals.

Prerequisite Course Objectives
MATH 054-Identify, recognize and classify real numbers, as integers, rationals, or irrationals and locate their approximate positions on the real number line.

Entrance Skills
Know and use the commutative, associative, distributive, identity, and inverse properties of the Real Numbers under the operations of addition and multiplication.

Prerequisite Course Objectives
MATH 054-Apply the commutative, associative, distributive, identity, and inverse properties to simplify algebraic expressions involving polynomial, rational and radical expressions - perform arithmetic operations with algebraic expressions using the order of operations.

Entrance Skills
Comprehend the concepts of variables and how variables can be used to represent unknown quantities.

Prerequisite Course Objectives
MATH 054-Understand the concepts of variables and how variables can be used to represent an unknown quantity or a range of quantities.

Entrance Skills
Apply variables to create algebraic expressions that model an application problem.

Prerequisite Course Objectives
MATH 054-Use variables to create algebraic expressions that model quantities in an application problem.

Entrance Skills
Apply the commutative, associative, distributive, identity, and inverse properties to simplify algebraic expressions - perform arithmetic operations with algebraic expressions using the order of operations.

Prerequisite Course Objectives

MATH 054-Apply the commutative, associative, distributive, identity, and inverse properties to simplify algebraic expressions involving polynomial, rational and radical expressions - perform arithmetic operations with algebraic expressions using the order of operations.

Entrance Skills

Apply variables with the algebraic method to create algebraic equations or inequalities that model an application problem.

Prerequisite Course Objectives

MATH 054-Employ variables to create algebraic equations or inequalities that model an application problem.

Entrance Skills

Add, subtract, multiply and divide polynomials.

Prerequisite Course Objectives

MATH 054-Add, subtract, multiply and divide polynomials.

Entrance Skills

Apply the zero product principle to solve quadratic equations by factoring.

Prerequisite Course Objectives

MATH 054-Solve quadratic equations in one variable by factoring and applying the zero product property.

Entrance Skills

Know square roots and solve square root equations.

Prerequisite Course Objectives

MATH 054-Interpret square roots and solve square root equations.

Entrance Skills

Know the Cartesian coordinate system and use it to graph linear equations by plotting points.

Prerequisite Course Objectives

MATH 054-Convert between the geometric (Cartesian) and algebraic representations of a linear relation in two variables. Make use of point-slope and slope intercept forms.

Entrance Skills

Demonstrate critical thinking skills when reading, composing and participating in class discussions.

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to think critically and express ideas using various patterns of development.
RDG 061-Read a variety of texts fluently.
RDG 061-Write organized summaries reactions that capture main idea and supporting details.

Course Content

1. Linear Models represented by tables, graphs, equations, or word problems.
2. Applications of Linear Models including 2x2 and 3x3 systems of linear equations and systems of linear inequalities.
3. Quadratic Models including quadratic equations and inequalities, graphs of parabolas and circles and maximum and minimum problems.
4. Functions represented by graphs, equations and tables, function notation, domain and range questions, and direct and inverse variation.
5. Rational exponents and Nth roots, properties of exponents, and root equations.
6. Introduction to exponential and logarithmic functions represented by tables, graphs, equations, and word problems.

Lab Content

In-class assignments designed to emphasize material from lecture and enhance problem-solving skills.

Course Objectives

	Objectives
Objective 1	Comprehend that the key characteristic of a linear model is its constant rate of change. Recognize when a table, graph or equation is linear.
Objective 2	Interpret slope as a rate of change, in preparation for generalizing the rate of change to the derivative in the Calculus course.
Objective 3	Develop the language of functions: calculate and find x and y intercepts, evaluate difference quotients, and how these calculations relate to graphs in preparation for the graphing application in the Calculus course.
Objective 4	Create and comprehend a linear model in the form of a table, graph, or equation from a verbal description, using the rule of 4.
Objective 5	Find the equation of a line and apply it to solve problems with a constant rate of change.
Objective 6	Solve 2x2 and 3x3 systems of linear equations & apply this to model circles, parabolas & lines from given data, as a lead into generalizing to least squares methods in the Calculus sequence.
Objective 7	Graph systems of linear inequalities in two dimensions. Introduction to non-linear inequalities.
Objective 8	Graph and find the equation of a circle. Graph the circle to discuss the domain & range of the explicit functions defined from the implicit circular relation, to prepare for applications of circles in Trigonometry.
Objective 9	Solve quadratic equations by factoring, completing the square, taking square roots, and the quadratic formula.
Objective 10	Solve quadratic inequalities. Also solve inequalities of higher degree polynomials graphically in preparation for the the first and second derivative tests in Calculus. Solve rational inequalities.
Objective 11	Recognize when a table, graph, or equation is quadratic.
Objective 12	Create a quadratic model with a table, graph, or equation and solve maximum and minimum problems. Start to develop the terminology and notation associated with the Extreme Value Theorem in Calculus.
Objective 13	Graph a parabola by finding the vertex, intercepts, and other symmetric points. Graph a circle by finding the "extreme points" and center.
Objective 14	Comprehend and manipulate rational exponents and Nth roots, and solve radical equations.
Objective 15	Apply the definition of a function including function notation and terminology (domain and range), especially as function notation relates to a graph. Develop the ability to read a graph and precisely describe how the output variable changes wrt (with respect to) the output variable, using function notation and inequality notation.
Objective 16	Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor. Recognize when a table, graph or function is exponential.
Objective 17	Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function. Develop the language associated with an exponential function such as: growth or decay factor; percent increase or decrease.
Objective 18	Develop the logarithm function as an inverse of the exponential function. Solve basic exponential & logarithmic equations. Apply properties of logarithms in anticipation of the Pre-Calculus course.
Objective 19	Read and comprehend an application problem, define variables appropriately and create a mathematical model that can be used to analyze the problem.
Objective 20	Use geometric reasoning to create mathematical models.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Combine and use properties of real numbers to manipulate algebraic expressions and equations.
Outcome 2	Use functions to model a deterministic relationship between two quantities in a variety of applications.
Outcome 3	Use the information obtained in application problems to estimate a solution, identify and execute methods of solution that involve algebraic computations, and evaluate the reasonableness of results.
Outcome 4	Construct solutions to equations and inequalities based on deductive reasoning.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Laboratory	Individual and group exploration of course topics with instructor guidance.
Discussion	Review, analyze, and evaluate various methods of solution.
Lecture	Presentation of explanation of course topics.
Other (Specify)	1. Teamwork 2. Team assignments done asynchronously and in real-time lab. 3. Asynchronous and synchronous communication to review, analyze, and evaluate various methods of solution: Student to Student and Student to Teacher.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	Students will be evaluated by homework assignments covering topics from lecture. Students will typically be assigned 4-5 hours of homework a week.	Out of Class Only
Mid-term and final evaluations	Students will be evaluated by examinations involving problems that require the application of studied principles and skills to new situations as well as problems that mimic those done on homework and in class. Students will be evaluated using a comprehensive two-hour final exam.	In Class Only
Computational/problem-solving evaluations	Students will be evaluated by completing challenging problem sets requiring careful reasoning and application of a variety of course topics.	In Class Only
Laboratory projects	Students will apply course topics to solve significant problems emphasizing applications in business, science, and mathematics.	In Class Only
Student participation/contribution	Students will be evaluated by their participation in lab activities and may be required to turn in written summaries of these activities.	In Class Only
Self-paced testing,Student preparation	Students will be expected to read the textbook before coming to class as well as reviewing their notes after class. Students will be evaluated on their preparation and review by their performance on homework and exams. Students should typically spend an average of 1-2 hours per week on preparation and review.	Out of Class Only

Assignments

Other In-class Assignments

1. Attend classroom lectures and take notes.
2. Attend and participate in lab.
3. Participate in discussion groups to review, analyze, diagnose, and evaluate various methods of solution used on homework.
4. Complete examinations involving problems that require the application of studied principles and skills to new situations as well as problems that mimic those done on homework and in class.
5. Complete challenging problem sets requiring careful reasoning and application of a variety of course topics.

Other Out-of-class Assignments

1. Read the textbook and any supplementary materials
2. Review notes taken in class.
3. Complete assigned homework including problem solving, exercises to improve skills and mathematical understanding.

Grade Methods
Letter Grade Only

COD GE
C4.B - Language and Rationality - Communication and Analytical Thinking

MIS Course Data

CIP Code
27.0101 - Mathematics, General.

TOP Code
170100 - Mathematics, General

SAM Code
E - Non-Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
One level below transfer

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Not transferable

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
11/15/2018

Academic Senate Approval Date
11/29/2018

Board of Trustees Approval Date
12/14/2018

Chancellor's Office Approval Date
1/7/19

Course Control Number
CCC000599884