MATH 049: INTERMEDIATE ALGEBRA

Originator
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Justification / Rationale
Periodic update.

Effective Term
Fall 2022

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
100% Online
Hybrid

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
Instructional Materials

Title
Intermediate Algebra by Sullivan and Stuve

Edition
3rd

Publisher
Pearson Prentice Hall

Year
2018

Description
My MathLab software

Resource Type
Book
Open Educational Resource
Yes

Author
Lynn Marecek, Andrea Honeycutt Mathis

Title
Intermediate Algebra

Edition
2nd

City
Houston

Publisher
OpenStax

Year
2020

College Level
No

ISBN #
978-1-975076-49-8

Resource Type
Web/Other
Open Educational Resource
No

Year
2020

Description
WebAssign for Intermediate Algebra - 1st edition by Marecek (www.webassign.net):

May be used with the textbook "Intermediate Algebra", 2nd edition, published by OpenStax.

Class Size Maximum

30

Entrance Skills

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

Requisite 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.

Requisite 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.

Requisite 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.

Requisite 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.

Requisite 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.

Requisite 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.

Requisite Course Objectives

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

Entrance Skills

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

Requisite 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.

Requisite 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.

Requisite 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.

Requisite 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	Interpret slope as a rate of change, in preparation for generalizing the rate of change to the derivative in the Calculus course.
Objective 2	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 College Algebra, Precalculus, and Calculus courses.
Objective 3	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 4	Find the equation of a line and apply it to solve problems with a constant rate of change.
Objective 5	Solve 2x2 and 3x3 systems of linear equations as a lead into generalizing to nxn systems in the Linear Algebra course.
Objective 6	Graph systems of linear inequalities in two dimensions. Introduction to non-linear inequalities.

Objective 7	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 8	Solve quadratic equations by factoring, completing the square, taking square roots, and the quadratic formula.
Objective 9	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 10	Recognize when a table, graph, or equation is quadratic.
Objective 11	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 12	Graph a parabola by finding the vertex, intercepts, and other symmetric points. Graph a circle by finding the "extreme points" and center.
Objective 13	Manipulate rational exponents and Nth roots, and solve radical equations.
Objective 14	Describe the definition of functions and related terminology such as domain and range. Represent and interpret single-variate functions as equations, graphs, verbal descriptions of the dependent variable in terms of the independent variable, and function notation.
Objective 15	Characterize a function, table, graph, or equation with a constant growth or decay as an exponential model.
Objective 16	Recognize when an 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 17	Develop the logarithm function as an inverse of the exponential function. Solve basic exponential & logarithmic equations. Apply properties of logarithms in anticipation of the Precalculus course.
Objective 18	Read and comprehend an application problem, define variables appropriately and create a mathematical model that can be used to analyze the problem.
Objective 19	Use geometric reasoning to create mathematical models.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Use properties of real numbers to manipulate exponential, radical, and polynomial expressions such as completing the square in a quadratic function or equation of a circle.
Outcome 2	Use functions to model a deterministic relationship between two quantities in a variety of applications.
Outcome 3	Use quantities and relationships in an application problem to estimate a solution, create a polynomial or exponential model, solve relevant equations and inequalities, and evaluate the reasonableness of results.
Outcome 4	Apply deductive reasoning to find solution sets of linear, polynomial, exponential, and radical equations and inequalities.

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	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

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

100

On-campus %

0

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?

Labs help students practice and apply what they have learned in lecture. They engage students in active learning, which is crucial for topic mastery.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?

Lab activities include problem sheets that are posted on Canvas. They also involve Canvas discussions. These lab activities are designed to reiterate important concepts from lecture, and students are allowed to ask questions while completing their labs. Labs are monitored by the instructor through Canvas.

How will you assess the online delivery of lab activities?

Labs will be submitted as write-ups or discussion responses in Canvas for evaluation and feedback.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

Depending on the textbook used, the professor may choose to use the free OER My OpenMath, or Pearson MyLab and Mastering, or Cengage WebAssign. All of these are considered to be safe for use in education for both faculty and students. All can also integrated with the college LMS (Canvas), which decreases the amount of times students will need to sign-in-and-out of accounts and open them up to data breaches.

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.

Professors who choose to use MyOpenMath, Pearson MyLab and Mastering, or Cengage WebAssign, do so in order to assign a wide range of problems for students to work on. By solving a variety of problems and receiving instantaneous feedback, students can enhance their learning.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:

Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Weekly announcements

External to Course Management System:

Direct e-mail
Posted audio/video (including YouTube, 3cmediasolutions, etc.)
Synchronous audio/video
Telephone contact/voicemail

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.

Faculty will regularly contact students individually and as a group through Canvas messages and/or COD email. Students will also receive regular announcements with information about the course, COD as a whole, or other relevant information. In discussions and through other lab assignments, students will communicate with each other and their professor regularly and frequently.

If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.

Students may prefer to contact their professor via email or on the phone, which allows for an improved experience for those who communicate better in those contexts. The professor may direct students to access free supplemental resources as well.

Other Information

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

General Education Status
C = Non Transferable-Local GE for Analytical Thinking or Math Competency

Support Course Status
N = Course is not a support course

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
11/18/2021

Academic Senate Approval Date
12/09/2021

Board of Trustees Approval Date
01/21/2022

Chancellor's Office Approval Date
03/11/2022

Course Control Number

CCC000599884

Programs referencing this course

Human Resource Generalist Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=118)
Registered Nursing AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=72)