COURSE OUTLINE

Mathematics 144
Algebra Basics

Catalog Statement

MATH 144 is a basic skills course designed to prepare students for their first course in algebra. It includes the fundamental processes of arithmetic, pre-algebra, and fundamental operations of algebra normally included in the first semester of a year course taught in secondary school. It is designed to develop skill in computation using whole numbers, signed numbers, fractions, decimals, percents, and properties of the decimal number system. Rules of exponents, first-degree equations, fundamental facts about geometry, solutions to linear equations, algebraic manipulations, exponents, polynomials, graphing linear equations, and solving linear systems are also included. This course is designed for students who have studied algebra for less than one year or have not studied algebra recently.

Total Lecture Units: 5.0
Total Laboratory Units: 1.0
Total Course Units: 6.0

Total Lecture Hours: 80.0
Total Laboratory Hours: 48.0
Total Laboratory Hours To Be Arranged: 0.0
Total Faculty Contact Hours: 128.0

Prerequisite: Placement is based on a composite of test scores and academic background.

Note: This course may not be taken for credit by students who have completed MATH 141, 145, or 245B. A maximum of 6 units will be granted for MATH 144 and any of the following courses: MATH 155, 255A, 255B, 255C, 255D, 245A, or 245B.

Course Entry Expectations

Prior to enrolling in the course, the student should be able to:

- read, write, and converse in English;
- use effective speaking and listening skills;
- read and write at a level of 10^{th} grade or above;
- perform basic arithmetic operations of addition, subtraction, multiplication, and division of whole numbers;
- perform basic computer operations.

Course Exit Standards

Upon successful completion of the required coursework, the student will be able to:

- convert between percents, decimals and fractions;
- solve linear equations and inequalities;

- solve absolute value equations and inequalities;
- simplify exponential expressions;
- add, subtract, multiply and divide polynomials;
- graph linear equations and inequalities;
- find the equation of the line passing through 2 points;
- solve linear systems using 3 different methods;
- use algebra to solve applied problems;
- use function notation;
- demonstrate knowledge of test-taking strategies and study skills.

Course Content **Total Faculty Contact Hours = 128.0**

Whole Numbers **(4 hours)**
- Reading numerals and place value
- Addition
- Subtraction
- Multiplication
- Division
- Factors and prime factorization
- Exponents and order of operations
- Rounding and Estimating

Signed Numbers **(8 hours)**
- Greater than and less than
- Absolute value
- Addition of signed numbers
- Subtraction of signed numbers
- Multiplication of signed numbers
- Division of signed numbers
- Order of operations

Fractions **(8 hours)**
- Reducing to lowest terms
- Changing improper fractions to mixed numbers
- Changing mixed numbers to improper fractions
- Finding common denominators and least common denominators
- Addition and subtraction of fractions
- Addition and subtraction of mixed numbers
- Comparing fractions
- Multiplication of fractions, mixed numbers
- Division of fractions, mixed numbers
- Exponents and order of operations

Decimals **(8 hours)**
- Reading and writing decimals
- Rounding decimals
- Comparing decimals
- Addition and subtraction of decimals

- Multiplication of decimals
- Division of decimals
- Multiplying and dividing by powers of ten
- Changing fractions to decimals
- Changing decimals to fractions
- Operations with both fractions and decimals
- Order of operations
- The Pythagorean Theorem

Ratio and Proportions **(4 hours)**
- Ratio and ratio applications
- Solving proportions
- Applications of proportions
- Similar triangles

Percent **(4 hours)**
- Meaning of percent
- Changing percent to decimals
- Changing decimals to percents
- Changing percents to fractions
- Changing fractions to percents
- Solving percent problems
- Applications of percents

Strategies for the mathematics student **(4 hours)**
- Learning styles and thought processes
- Recognizing and combating negative thoughts
- Effective studying and problem solving techniques
- Effective test preparation
- Test taking strategies

Linear Equations and Inequalities **(8 hours)**
- Simplifying expressions
- Addition property of equality
- Multiplication property of equality
- Solving linear equations
- Formulas
- Applications
- Linear and compound inequalities
- Absolute value equations and inequalities
- Perimeter of plane geometric figures

Linear Equations and Inequalities in Two Variables **(8 hours)**
- Graphing ordered pairs
- Solutions to linear equations in two variables
- Graphing linear equations in two variables
- Graphing using intercepts
- The slope of a line
- Finding the equation of a line
- Linear inequalities in two variables
- Area of geometric figures

Systems of Linear Equations **(11 hours)**
- Solving systems of equations by graphing
- Solving systems of equations by elimination
- Solving systems of equations by substitution
- Applications of systems of equations
- Solving systems of three equations in three variables

Exponents and Polynomials **(13 hours)**
- Multiplication with exponents
- Division with exponents
- Operations with monomials
- Addition and subtractions of polynomials
- Multiplication with polynomials
- Binomial squares and other special products
- Dividing polynomials
- Functions and function notation
- Volume of geometric solids

Laboratory Content **(48 hours)**
- Growth Mindset interventions
- Calculate the area, perimeter, and volume of various objects
- Calculate sales tax and total price
- Graph lines using slope and intercepts
- Apply mathematical models

Methods of Instruction

The following methods of instruction may be used in the course:
- lecture/discussion;
- group work/discussion;
- online presentation;
- guest speakers.

Out of Class Assignments

The following out of class assignments may be used in the course:
- homework (e.g. problems sets related to course content);
- lab assignments and projects (e.g. design a matte frame for a photo using mixed numbers).

Methods of Evaluation

The following methods of evaluation may be used in the course:
- group work (e.g. find areas and volumes of shapes involving objects that can be brought into the classroom such as cans and boxes);
- quizzes;
- five to eight examinations are required;

- a comprehensive final examination is required.

Textbooks

Tussy, Alan, and Diane Koenig. *Prealgebra*. 5th ed. Belmont: Cengage, 2015. Print.
10th Grade Textbook Reading Level. ISBN: 1-285-73725-3.

Tussy, Alan, and David Gustafson. *Elementary Algebra:* Glendale Community College. 5th ed. Boston: Cengage Learning, 2016.

8th Grade Textbook Reading Level. ISBN: 978-1-111-56766-8

Student Learning Outcomes

Upon successful completion of the required coursework, the student will be able to:

- perform arithmetic operations on whole numbers, fractions, decimals, and signed numbers;
- calculate area and perimeter of polygons and circles, volumes of solids and solve similar triangle problems;
- simplify polynomial expressions;
- solve linear and absolute value equations and inequalities, and solve systems of equations;
- graph linear functions;
- use mathematical models including linear equations and systems of equations to solve application problems.