

Course Outline

Course Title: Pre Calculus Algebra

Common Course Title: MAC1140

Effective Term: Fall 2021 (Aug 9, 2021)

Credit Hours: 3 Units

Next Review : Aug 8, 2026

Contact Hour Breakdown: *(Per 16 week Term)*

Total: 48

Lecture:

Lab:

Clinic:

Other:

Requirements

Pre-requisite with minimum grade required

MAC1105 (C) **OR** MAC1105C (C)

Course Description:

This course, in conjunction with MAC1114, is designed to prepare the student for the study of calculus. Topics include sequences, series matrices, determinants, conic sections and systems of equations. Also included are polynomial, rational, exponential, and logarithmic functions and equations; and polynomial and rational and absolute value inequalities. Functions and graphs are emphasized. A graphing calculator may be required. Recommendation of the Mathematics Department or at least a grade of C in the prerequisite course is required.

Course Outline

Alignment of General Education Competencies with General Outcomes of this Course (for general education assessment purposes)

1. Critical Thinking

- 1.0

2. Effective Communication

- 3.0

3. Ethical Reasoning

4. Global Awareness

5. Information Literacy

6. Mathematical and Scientific Reasoning

- 6.0

UNITS

Unit 1: Properties and Graphs of Polynomial, Rational, and Other Algebraic Functions

General Outcome

1.0 Recognize and graph polynomial, rational, and other algebraic functions, and write functions that satisfy specific

characteristics.

Specific Learning Outcomes

- 1.1 Recognize and construct graphs of polynomial functions.
- 1.2 Recognize and construct graphs of rational functions.
- 1.3 Define, graph, and write the equations of vertical, horizontal, and slant asymptotes.
- 1.4 Categorize and graph basic algebraic functions, such as absolute value, quadratic, cubic, radical, and reciprocal functions.
- 1.5 Create appropriate polynomial or rational functions that satisfy specific given conditions.
- 1.6 Recognize and construct graphs of piecewise functions.

Unit 2: Polynomial, Absolute Value, Rational Functions, Equations, and Inequalities

General Outcome

2.0 Identify the zeros of polynomial functions, determine solutions to polynomial, absolute value, and rational inequalities, and find the partial fraction decomposition of rational expressions.

Specific Learning Outcomes

- 2.1 Determine the number of zeros of a polynomial and the multiplicity of each zero.
- 2.2 Read and apply the Remainder Theorem and the Factor Theorem.
- 2.3 Use the Rational Root (Zeros) Theorem to find zeros of polynomials.
- 2.4 Perform synthetic division to find zeros of polynomials.
- 2.5 Determine the solution sets of polynomial, rational, and absolute value inequalities.
- 2.6 Find the partial fraction decomposition of a rational expression.

Unit 3: Exponential and Logarithmic Functions

General Outcome

3.0 Recognize and graph exponential and logarithmic functions, and solve exponential and logarithmic equations.

Specific Learning Outcomes

- 3.1 Read and apply the definitions and properties of exponents and logarithms.
- 3.2 Recognize and graph exponential and logarithmic functions.
- 3.3 Use the change-of-base formula.
- 3.4 Evaluate logarithmic and exponential expressions using a calculator.
- 3.5 Recognize and solve exponential and logarithmic equations, and provide these solutions both exactly and accurate to an indicated number of decimal places.
- 3.6 Read and solve applications of exponential and logarithmic functions involving topics such as population growth, compound interest, Carbon-14 dating, etc., and interpret the results in context, giving the solutions both exactly and accurate to an indicated number of decimal places.

Unit 4: Conic Sections

General Outcome

4.0 Manipulate and graph equations of conic sections.

Specific Learning Outcomes

- 4.1 Recognize, write the equations of, analyze, and graph conic sections such as parabolas, hyperbolas, ellipses.

Unit 5: Matrices, Determinants, and Systems of Equations

General Outcome

5.0 Perform matrix operations, and apply the theories and techniques used in solving systems of equations.

Specific Learning Outcomes

- 5.1 Recognize and solve systems of linear equations in two or more variables using matrix reduction techniques and Cramer's Rule.
- 5.2 Find the sum, difference, and product of two matrices, if they exist.
- 5.3 Demonstrate how to multiply a matrix by a scalar.

Unit 6: Sequences, Series, and the Binomial Theorem

General Outcome

- 6.0 Apply properties of sequences and series, and demonstrate the use of the binomial theorem.

Specific Learning Outcomes

- 6.1 Perform operations on summations, determine sequences defined recursively, and determine the n th term of an arithmetic or geometric sequence.
- 6.2 Recognize and identify arithmetic and geometric sequences.
- 6.3 Determine the sum of the first n terms of an arithmetic or geometric sequence, and determine the sum of an infinite geometric series, if it exists.
- 6.4 Apply the binomial theorem to expand powers of binomials, and write the k th term of an indicated binomial expansion.