

Department:

Mathematics

Course Description:

College Algebra is a comprehensive study of the fundamental laws of algebra, including exponents, linear and quadratic equations, polynomial and rational inequalities, system of equations, radicals and radical equations, functions and graphing, polynomials and polynomial equations, modeling, logarithms, complex numbers, augmented matrices, determinants, and regression. The course will provide analysis of graphs and linear systems in two or three variables, as well as applications of most of the topics listed above and others as time permits. A graphing calculator is required for this course.

Course Competencies:

The learning outcomes and competencies detailed in this syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups for this course as approved by the Kansas Board of Regents. (Kansas Regents Shared Number Course and Title: **KRSN Course MAT 1010 College Algebra.**)

Upon completion of the course, the student should be able to:

Analysis and Graphing of Functions and Equations

1. Use functional notation.
2. Simplify, manipulate, and solve problems involving complex numbers.
3. Recognize and distinguish between functions and relations (equations).
4. Perform polynomial synthetic division.
5. Utilize the remainder and factor theorems, and use a variety of techniques to find the zeroes of polynomial functions.
6. Use concepts of symmetry, intercepts, left- and right-hand behavior, asymptotes, and transformations to sketch the graph of various types of functions (constant, linear, quadratic, absolute value, piecewise-defined, square root, cubic, polynomial, rational, exponential, and logarithmic) or relations (circle) given in description.
7. Determine the domain and range of a function.
8. Write the equation that describes a function (for types given above) or circle given its description.
9. Use graphs of functions for analysis.
10. Find arithmetic combinations and composites of functions.
11. Find the inverse of a function.

Solutions of Equations and Inequalities

1. Solve equations listed in the sixth bullet above, i.e., literal equations, quadratic equations by factoring and the quadratic formula, equations involving rational expressions, equations involving radicals, and equations involving absolute value expressions, along with equations involving exponential or logarithmic functions.

2. Solve inequalities of the following types: linear (in one and two variables), polynomial, rational, and absolute value.
3. Solve systems of inequalities by graphing.
4. Apply equations from the first bullet in this core outcome to real-world situations, including but not limited to depreciation, growth and decay, and max/min problems.
5. Examine and analyze data, make predictions/interpretations, and do basic modeling.
6. Solve systems of equations by various methods, including matrices.

Course Content:

- A. Review of Basic Concepts and Skills
 1. Radicals and Rational Exponents
 2. Factoring Polynomials
 3. Rational Expressions
- B. Equations and Inequalities
 1. Linear Equations, Formulas, and Problem Solving
 2. Linear Inequalities in One Variable
 3. Complex Numbers
 4. Solving Quadratic Equations
 5. Solving Other Types of Equations
- C. Relations, Functions, and Graphs
 1. Rectangular Coordinates; Graphing with the Graphing Calculator
 2. Linear Graphs and Rates of Change
 3. Functions, Function Notation, and the Graph of a Function
 4. Analyzing the Graph of a Function
 5. Linear Functions and Real Data
- D. Functions
 1. Toolbox Functions and Transformations
 2. Basic Rational Functions and Power Functions
 3. Variation: The Toolbox Functions in Action*
 4. Piecewise-Defined Functions
 5. Algebra of Combinations/Compositions of Functions
 6. Formulas, Functions, and Problem Solving*
- E. Polynomial and Rational Functions
 1. Quadratic Functions and Applications
 2. Synthetic Division: Remainder and Factor Theorems
 3. Zeroes of Polynomial Functions
 4. Graphing Polynomial and Rational Functions
 5. Polynomial and rational Inequalities
- F. Exponential and Logarithmic Functions
 1. One-to-one and Inverse Functions
 2. Exponential Functions
 3. Logarithms and Logarithmic Functions
 4. Properties of Logarithms
 5. Solving Exponential and Logarithmic Equations
 6. Applications from Business, Finance, and Science
- G. Systems of Equations and Inequalities
 1. Linear Systems in Two Variables with Applications
 2. Linear Systems in Three Variables with Applications
 3. Nonlinear Systems of Equations and Inequalities
- H. Matrices and Matrix Applications
 1. Solve Linear Systems Using Matrices
 2. The Algebra of Matrices

3. Solving Linear Systems Using Matrix Equations, with Applications

*Covered if time permits.

Learning Assessments:

Course competencies will be assessed by written examinations covering all course material, including regular hour-long exams and a required, comprehensive final exam. Additionally, assessment may also occur through any of the following at the discretion of the instructor: regular collection of homework, in-class work, quizzes, journals, and various projects.

Instructional Materials:

Textbook: Miller, J. & Gerken, D. (2017). *College Algebra* (2nd ed.). New York, NY: McGraw-Hill. ISBN-13: 978-0077836344

Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the “Disabilities Self-Identification Form” on our [Disability Services website](#).

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

A Note on Harassment, Discrimination and Sexual Misconduct

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an [online report](#) about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our [Equity Grievance Policy](#).