

**Department:**

Mathematics

**Course Description:**

College Algebra with Lab involves the study of the fundamental concepts of algebra; algebraic equations and inequalities; functions and graphs; exponential and logarithmic functions; systems of equations and inequalities. Apply the above concepts to real-world situations. The course consists of three hours of lecture plus three hours of laboratory work per week. 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, including find arithmetic combinations and composition of functions.
2. Recognize and distinguish between functions and relations (equations).
3. 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.
4. Determine the domain and range of relations and function.
5. Write the equation that describes a function (for types given above) or circle given its description.
6. Use graphs of functions for analysis.
7. Find the inverse of a function.

Solutions of Equations and Inequalities

1. Solve equations including literal equations, quadratic equations by factoring and the quadratic formula, higher-order polynomial equations, 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 #1 in this core outcome to real-world situations, such as 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. Equations and Inequalities
  1. Solve linear, rational and literal equations (1.1)
  2. Solve applications with linear and rational equations involving simple interest, mixtures, uniform motions, rate of work and proportions (1.2)
  3. Solve quadratic equations by using the zero product property, square root property, quadratic formula and literal equations (1.4)
  4. Apply the quadratic equations to applications and models (1.5)
  5. Solve polynomials, rational, absolute value and radical equations (1.6)
  6. Solve linear, compound, and absolute value inequalities (1.7)
- B. Relations and Functions
  1. Graph by plotting points and x- and y-intercepts (2.1)
  2. Graph and writing the equation of a circle using the distance and midpoint formulas (2.1, 2.2)
  3. Find the domain and range of a relation and determine if it is a function (2.3)
  4. Apply function notion and use it to graph functions (2.3)
  5. Graph linear equations in two variables and linear functions (2.4)
  6. Solve applications of linear equations and modeling including linear regression (2.5)
  7. Recognize basic functions and transformation of graphs (2.6)
  8. Test for symmetry, determine if a function is even or odd, analyzing increasing, decreasing, and constant behavior of functions, and determining minimum and maxima values of a function (2.7)
  9. Graph piecewise-defined functions (2.7)
  10. Perform operations on functions and function composition (2.8)
- C. Polynomial and Rational Functions
  1. Graph quadratic function using the vertex formula (3.1)
  2. Identify end behaviors, zeros and multiplicities of zeros and graphing polynomial functions (3.2)
  3. Divide polynomials (3.3)
  4. Find zeroes of polynomial functions (3.4)
  5. Identify end behavior and asymptotes and graphing rational functions (3.5)
  6. Solve polynomial and rational inequalities (3.6)
- D. Exponential and Logarithmic Functions
  1. Find the inverses of functions (4.1)
  2. Evaluate and graph exponential functions (including natural exponential and exponential application) (4.2)
  3. Basic properties and graphing of logarithmic (4.3)
  4. Understand the properties of logarithms (4.4)
  5. Solve exponential and logarithmic equations and applications (4.5)
  6. Model growth and decay using exponential and logarithmic functions (4.6)
- E. Systems of Equations and Inequalities
  1. Solve linear systems in two variables by various methods (5.1)
  2. Solve linear systems three variables by various methods (5.2)
  3. Solve nonlinear systems in two variables (5.4)
  4. Solve inequalities and systems of inequalities in two variables (5.5)
- F. Matrices and Matrix Applications
  1. Solve systems of linear equations using matrices (6.1)

2. Solve inconsistent and dependent system equations (6.2)
3. Apply operations on matrices (6.3)
4. Using inverse matrices to solve systems (6.4)

## 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](#).