HIGHLAND COMMUNITY COLLEGE

Syllabus

MAT104 College Algebra
3 Hours Lecture
Prerequisites: Assessment
C&I Revision Date: 02/14/2025

Department:

Mathematics

Course Description:

College Algebra is 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. 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. Rectangular Coordinate Systems and Graphs (2.1)
    2. Linear (and rational) Equations in One Variable (2.2)
    3. Models and Application (2.3)
    4. Solve quadratic equations by using the zero product property, square root property, quadratic formula and literal equations (2.5)
    5. Solve polynomials, rational, absolute value and radical equations (2.6)
    6. Solve linear, compound, and absolute value inequalities (2.7)

B. Functions
    1. Functions and Function Notation (3.1)
    2. Domain and Range (3.2)
    3. Rates of Change and Behavior of Graphs (3.3)
    4. Graph and writing the equation of a circle using the distance and midpoint formulas (8.1 Co-requisite Objective 2 and Supplemental Material Section 5.2)
    5. Composition of Functions (3.4)
    6. Recognize basic functions (C3.5 Co-requisite material) and transformation of graphs (3.5)
    7. Absolute Value Functions (3.6)
    8. Inverse Functions (3.7)

C. Linear Functions
    1. Linear Functions (4.1)
    2. Modeling with Linear Functions (4.2)
    3. Fitting Linear Models to Data (4.3)

D. Polynomial and Rational Functions
    1. Quadratic Functions (6.1)
    2. Power Functions and Polynomial Functions (5.2)
    3. Graphs of Polynomial Functions (5.3)
    4. Dividing Polynomials (5.4)
    5. Zeros of Polynomial Functions (5.5)
    6. Solve polynomial inequalities (Supplemental Material Section 2.6)
    7. Rational Functions (5.6)
    8. Solve rational inequalities (Supplemental Material Section 3.4)
    9. Inverses and Radical Functions (5.7)

E. Exponential and Logarithmic Functions
    1. Exponential Functions. (61)
    2. Graphs of Exponential Functions (6.2)
    3. Logarithmic Functions (6.3)
    4. Graphs of Logarithmic Functions (6.4)
    5. Logarithmic Properties (6.5)
    6. Exponential and Logarithmic Equations (6.6)
    7. Exponential and Logarithmic Models (6.7)

F. Systems of Equations and Inequalities
    1. Solve linear systems in two variables by various methods (7.1)
    2. Solve linear systems three variables by various methods (7.2)
    3. Solve nonlinear systems and Inequalities in two variables (7.3)
    4. Matrices and Matrix Operations (7.5)
    5. Solving systems with Gaussian Elimination (7.6)
    6. Solving Systems with Inverses (7.7)

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: Abramson, J. & North, S. (2024). *College Algebra 2e with Corequisite Support*. OpenStax. https://openstax.org/details/books/college-algebra-corequisite-support-2e/ Digital ISBN-13: 978-1-951693-46-6

Supplemental Material: Diaz, C., & Ghoreishi, A. (Eds.). (2021). *College Algebra Version 2*. https://www.slcc.edu/math/docs/oer-college-algebra.pdf, (Sections 2.6, 3.4, and 5.2)

A TI-84 calculator is required for this course.

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.