

COURSE SYLLABUS

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| LAST REVIEW | Spring 2021 |
| COURSE TITLE | Pre-calculus Mathematics |
| COURSE NUMBER | MATH0108 |
| DIVISION | Math, Science, Business & Technology |
| DEPARTMENT | Mathematics |
| CIP CODE | 24.101 |
| CREDIT HOURS | 5 |
| CONTACT HOURS/WEEK | Class: 5 |
| PREREQUISITES | MATH0104 Intermediate Algebra with a grade of "C" or better. |
| COURSE PLACEMENT | Students must meet the correct placement measure for this course. Information may be found at: https://www.kckcc.edu/admissions/information/mandatory-evaluation-placement.html |

COURSE DESCRIPTION

Pre-Calculus includes the analysis and graphing of functions, including constant, linear, absolute value, square root, polynomial, rational, exponential and logarithmic functions, non-functions and trigonometric functions; solving equations and inequalities, including polynomial equations, exponential equations, logarithmic equations, trigonometric equations, systems of linear equations and inequalities; trigonometric and inverse trigonometric functions, radian and degree measure, identities, and applications to physical problems; conic sections; and sequences and series. A graphing calculator is required for this course.

GENERAL EDUCATION LEARNING OUTCOME

- Basic Skills for Communication
- Mathematics
- Humanities
- Natural and Physical Sciences
- Social and Behavioral Sciences

INSTITUTIONAL LEARNING OUTCOMES

- Communication
- Computation and Financial Literacy
- Critical Reasoning
- Technology and Information Literacy

- Community and Civic Responsibility
- Personal and Interpersonal Skills

TEXTBOOKS

<http://kckccbookstore.com/>

METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

- I. Functions, Graphs, and Models
 - A. Characteristics
 - B. Regression line
 - C. Symmetry
 - D. Translations
 - E. Combining functions
 - F. Variation
- II. Functions and Equations
 - A. Linear
 - B. Applications
 - C. Quadratic
 - D. Rational and radical
 - E. Absolute value
 - F. Linear inequalities
- III. Polynomial and Rational Functions
 - A. Graph
 - B. Applications
 - C. Inequalities
- IV. Exponential and Logarithmic Functions
 - A. Inverse
 - B. Exponential
 - C. Logarithmic
 - D. Exponential and logarithmic equations
 - E. Applications
- V. Trigonometric functions
 - A. Right triangle definition
 - B. Unit circle definition
- VI. Right Triangles
 - A. 30 degree angle

- B. 45 degree angle
- C. 60 degree angle
- VII. Radian measurement
 - A. Angles
 - B. Circular functions
- VIII. Graphs
 - A. Sine, cosine, and tangent functions
 - B. Secant, cosecant, and cotangent functions
- IX. Trigonometric identities
 - A. Double angle and half angle identities
 - B. Sum and difference identities
- X. Inverse trigonometric functions
 - A. Graph
 - B. Analyze
- XI. Equations
 - A. Sine, cosine, and tangent
 - B. Secant, cosecant and cotangent
- XII. Oblique triangles
 - A. Law of cosines
 - B. Law of sines
- XIII. Applications
 - A. Distance
 - B. Elevation
- XIV. Systems
 - A. Substitution, elimination, and graphing
 - B. Matrices
- XV. Conic Sections
 - A. Parabolas
 - B. Ellipses
 - C. Hyperbolas
- XVI. Sequences and Series
 - A. Arithmetic
 - B. Geometric

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. be able to graph and model using functions.
 1. be able to find the domain, range, intercepts, and relative extrema of a function.
 2. be able to fit a regression line to a set of data; then use the linear model to make predictions.
 3. be able to determine whether a graph is symmetric.
 4. be able to graph the transformation of a function.

5. be able to compute function values for the sum, the difference, the product, and the quotient of two functions, and determine the domains.
6. be able to find equations of direct, inverse, and combined variation.
- B. be able to find zeros of functions and solutions of equations.
 7. be able to find zeros of linear functions and solve linear equations.
 8. be able to solve applied problems using linear models.
 9. be able to solve quadratic equations by completing the square and using the quadratic formula.
 10. be able to find zeros of rational and radical functions and solve rational and radical equations.
 11. be able to find zeros of absolute value functions and solve absolute value equations.
 12. be able to solve linear inequalities using interval notation to express solution sets.
- C. be able to graph functions and solve equations (polynomial and rational)
 13. be able to graph a polynomial function.
 14. be able to solve applied problems using polynomial models.
 15. be able to graph a rational function.
 16. be able to solve applications involving rational functions.
 17. be able to solve polynomial and rational inequalities.
- D. be able to graph functions and solve equations (exponential and logarithmic).
 18. be able to determine whether a function is one-to-one and find a formula for its inverse.
 19. be able to graph exponential equations and functions.
 20. be able to graph logarithmic functions.
 21. be able to solve exponential and logarithmic equations.
 22. be able to solve applications involving exponential and logarithmic functions and their graphs.
- E. be able to define trigonometric functions.
 23. be able to define trigonometric functions using the right triangle.
 24. be able to define trigonometric functions using the unit circle.
- F. be able to solve right triangles.
 25. be able to use 30 degree angles.
 26. be able to use 45 degree angles.
 27. be able to use 60 degree angles.
- G. be able to use radian measurement and circular functions.
 28. be able to define a radian measure.
 29. be able to use circular functions.
- H. be able to analyze trigonometric graphs.
 30. be able to analyze graphs using the sine, cosine, and tangent functions.
 31. be able to analyze graphs using the secant, cosecant, and cotangent functions.
- I. be able to verify trigonometric identities.
 32. be able to verify the double angle and the half angle identities.

- 33. be able to verify the angle sum and the angle difference identities.
- J. be able to use inverse trigonometric functions.
 - 34. be able to graph inverse trigonometric functions.
 - 35. be able to analyze inverse trigonometric functions.
- K. be able to solve trigonometric equations.
 - 36. be able to solve equations using sine, cosine and tangent functions.
 - 37. be able to solve equations using secant, cosecant and cotangent functions.
- L. be able to solve oblique triangles.
 - 38. be able to use the Law of Cosines.
 - 39. be able to use the Law of Sines.
- M. be able to solve trigonometric applications.
 - 40. be able to solve distance applications.
 - 41. be able to solve elevation applications.
- N. be able to solve systems of equations.
 - 42. be able to solve a system of two linear equations in two variables using substitution, elimination, and graphing.
 - 43. be able to solve systems of equations using matrices.
- O. be able to graph and find equations for the conic sections.
 - 44. be able to find the vertex, the focus, and directrix and graph a parabola given its equation.
 - 45. be able to find the center, the vertices, and the foci and graph an ellipse given its equation.
 - 46. be able to find the center, the vertices, and foci and graph a hyperbola given its equation.
- P. be able to use sequences and series.
 - 47. be able to, for any arithmetic sequence, find the n th term when n is given and n when the n th term is given, and given two terms, find the common difference and construct the sequence.
 - 48. be able to identify the common ratio of a geometric sequence, and find a given term and the sum of the first n terms.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

College Catalog

<https://www.kckcc.edu/academics/catalog/index.html>

College Policies and Statements

<https://www.kckcc.edu/about/policies-statements/index.html>

Accessibility and Accommodations

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.