University Of Arkansas – Fort Smith
5210 Grand Avenue
P.O. Box 3649
Fort Smith, AR 72913
479-788-7000

General Syllabus

Math 1715 Precalculus Mathematics

Credit Hours: 5 Lecture Hours: 5 Laboratory Hours: 0

Prerequisite: MATH 1403 College Algebra or required placement score

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

Designed for students in majors requiring MATH 2804 Calculus I, course covers advanced topics from algebra specifically necessary for calculus and covers the concepts of plane trigonometry, emphasizing circular functions of real numbers. Emphasizes the creation and analysis of mathematical formulas to model physical situations. Concepts covered include polynomial, rational, exponential, logarithmic, and trigonometric functions and equations, inverse functions, complex numbers in rectangular and trigonometric form, systems of equations, matrices, determinants, triangles, identities, and vectors. (ACTS: MATH 1305)

B. Additional Information

A graphing calculator is required.

II. Student Learning Outcomes

A. Subject Matter

The student who successfully completes MATH 1715 Precalculus Mathematics will be able to:

1. Solve linear and quadratic equations.
2. Perform operations with functions: evaluation, composition, find inverses.
3. Graph linear, quadratic, rational, exponential, logarithmic, and trigonometric functions, and identify intercepts and extreme values, describe long-term behavior, and interpret each of these in the context of applications.
4. Compute zeroes of polynomial functions.
5. Solve systems of equations, including the use of matrix methods.
6. Graph trigonometric functions.
7. Solve trigonometric equations.

8. Convert radians to degrees and degrees to radians.
9. Find all trigonometric functions of an angle.
10. Find all trigonometric functions of a real number.
11. Simplify trigonometric expressions, including expressions involving inverse functions, using the fundamental relationships of trigonometry.
12. Find the exact value of sine, cosine, and tangent using the angle addition and related identities.
13. Evaluate and use inverse trigonometric functions.
14. Solve right triangles and solve oblique triangles using the law of sines and the law of cosines.
15. Perform operations with vectors: dot product, vector projection, unit vectors, perpendicular vectors.
16. Be able to appropriately utilize polynomial, rational, exponential, logarithmic, and trigonometric functions in the modeling and solution of a variety of application problems.

B. University Learning Outcomes

Communication Skills (written and oral)
Students will communicate effectively information relating to real world problems and mathematics.

Analytical Skills
Quantitative Reasoning: Students will assign and use numbers, read and analyze data, create models, draw inferences, and support conclusions based on sound mathematical reasoning. Students will apply appropriate mathematical skills to solve problems. Students will represent mathematical information symbolically, visually, numerically and verbally and will interpret models and data in order to draw inferences.

III. Major Course Topics

A. Algebraic equations and inequalities
   1. Graphing Linear Equations
   2. Slope of a line
   3. Writing equation of lines
   4. Introduction to function
   5. Solving linear inequalities in one variable
   6. Solving absolute value equation and inequalities
   7. Solving system of linear and quadratic inequalities in two variables

B. Functions, graphs, and transformations
   1. Polynomial functions: zeroes and extrema
   2. Exponential and logarithmic functions
   3. Transformations of graphs

C. Polynomial functions: graphs and zeroes
   1. The fundamental Theorem of Algebra

2. Rational zero theory
3. Descartes' Rule of Signs

D. Exponential and logarithmic functions
   1. Exponential functions and graphs
   2. Logarithmic functions and graphs
   3. Properties of Logarithmic functions
   4. Solving exponential equations and logarithmic equations

E. Rational Functions and their graphs
   1. The domain of a rational function
   2. Asymptotes of a rational function
   3. Application of a rational function

F. Modeling with algebraic Functions
   1. Linear models
   2. Exponential models
   3. Logarithmic models

G. Systems of equations
   1. Solving system of two linear equations
   2. Solving system of three linear equations

H. Matrices and determinants
   1. Matrix Operations
   2. Inverse of matrices
   3. Partial fractions

I. Triangular functions and solving triangles.
   1. Trigonometric functions of any angle
   2. Trigonometric functions of quadrantal angles
   3. Signs of Trigonometric function

J. Circular functions and graphs
   1. The wrapping function
   2. Trigonometric functions of real numbers
   3. Properties of trigonometric functions of real numbers

K. Trigonometric equations and identities
   1. Solve trigonometric equations quadratic in form
   2. Use factoring to separate different functions in trigonometric equation
   3. Use identities to solve trigonometric equations

L. Modeling periodic behavior

M. Oblique triangles
   1. The Law of Sines
   2. Solve applied problems using the Law of Sines
   3. The Law of Cosines
   4. Solve applied problems using the Law of Cosines

N. Vectors
   1. Operations of vectors
   2. Combined vectors
   3. Unit vectors

O. Complex Numbers
   1. Simplify an imaginary number

2. Simplify an expression containing complex numbers
3. Rationalize the denominator of a fraction that contains a complex number