CENTRAL TEXAS COLLEGE  
SYLLABUS FOR MATH 1414  
COLLEGE ALGEBRA  

Semester Credit Hours: 4

I.  INTRODUCTION

A. Math 1414, College Algebra, is a four semester-hour course. This course includes an in-depth study and application of polynomial, rational, radical, exponential and logarithmic functions, and systems of equations using matrices. Additional topics include matrix operations, sequences, series, and probability.

B. This course satisfies the mathematics requirement in most curricula, and is the prerequisite for Pre-calculus. Please, check your degree plan to determine the status of this course in your program of study. This course is occupationally related and serves as preparation for careers in mathematics and engineering.

C. In support of the objectives of the Texas core curriculum, the course provides significant exercise of students’ critical thinking, communication skills, and empirical and quantitative skills. These objectives form a foundation of intellectual and practical skills that are essential for all learning.
   1. Critical thinking skills include creative thinking, innovation inquiry, and analysis, evaluation and synthesis of information
   2. Communication skills include effective development, interpretation and expression of ideas through written, oral and visual media.
   3. Empirical and quantitative skills include the ability to manipulate and analyze numerical data or observable facts to reach informed conclusions.

D. Prerequisites: A grade of C or higher in DSMA 0303, or equivalent placement test score.

II.  LEARNING OUTCOMES

Upon successful completion of this course, College Algebra, the student will be able to

A. Simplify algebraic expressions by combining like terms and by factoring. (F3, F8, F9)
B. Solve linear and quadratic equations of one variable. (F3, F8, F9)
C. Define relation and function. (F1, F2, F5, F6)
D. Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, and inverses. (F1, F8, F9)
E. Evaluate functions. (F3, F8, F9)
F. Find slopes of a line and write the equation of lines in point-slope and slope-intercept forms. (F8, F9, F10)
G. Construct and analyze graphs of functions using transformations. (F2, F10)
H. Recognize and apply polynomial, rational, radical, exponential and logarithmic functions and solve related equations and application problems. (F8, F10)
I. Evaluate all roots of higher degree polynomial and rational functions. (F3, F8, F9)
J. Evaluate trigonometric functions of any angle of radian or degree measure. (F8, F9)
K. Recognize, solve and apply systems of linear equations by the substitution and elimination methods, as well as by using matrices. (F3, F4, F8, F9)
L. Use partial fractions to decompose rational expressions. (F8, F9, F10)
M. Graph a system of inequalities. (F8, F9, F10)
N. Use matrix operations. (F3, F4)
O. Identify types of sequences and series. (F1, F8)
P. Use sequences and series to solve problems. (F3, F4, F9)
Q. Use electronic and other media, such as the computer and DVD, to reinforce and supplement the learning process. (F1, F2, F3, F6)
R. Demonstrate critical thinking, communication, and empirical and quantitative skills. (F1, F3, F4, F9)

Some learning outcomes are followed by letters and numbers; i.e., C9 or F11. These refer to SCANS foundations skills (F) and workplace competencies (C). View a chart showing these skills at http://www.ctcd.edu/scans. For more on the (Labor) Secretary's Commission on Achieving Necessary Skills, or SCANS, go to the U.S. Department of Labor site at http://wdr.doleta.gov/SCANS/.

III. INSTRUCTIONAL MATERIALS

The Instructional materials identified for this course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS

A. Assignments are given in MyMathLab (MML) and are due as scheduled by your instructor. The instructor will monitor students’ progress in completing the assignments.

B. Students are expected to attend every class, to arrive at each class on time, and remain in class for the entire period. Instructors may choose to lower a student's grade because of tardiness.

V. EXAMINATIONS

A. Examinations will be given at appropriate points during the semester. Each examination will be announced in class in advance. There will be three examinations (including the final).

B. Students who miss an exam should discuss with the instructor the circumstances surrounding the absence. The instructor will determine whether a make-up exam is to be given. It is necessary to make an appointment with the instructor for a make-up exam.

VI. SEMESTER GRADE COMPUTATIONS

The semester average is derived from the homework, quizzes, Chapter Applications, unit exams, and REQUIRED comprehensive final exam in MyMathLab. You must take the final exam and score at least 50% to pass the course.
Final grades will follow the grade designation below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Class Average</th>
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<tbody>
<tr>
<td>“A”</td>
<td>90 to 100</td>
</tr>
<tr>
<td>“B”</td>
<td>80 to 89</td>
</tr>
<tr>
<td>“C”</td>
<td>70 to 79</td>
</tr>
<tr>
<td>“D”</td>
<td>60 to 69</td>
</tr>
<tr>
<td>“F”</td>
<td>0 to 59</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS

A. Withdrawal from Course: It is the student's responsibility to officially drop a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file an Application for Withdrawal or an Application for Refund. The withdrawal form must be signed by the student.

An Application for withdrawal will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is as follows.

<table>
<thead>
<tr>
<th>Session</th>
<th>Deadline for Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-week session</td>
<td>Friday of the 9th week</td>
</tr>
<tr>
<td>10-week session</td>
<td>Friday of the 7th week</td>
</tr>
<tr>
<td>8-week session</td>
<td>Friday of the 6th week</td>
</tr>
<tr>
<td>6-week session</td>
<td>Friday of the 4th week</td>
</tr>
<tr>
<td>5-week session</td>
<td>Friday of the 3rd week</td>
</tr>
</tbody>
</table>

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

Students who officially withdraw will be awarded the grade of "W" provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of "F" or "FN" for nonattendance.

B. An Incomplete Grade: The College catalog states, "An incomplete grade may be given in those cases where the student has completed the majority of the course
work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course..." Prior approval from the instructor is required before the grade of "I" is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an "F" for the course.

C. **Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

D. **Americans With Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

E. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

F. **Advanced Math Lab:** The Math Department operates an Advanced Mathematics Lab in Building 152, Room 145. All courses offered by the Math Department are supported in the lab with appropriate tutorial software. Calculators are available for student use in the lab. Students are encouraged to take advantage of these opportunities. See posted hours for the Advanced Math Lab.

G. **Office Hours:** Full-time instructors post office hours outside the door of the Mathematics Department (Building 152, Room 223). Part-time instructors may be available by appointment. If you have difficulty with the course work, please consult your instructor.

**VIII. COURSE OUTLINE**

A. **Lesson One:** Fundamental Concepts of Algebra, Equations and Inequalities (Chapters P and 1)

1. **Learning Outcomes:** Upon successful completion of this unit, the student will be able to:

   a. Evaluate algebraic expressions.
   b. Simplify algebraic expressions.
   c. Simplify using properties of exponents.
   d. Factor polynomial expressions.
e. Simplify rational expressions.
f. Multiply/Divide/Add/Subtract rational expressions.
g. Solve linear equations of one variable.
h. Solve rational equations with variables in the denominators.
i. Solve quadratic equations by factoring.
j. Solve quadratic equations using the quadratic formula.

2. **Learning Activities:**

   a. Listen to classroom lecture and discuss exercises.  (F5, F6, F7, F8)
   b. Read pages of assigned chapter.  (F1)
   c. Work problems as assigned by the instructor.  (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**

   a. Section P.1 (Algebraic Expressions, Mathematical Models, and Real Numbers)
   b. Section P.2 (Exponents and Scientific Notation)
   c. Section P.5 (Factoring Polynomials)
   d. Section P.6 (Rational Expressions)
   e. Section 1.2 (Linear Equations and Rational Equations)
   f. Section 1.5 (Quadratic Equations)

B. **Lesson Two:** Functions and Graphs (Chapter 2)

1. **Learning Outcomes:** Upon successful completion of this unit, the student will be able to:

   a. Define a relation.
   b. Define a function.
   c. Evaluate functions.
   d. Determine domain and range.
   e. Use the vertical line test.
   f. Graph functions and relations.
   g. Identify increasing or decreasing functions.
   h. Calculate the slope of a line.
   i. Write the point-slope form of the equation of a line.
   j. Write the slope-intercept form of the equation of a line.
   k. Graph horizontal and vertical lines.
   l. Graph transformations of functions.
   m. Form combinations of functions.
   n. Form the composition of functions.
   o. Find and give definition of the inverse of functions.

2. **Learning Activities:**

   a. Listen to classroom lecture and discuss exercises.  (F5, F6, F7, F8)
   b. Read pages of assigned chapter.  (F1)
   c. Work problems as assigned by the instructor.  (F2, F7, F8, F9, F10, F11, F12)
a. Listen to classroom lecture and discuss exercises.  (F5, F6, F7, F8)
b. Read pages of assigned chapter.  (F1)
c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, 
F11, F12)

3. **Lesson Outline:**

   a. Section 2.1 (Basics of Functions and Their Graphs)
   b. Section 2.2 (More on Functions and Their Graphs)
   c. Section 2.3 (Linear Functions and Slopes)
   d. Section 2.5 (Transformations of Functions)
   e. Section 2.6 (Combinations of Functions; Composite Functions)
   f. Section 2.7 (Inverse Functions)

B. **Lesson Three:** Polynomial and Rational Functions
   (Chapter3)

1. **Unit Objectives:** Upon successful completion of this unit, the student will be able to:

   a. Analyze graphs of polynomials using end-behavior, leading coefficient test.
   b. Perform synthetic division.
   c. State and use the Remainder Theorem.
   d. State and use the Factor Theorem.
   e. State and use the Rational Zero Theorem.
   f. Solve Polynomial Equations.
   g. Graph rational functions.

2. **Learning Activities:**

   a. Listen to classroom lecture and discuss exercises.  (F5, F6, F7, F8)
   b. Read pages of assigned chapter.  (F1)
   c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, 
F11, F12)

3. **Lesson Outline:**

   a. Section 3.2 (Polynomial Functions and Their graphs)
   b. Section 3.3 (Dividing Polynomials: Remainder and Factor Theorems)
   c. Section 3.4 (Zeros of Polynomial Functions)
   d. Section 3.5 (Rational Functions and Their Graphs)
   e. Section 3.6 (Polynomial and Rational Inequalities)

C. **Lesson Four:** Exponential and Logarithmic Functions (Chapter 4)
1. **Unit Objectives:** Upon successful completion of this unit, the student will be able to:
   a. Define the exponential function
   b. Graph exponential functions.
   c. Use exponential models to solve problems.
   d. Define the logarithmic function.
   e. Identify properties of the logarithmic function.
   f. Graph the logarithmic function.
   g. Use logarithmic models to solve problems.
   h. Solve logarithmic or exponential equations.

2. **Learning Activities:**
   a. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   b. Read pages of assigned chapter. (F1)
   c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**
   a. Section 4.1 (Exponential Functions)
   b. Section 4.2 (Logarithmic Functions)
   c. Section 4.3 (Properties of Logarithms)
   d. Section 4.4 (Exponential and Logarithmic Equations)
   e. Section 4.5 (Exponential Growth and Decay; Modeling Data)

**D. Lesson Five:** Trigonometric Functions (Chapter 5)

1. **Unit Objectives:** Upon successful completion of this unit, the student will be able to:
   a. Convert between degrees and radians.
   b. Draw angles in standard position.
   c. Find the length of a circular arc.
   d. Use linear and angular speed to describe motion of a circular path.
   e. Use right triangles to evaluate trigonometric functions.
   f. Use right triangle trigonometry to solve applied problems.
   g. Find reference angles and use them to evaluate trigonometric functions of any angle.

2. **Learning Activities:**
   a. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   b. Read pages of assigned chapter. (F1)
   c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, F11, F12)
3. **Lesson Outline:**
   a. Section 5.1 (Angles and Radian Measure)
   b. Section 5.2 (Right Triangle Trigonometry)
   c. Section 5.3 (Trigonometric Functions of Any Angle)

D. **Lesson Six:** Matrices and Linear Systems (Chapters 8 and 9)

   1. **Unit Objectives:** Upon successful completion of this unit, the student will be able to:
      
      h. Define a solution of a system of equations.
      i. Solve a system of equations using the substitution method.
      j. Solve a system of equations using the elimination method.
      k. Use partial fractions to decompose rational expressions.
      l. Graph a system of inequalities.
      m. Define a matrix.
      e. Solve a linear system using the Gauss-Jordan Method.
      f. Model stated problems using matrices.
      g. Find solutions to dependent systems.
      h. Perform operations on matrices.
      i. Find the inverse of a matrix
      j. Solve a linear system using the inverse.

   2. **Learning Activities:**
      
      a. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
      b. Read pages of assigned chapter. (F1)
      c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**
   
   d. Section 8.1 (Systems of Linear Equations in Two Variables)
   e. Section 8.3 (Partial Fractions)
   f. Section 8.4 (Systems of Nonlinear Equations in Two Variables)
   g. Section 8.5 (Systems of Inequalities)
   h. Section 9.1 (Matrix Solutions to Linear systems)
   d. Section 9.2 (Inconsistent and Dependent Systems and their Applications)
   e. Section 9.3 (Matrix Operation and their Applications)
   f. Section 9.4 (Multiplicative Inverses of Matrices and Matrix Equations)

E. **Lesson Seven:** Sequences and Series (Chapter 8)

   1. **Unit Objectives:** Upon successful completion of this unit, the student will
be able to:

a. Define a sequence.
b. Define an arithmetic sequence.
c. Find the $n^{th}$ term and the $n^{th}$ partial sum of an arithmetic sequence.
d. Model problems using arithmetic sequences.
e. Define a geometric sequence.
f. Find the $n^{th}$ term and the $n^{th}$ partial sum of a geometric sequence.
g. Find the sum of certain infinite geometric series.
h. Find the future value of an annuity.

2. Learning Activities:

a. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
b. Read pages of assigned chapter. (F1)
c. Work problems as assigned by the instructor. (F2, F7, F8, F9, F10, F11, F12)

3. Lesson Outline:

a. Section 11.1 (Sequences and Summation Notation)
b. Section 11.2 (Arithmetic Sequences)
c. Section 11.3 (Geometric Sequences and Series)