COURSE OUTLINE
CHAFFEY COLLEGE

Discipline: Mathematics

1. COURSE IDENTIFICATION: MATH 425

2. COURSE TITLE: Intermediate Algebra

3. UNITS: 4
Lecture Hours: Normal: 72 Range: 64 - 76

4. GRADING: Letter Grade

5. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

6. REQUIRED AND/OR RECOMMENDED BACKGROUND:
Prerequisite(s):
MATH 410 Elementary Algebra

Factor a difference of squares, a trinomial, a polynomial with four or more terms by grouping and a sum or difference of cubes.	MATH 410 - Factor a given polynomial or determine that it is prime over the set of integers.
Calculate compositions and inverses of functions.	MATH 410 - Perform basic algebraic operations with polynomials and rational expressions with polynomials.
Calculate compositions and inverses of functions.	MATH 410 - Evaluate expressions using function notation.
Graph elementary nonlinear functions and conic sections.	MATH 410 - Solve and graph quadratic equations.

Corequisite(s): None
Advisory: None
Limitation on Enrollment: None
Assessment Level:
Or eligibility for Mathmatics 425 as determined by the Chaffey assessment process.

7. CATALOG DESCRIPTION:
More advanced study of the following topics introduced in Math 410: factoring, algebraic fractions, equations and inequalities with rational expressions, exponents and radicals,

quadratic equations, equations with radicals. New topics include: absolute value equations and inequalities, quadratic inequalities, applications, graphing of elementary nonlinear functions and conic sections, determining the equation of a line, solving nonlinear one-variable inequalities. complex numbers, composition and inverse of functions, solving linear systems by matrices and determinants, logarithmic and exponential expressions and equations, binomial theorem, summation notation, sequences and series, probability.

8. CONTENT (Scope and Description of Content):

Order and emphasis of core topics may vary from instructor to instructor.

A. Factoring
   1. Sum/difference of cubes.
   2. Quadratic forms.
   3. Trinomials with large coefficients.
   4. Factoring by composition of two or more methods, e.g., $(x^2+2x+1)-2^2$
   5. (Optional) Using the quadratic formula to factor.

B. Rational expressions
   1. Review of basics from Math 410: adding, subtracting, multiplying, dividing, simplifying complex fractions, solving equations with rational expressions.
   2. Solving part 1 (above) type problems which require more complicated calculations.
   3. Solving application problems.

C. Introduction to complex numbers
   1. Definitions of i , square root of negative number, $a+bi$
   2. Addition, subtraction, multiplication, division.
   3. i^n

D. Solving nonlinear single-variable inequalities.

E. Equations and inequalities containing *absolute values*.

F. Roots and radicals
   1. Emphasize roots of index greater than 2.
   2. Simplifying radical expressions.
   3. Rationalizing the denominator, including binomial square root and cube root.
   4. Solving equations containing radicals (mostly square roots; some higher roots.)

G. Using laws of exponents to simplify expressions containing real number (especially negative, rational and irrational) exponents.

H. Functions
   1. Recognizing the domain.
   2. Composition of functions.
   3. Inverse relations and functions.
   4. Application problems involving *linear* functions.

I. Linear systems of equations
   1. Solving 2x2 and 3x3 systems by elimination and substitution.
   2. Matrix representation of a linear system. Solving by row operations.
   3. Cramer's Rule.
   4. Application problems that lead to linear systems.
   5. (Optional) Reduced echelon form.

J. Quadratic functions
   1. Graphing.
   2. Finding the vertex by completing the square and by $h=-b/(2a)$.

3. Application problems. Maxima and minima.
4. Zeros of a quadratic function.

K. Graphing nonlinear functions
1. Square root, absolute value and $y=x^n$ functions. Other basic nonlinear functions as time and instructor discretion warrant.
2. Translations of the graph of $y=f(x)$.
3. Introduction to rational function graphs: linear denominators only.
4. Vertical and horizontal asymptotes.
5. (Optional) Oblique asymptotes.

L. Introduction to conic sections
1. Graphing basic (i.e., untranslated) parabolas, ellipses and hyperbolas.
2. Completing the square to find the center or vertex and to identify the graph.
3. Mention that graph of $y=c/x$ is a hyperbola.

M. Graphing nonlinear two-variable inequalities

N. Introduction to logarithms
1. Definitions.
2. The equivalent logarithmic equation.
3. The logarithmic function.
4. Graphing basic logarithmic functions.
5. Solving basic logarithmic equations.

O. Introduction to exponential functions
1. Definitions, domain and range.
2. Graphing them.
3. Solving basic exponential equations.

P. Discrete mathematics
1. Introduction to summation notation.
2. Introduction to sequences and series.
3. The Binomial Theorem, expressed with summation notation.
4. Combinations and permutations.
5. Introduction to probability.
6. (Optional) introduction to linear regression.

9. OBJECTIVES:

Upon completion of the course, students should be able to:

A. Factor a difference of squares, a trinomial, a polynomial with four or more terms by grouping and a sum or difference of cubes.
B. Solve equations and inequalities in one variable involving absolute values.
C. Perform algebraic operations with rational expressions, radicals, and complex numbers.
D. Simplify expressions containing negative integers and rational exponents.
E. Solve quadratic equations and inequalities, radical equations, fractional equations and inequalities.
F. Solve application problems such as uniform motion, interest, percent mixture, and work using methods of intermediate algebra.
G. Graph elementary nonlinear functions and conic sections.
H. Determine the equation of a line.
I. Calculate compositions and inverses of functions.
J. Calculate solutions of linear systems using matrices and determinants.
K. Simplify or solve logarithmic and exponential equations and expressions.

L. Evaluate expressions using the Binomial Theorem.
M. Calculate sums and individual terms of sequences.
N. Calculate sums using sigma notation.
O. Calculate probabilities of basic events.

10. METHODS OF INSTRUCTION:

Instructors may employ any of the following instructional methodologies:

A. Lecture
B. Internet instruction
C. Collaborative Group Work
D. Skill-building exercises
E. Small group or directed class discussion
F. Study groups
G. Computer assisted instruction

11. OUT-OF-CLASS ASSIGNMENTS:

The following assignments are representative. Specific assignments will vary from instructor to instructor.

A. Reading
   Textbooks, Study guides, Course handouts
   An example assignment would be where students are asked to find, read, and report on a periodical article that employs a two-dimensional graph to illustrate the relationship of two varying measures.
B. Writing
   Notebook/journal, Reports
   An example assignment would be where students are to summarize the definitions, topics, problem types and solution strategies of a given chapter.
C. Critical Thinking
   Interactive computer-exercises, Problem sets
   An example assignment would be to give students practical applications whose solutions involve quadratic equations. They must solve and then determine and explain the actual answer and extraneous answers.

   Another example would be a summary assignment in which students are presented with various expressions to be factored; they are first to state the type of factoring required, and they are then to factor each.
D. Other
   Computer-assisted modules
   An example assignment would be to focus on one type of application problem type and have students work a set of very similar problems where only minor conditions change.

12. METHODS OF EVALUATION:

The following evaluation methods are representative. Specific applications will vary from instructor to instructor.

A. A grading scale specified in the course syllabus
B. Analytical projects
C. Application of knowledge/skill

D. Class presentations
E. Completion of homework assignments
F. Demonstrated ability
G. Notebooks
H. Objective exams and quizzes - completion
I. Objective exams and quizzes - matching
J. Objective exams and quizzes - problem solving
K. Objective exams and quizzes - short answer
L. Participation in classroom discussion
M. Problem sets
N. There shall be a comprehensive final exam.

13. TEXTS AND SUPPORTING REFERENCES:
Instructors may choose from among the following representative texts

Texts:
1. Martin Gay, Elayn. Beginning & Intermediate Algebra. (4th/e). Upper Saddle River, NJ: Prentice Hall, 2009.

Supplemental:
1. Johnson, Mildred and Tim. How to Solve Word Problems. 2nd edition, McGraw-Hill, 2000 (Classic/E).

   Bello, Ignacio. Intermediate Algebra. 2nd ed. McGraw-Hill, 2006.