Mathematics (MATH) 1500 Math for a Modern Society—A Liberal Arts Course (4) CSU:UC
[formerly Mathematics 18]

Prerequisite: Successful completion in Mathematics 1060 or the equivalent

Prerequisite knowledge/skills: Before entering the course, the student should be able to

1.   identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2.   perform the basic arithmetic operations with positive and negative real numbers, plus raising to powers,
3.   know and apply the rules of exponents and the order of operations in algebraic calculations,
4.   apply the properties of addition and multiplication for real numbers and identify their use in practice,
5.   solve linear equations and inequalities in one variable, and analyze and solve applications leading to such equations or inequalities,
6.   solve and graph the solutions of compound inequalities or absolute value inequalities in one variable,
7.   perform addition, subtraction, multiplication and division of polynomials,
8.   factor simple polynomials, with special emphasis on trinomials quadratic in form, and solve related polynomial equations,
9.   add, subtract, multiply and divide rational algebraic expressions, and simplify to lowest terms,
10.   solve equations involving rational algebraic expressions, and analyze and solve word problems leading to such equations,
11.   simplify radical expressions involving numbers and/or variables,
12.   use fractional exponents,
13.   perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results, including rationalization of denominators,
14.   solve equations that involve radicals,
15.   solve quadratic equations in one variable, and equations quadratic in form, by factoring, completing the square, and the quadratic formula,
16.   analyze and solve application problems requiring the use of quadratic equations,
17.   solve and graph quadratic inequalities in one variable,
18.   graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from its equation,
19.   determine the slope of the line between any specified pair of points,

20.   know the slope forms of the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
21.   solve and graph linear inequalities in two variables,
22.   solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
23.   analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
24.   evaluate determinants and use them to solve linear systems of equations,
25.   determine whether or not a specified relation is a function,
26.   for a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions in numeric or algebraic terms,
27.   identify the quadratic equation representing a specific conic section, and be able to draw the graph of a conic section by analyzing its equation, or to write the equation of a specified conic section,
28.   solve nonlinear systems of equation involving the intersection of two conic sections or a conic section and a straight line,
29.   compute and graph specified exponential and logarithmic functions,
30.   know the properties of logarithms (product, quotient, power and change of base rules) and be able to use them in practical numerical computations using a table of common logarithms or a calculator, and
31.   solve simple exponential and logarithmic equations.

Total hours: 64 hours lecture

Catalog Description: A liberal arts mathematics course designed for students whose majors do not require calculus, this applications-orientated course involves the study of several topics from modern society. At least six independent parts will be included: thinking critically, approaches to problem solving, numbers in the real world, financial management, statistical reasoning, and exponential modeling.

Type of Class/Course: Degree Credit

Text: Bennett, Jeffery O. and W. Briggs. *Using and Understanding Mathematics—A Quantitative Reasoning Approach*. 5th ed. Boston, MA: Pearson Addison Wesley, 2011. Print.

Additional Instructional Materials:
1.   Videotapes correlated to each textbook topic
2.   www.MyMathLab.com
3.   www.InterActMath.com
4.   www.aw.com/bennett-briggs
5.   MyMathLab start kit

Course Objectives:

By the end of the course, a successful student will be able to:

1. perform a statistical study by collecting data [sampling from a population],
2. present statistical analysis of that data in a variety of descriptive ways,
3. calculate descriptive statistical measures on single and bivariate data, including measures of central tendency and measures of dispersion,
4. apply the rules of simple probability,
5. use the normal distribution curve to estimate probabilities, including percentiles and areas under the curve,
6. construct valid arguments and find fallacies in faulty arguments,
7. perform set operations and use Venn diagrams, and
8. recognize typical growth patterns in various areas of contemporary life including compound interest, logistic and exponential growth and how they can be used by individuals.

Course Scope, Content and Learning outcomes:

Unit I   Thinking Critically

   A. Identify and recognize fallacies,
   B. Write propositions and negations and determine truth values,
   C. Identify sets and draw and use Venn diagrams, and
   D. Use and apply critical thinking skills.

Unit II   Approaches to Problem Solving

   A. Use units to solve problems,
   B. Convert between U.S. customary units and the metric system, and
   C. Use problem solving guidelines .

Unit III   Numbers in the Real World

   A. Solve problems using percentages and recognize common errors in solving percentage problems,
   B. Solve problems with very large and very small numbers and use scientific notation,
   C. Distinguish between random and systematic errors and distinguish between accurate and precise measurements, and
   D. Understand and apply Simpson's paradox.

Unit IV   Financial Management

   A. Use formulas to calculate simple and compound interest,
   B. Use savings plan formulas, and
   C. Use formulas to calculate loan, mortgage, and credit card payments.

Unit V   Statistical Reasoning

   A. Understand the fundamentals of statistics,
   B. Analyze statistical studies,
   C. Understand and interpret statistical tables and graphs,

D. Understand and interpret media graphics,
E. Distinguish between correlation and causality, and
F. Calculate mean, median, mode and describe data distributions.

Unit VI   Probability: Living With the Odds

A. Distinguish between linear and exponential growth and decay,
B. Calculate doubling time and half-life, and
C. Understand exponential modeling**.**

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1.   Studying
2.   Answering questions
3.   Interacting with web site mathematical references
4.   Completing required reading
5.   Problem solving activity or exercise
6.   Project building and analysis

Methods of Instruction:

1.   Lecture-demonstrations and simple problems solved by the instructor
2.   Occasional lab activities on the computer and/or calculator
3.   Demonstrations and interactive lessons from the Internet

Methods of Evaluation

1.   Computational or non-computational problem solving demonstrations including:
2.   exams,
3.   homework problems,
4.   quizzes,
5.   projects, and
6.   final examination