NC 226A: INTEGRATED MATH IA

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Credits:	0
Total Contact Hours:	60
Lecture Hours :	60
Lab Hours:	0
Hours Arranged:	0
Outside of Class Hours:	120
Prerequisite:	Placement by high school counselor or math placement exam.
Transferable to CSU:	No
Transferable to UC:	No
Grading Method:	Non-Credit Course

Catalog Course Description

This is an integrated course that combines the content of algebra with logical reasoning, statistics, probability, problem solving, real life situations, spatial visualization, and introductory topics in geometry. The course format will include activity-based investigations with hands on activities, concepts, and applications compliant with the adopted California State Mathematics Standards to meet the minimum course requirements for high school graduation. 60 lecture hours.

Course Objectives

- Explain the meaning of a problem and look for entry points to its solution.
- Analyze givens, constraints, relationships, and goals.
- Make sense of quantities and their relationships in problem situations.
- Understand and use stated assumptions, definitions, and previously\ \nestablished results in constructing arguments.
- Compare the effectiveness of two plausible arguments, distinguish correct \\nlogic or reasoning from that which is flawed, and explain what it is.
- Understand and use stated assumptions, definitions, and previously\ \nestablished results in constructing arguments.
- Identify important quantities in a practical situation and map relationships \\nusing such tools such as diagrams, two-way tables, graphs, flowcharts, and formulas.
- Calculate accurately and efficiently, express numerical answers with a \ \ndegree of precision appropriate for the problem context.
- Discern patterns or structures.
- Look for and express regularity in repeated reasoning.

Major Course Content

1. Number and Quantity
   a. Reason quantitatively and use units to solve problems.
      i. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
      ii. Define appropriate quantities for the purpose of descriptive modeling.
2. Algebra
   a. Interpret the structure of expressions.
      i. Interpret parts of an expression, such as terms, factors, and coefficients.
      ii. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret as the product of P and a factor not depending on P.
   b. Create equations that describe numbers or relationship (linear, absolute value, exponential).
      i. Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions.
      ii. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
   c. Understand solving equations as a process of reasoning and explain the reasoning
      i. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
   d. Solve equations and inequalities in one variable
      i. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. [Linear inequalities; literal equations that are linear in the variables being solved for; exponential of a form.
   e. Solve systems of equations
      i. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
      ii. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
   f. Represent and solve equations and inequalities graphically
      i. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
      ii. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, and exponential functions.
3. Functions
   a. Understand the concept of a function and use function notation
      i. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph off is the graph of the equation y = f(x).
      ii. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

iii. Interpret functions that arise in applications in terms of the context.
iv. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries.

b. Analyze functions using different representations
   i. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
      1. Graph linear and quadratic functions and show intercepts, maxima and minima.
      2. Graph exponential functions, showing intercepts and end behavior.

c. Build a function that models a relationship between two quantities
   i. Determine an explicit expression, a recursive process, or steps for calculation from a context.
   ii. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

d. Build new functions from existing functions
   i. Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

e. Construct and compare linear and exponential models and solve problems.
   i. Distinguish between situations that can be modeled with linear functions and with exponential functions.
      1. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
      2. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
      3. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

f. Interpret expressions for functions in terms of the situation they model
   i. Interpret the parameters in a linear or exponential function in terms of a context.

Examples of Required Writing Assignments

Students will be asked to write a formal proof about a diagram accompanied by given information. This task requires students to provide formal and logical series of statements that will lead to the indicated result through analyzing the given information.

Examples of Outside Assignments

There will be homework given on a daily basis along with some performance tasks that will need additional time outside of class.

Instruction Type(s)

Lecture, Online Education Lecture