Course Description for Topics in Elementary Mathematics: Math 367
An extension of the structure of the rational and real numbers using the role of axiomatic systems; the concepts of exactness and approximation, applications of proportional reasoning; dimensional analysis and scientific notation; simple logic; modular systems; and the use of matrices and spreadsheets.

The course will use the learning theory of Constructivism, which assumes that knowledge is not passively received either through the senses or by way of communication, but rather that knowledge is actively built up by constructing the subject for oneself. Hence the philosophy of this course is that people, of all ages and many learning styles, learn best in an environment where they explore topics and come to their own understanding. To facilitate this learning theory, we will do some of the work in cooperative groups where you will construct, develop and share your learning style with others, and also do work where you will be individually accountable for your learning.

This course will involve three hours of lecture-lab experience and one hour of field experience in direct contact with students in schools in the area of certification, per week. This field experience (a total of 15 hours) will be coordinated with the department of Teaching and Learning.

Goal and Objectives: The objectives below reflect the Content Knowledge (CK) component of the COEHD Conceptual Framework. The COEHD’s Conceptual Framework provides direction for the development of effective professionals. It is a living document that continuously evolves as opportunities and challenges emerge. The four components of the CF are the institutional standards used for candidate assessment in undergraduate and graduate programs. They are Knowledge of Learner (KL), Strategies and Methods (SM), Content Knowledge (CK), and Professional Standards (PS). Diversity and Technology are included in the assessment process as themes that are integrated throughout all programs in the educational unit (diversity) (technology).

Students who successfully complete this course will be able to...
1. determine the truth-value of a statement (CK)
2. express statements in symbolic form (CK)
3. express symbolic statements as English sentences (CK)
4. write simple truth tables for compound statements (CK)
5. write the various forms of conditional statements (CK)
6. determine if two statements are equivalent (CK)
7. show the equivalence of a statement and its contrapositive (CK)
8. use truth tables to determine equivalence (CK)
9. negate a statement (CK)
10. identify sets and subsets (CK)
11. determine the equivalence of sets (CK)
12. find complements of sets (CK)
13. find unions and intersections of sets (CK)
14. solve problems using Venn diagrams (CK)
15. use Venn diagrams to determine the validity of arguments (CK)
16. write an argument in symbolic form (CK)
17. draw a valid conclusion from given statements (CK)
18. test the validity of an argument (CK)
19. identify the “personalities” of fractions (CK)
20. represent and recognize fractional parts with objects and diagrams (CK)
21. find equivalent fractions (CK)
22. explain the meaning of the four basic operations with fractions (CK)
23. explain the relationship between numbers written in fractional form and numbers written in decimal form (CK)
24. change fractions to decimals and decimals to fractions (CK)
25. write decimal numbers in expanded notation (CK)
26. add, subtract, multiply, and divide decimal numbers and fractions (CK)
27. explain the common algorithms for operations on decimal numbers and fractions (CK)
28. create a visual representation for percents (CK)
29. describe the relationship between fractions, decimals, and percents (CK)
30. compare and order fractions, decimals, and percents (CK)
31. solve problems involving percents (CK)
32. identify and solve problems using unit rates (CK)
33. define “the golden ratio” and give examples of its use (CK)
34. determine the ratios associated with given problems (CK)
35. use dimensional analysis to exchange units for a given rate (CK)
36. define the term “proportion” (CK)
37. relate direct proportionality with a particular linear relationship (CK)
38. solve problems involving proportional reasoning (CK)
39. recognize and extend patterns (CK)
40. make rules for extending patterns (CK)
41. use patterns to solve applied problems (CK)
42. define the term “variable” and recognize its usage (CK)
43. explain the concept of equations as a balance of two quantities (CK)
44. solve equations using the properties of equality (CK)
45. use counting, manipulatives, and/or drawings to represent, explain and solve problems (CK)
46. model physical, social, and purely quantitative phenomenon (CK)
47. use the coordinate system, tables of values, and graphing to represent mathematical situations (CK)
48. interpret graphical representations (CK)
49. write number sentences too represent quantitative statements (CK)
50. problem-solve using a variety of representative tools (CK)
51. simplify algebraic expressions (CK)
52. solve quadratic equations using the square root property (CK)
53. use the Pythagorean Theorem to solve problems (CK)
54. solve linear inequalities (CK)
55. explain and use the average rate of change in problems (CK)
56. calculate the slope of a line (CK)
57. solve problems involving exponential growth and decay (CK)
58. explain the difference between linear and exponential growth or decay (CK)
59. discuss and apply Polya’s problem solving process (CK)
60. solve a variety of non-routine problems (CK)