Course Description: Problem solving and critical thinking skills applied to the study of a broad range of topics, including sequences and series, recursion, and mathematical modeling with families of functions, including connections to the classroom.

Credit Hours: 3

Course Prerequisites and Corequisites: MTH 127 and MTH 128

Course Outline: Approximate time spent:

- The Real Number System 20%
  - Common Subsets of the Real Numbers
  - Decimals and Real Numbers
  - Connections between Fractions and Decimals in the Context of Terminating and Nonterminating Decimals
  - Connections to the Classroom

- Algebraic Thinking 65%
  - Sequences, Series, and Recursion (Including the Fibonacci Sequence)
  - Arithmetic and Geometric Progressions as Functions; Connections to Recursive and Closed Form Rules
  - Simulations as a Tool to Model and Solve Problems
  - Developing and Validating Conjectures about Patterns and Relationships in Data Presented in Tables, Sequences, or Graphs
  - Finite Differences
  - Interpreting and Using Graphs for Mathematical Modeling
  - Problem Solving Strategies
  - Connections to the Classroom

- Standards 15%
  - National and state mathematics standards for grades EC-8
    - Reference: Texas Essential Knowledge and Skills (TEKS), Texas Education Agency
  - National and state mathematics standards for beginning teachers of grades EC-8
    - Reference: Early Childhood – Grade 12 Mathematics Standards, Texas State Board for Educator Certification (SBEC), Standards I-VI, grade levels EC-8. (Note: See attached standards; all standards will be reviewed, but standards in bold are those primarily targeted in 129.)
**Student Learning Outcomes (SLO):** At the end of MTH 129, a student who has studied and learned the material should be able to:

1. Identify the number sets. [SBEC: I]
2. Identify and define recursively and explicitly (when possible) arithmetic and geometric sequences. [SBEC: II, V]
3. Use finite differences to find the closed form rule for sequences defined by a polynomial. [SBEC: II]
4. Use geometric series to find the rational number representation of a repeating decimal. [SBEC: I, II, V]
5. Define relations and represent them in a variety of ways. [SBEC: II]
6. Determine whether a relation satisfies the reflexive, symmetric, and transitive properties. [SBEC: II, V]
7. Define functions and function properties. [SBEC: II]
8. Identify the function families. [SBEC: II]
9. Interpret graphs of functions. [SBEC: II, V]

There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and/or a service course.

**Texas State Board for Educator Certification (SBEC): Mathematics Standards:**

*Standard I. Number Concepts:* The mathematics teacher understands and uses numbers, number systems, and their structure, operations and algorithms, quantitative reasoning, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

*Standard II. Patterns and Algebra:* The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

*Standard V. Mathematical Processes:* The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics, and to communicate mathematically.

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