MTH 129 – Concepts and Applications

Course Syllabus

**Course Description**: Problem solving and critical thinking skills applied to the study of a broad range of topics, including number theory, sequences and series, recursion, data analysis, mathematical modeling and algebra, including connections to the grades EC-4 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 Grades EC – 4 Classroom
* **Algebraic Thinking 65%**
* Properties of Algebra, Algebraic Expressions and Equations
* Sequences, Series, and Recursion (Including the Fibonacci Sequence)
* Relation and Function Definitions with Emphasis on Proper Mathematical Notation
* 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
* Interpretting and Using Graphs for Mathematical Modeling
* Developing Inferential Thinking
* Connections to the Grades EC – 4 Classroom
* **Standards 15%**
* National and state mathematics standards for grades EC-4
* Reference: *Principles and Standards for School Mathematics*, National Council of Teachers of Mathematics, 2000, chapters 1-5 and 8.
* Reference: *Texas Essential Knowledge and Skills (TEKS)*, Texas Education Agency
* National and state mathematics standards for beginning teachers of grades EC-4
* Reference: *Early Childhood – Grade 12 Mathematics Standards*, Texas State Board for Educator Certification (SBEC), Standards I-VI, grade levels EC-4. (Note: See attached standards; all standards will be reviewed, but standards in bold are those primarily targeted in 129.)
* Reference: *The Mathematical Education of Teachers*, Conference Board of the Mathematical Sciences, AMS/MAA, 2001, chapter 3.

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Syllabus Continuation

**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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