



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 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: *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-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.)
 - Reference: *The Mathematical Education of Teachers II*, Conference Board of the Mathematical Sciences, AMS/MAA, 2012.

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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