MAT 420 - Real Analysis I

Catalog Description:

(A) Foundational theory for the analysis of real numbers, sequences, continuous functions, and differentiation. Prerequisite: A grade of C- or above in MAT 224 and MAT 237. (3 cr. hr.)

Course Goals / Objectives:

- A more thorough understanding of real numbers and their relationship to limits, functions, and calculus.
- Improved ability to read, write, and generally communicate formal mathematics.

Required Topics:

- Properties of the Real number system, including the Completeness Axiom and comparisons to the integer and rational number systems.
- Sequences, including limits and convergence, divergence, subsequences, the Cauchy property, and the Monotone Convergence Theorem.
- Limits of functions, including one and two-sided limits, infinite limits, and limits at infinity.
- Continuous functions, including algebraic closure properties, the Extreme Value Theorem, and the Intermediate Value Theorem.
- Differentiation, including the Derivative Rules, the Mean Value Theorem, and L'Hôpital's Rule.

Optional Topics:

- Topological structure of the real number system.
- Construction of the real number system from the rationals.
- Metrics and convergence in metric spaces.