

Mathematics 4331 – Analysis

Student Learning Outcomes

- 1. The students will demonstrate an understanding of factual knowledge including the mathematical notation and terminology used in this course.** Students will read, interpret, and use the vocabulary, symbolism, and basic definitions used in set theory, function theory, and single variable calculus.
- 2. The students will describe the fundamental principles including the mathematical rules and theorems arising from the concepts covered in this course.** Students will identify and apply the results of major theorems including theorems involving least upper bounds and greatest lower bounds, convergence of sequences, properties of continuous functions, differentiation, and integration.
- 3. The students will apply course material using with techniques and procedures covered in this course to solve problems.** Students will utilize the facts, concepts, and techniques learned in this course to provide mathematical justification for basic theorems and related examples that form the foundations of calculus.
- 4. The students will develop specific skills, competencies, and thought processes sufficient to support further study, or work in this field or related fields.** Students will acquire a level of proficiency in basic concepts and techniques necessary for further study in mathematics or for work in occupational fields requiring the application of logical inquiry or mathematical reasoning.

Course Content

Textbook *Elementary Analysis: The Theory of Calculus*; 12th. ed., by Kenneth A. Ross. Content consists of the following topics, listed according to the corresponding chapters in the text.

Chapter 1: Introduction. Natural Numbers, Rational Numbers, Real Numbers, Completeness Axiom, The Symbols for Positive and Negative Infinity.

Chapter 2: Sequences. Limits of Sequences, Proofs, Limit Theorems, Monotone Sequences, Subsequences, Alternating Series and Integral Tests.

Chapter 3: Continuity. Continuous Functions, Properties of Continuous Functions, Uniform Continuity, Limits.

Chapter 4: Sequences and Series of Functions. Power Series, Uniform Convergence, Differentiation and Integration of Power Series.

Additional topics as time allows: Differentiation, Integration