

Mathematics 2513 – Calculus I

Student Learning Outcomes

- 1. The students will demonstrate 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 Calculus I as they pertain to functions, limits, derivatives, and integrals.
- 2. The students will describe the fundamental principles including the laws and theorems arising from the concepts covered in this course.** Students will identify and apply the laws and formulas that result directly from the definitions; for example, domain and range of a function, operations on functions, limit laws, differentiation formulas, integration formulas and integration techniques.
- 3. The students will apply course material along with techniques and procedures covered in this course to solve problems.** Students will use the facts, formulas, and techniques learned in this course to sketch graphs of functions; to study position-velocity-acceleration problems; to solve related rate and optimization (“max-min”) problems; to analyze problems in physics; to calculate areas and volumes.
- 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 the fundamental concepts and applications necessary for further study in academic areas requiring Calculus I as a prerequisite, or for work in occupational fields requiring a background in Calculus I. These fields might include computer science, engineering, the physical and natural sciences as well as mathematics.

Course Content

Textbook: *Calculus: Early Transcendentals*, Sixth Edition, by James Stewart. The following chapters are covered. (See textbook "Contents")

- Chapter 1 - Functions and Models:** Brief summary of functions, operations on functions, different classes of functions and their properties.
- Chapter 2 - Limits and Derivatives:** Informal definition of a limit, estimating limits, limit laws, infinite limits, continuity, the definition of the derivative, physical and geometric interpretation of the derivative, higher derivatives.
- Chapter 3 - Differentiation Rules:** Derivatives of the different classes of functions, product rule, quotient rule, chain rule, implicit differentiation, related rates, differentials.
- Chapter 4 - Applications of Differentiation:** Maximum and minimum values, the Mean Value Theorem, sketching graphs, L'Hospital's Rule, optimization, antiderivatives.
- Chapter 5 - Integrals.** Areas, the definition of the definite integral, the Fundamental Theorem of Calculus, indefinite integrals, substitution.
- Chapter 6 - Applications of Integration:** Areas, volumes, work, average values of functions.
- Chapter 7 - Techniques of Integration:** Integration by parts, trigonometric integrals, trigonometric substitution, integration by partial fractions.