

Mathematics 2331 – 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, and derivatives.
- 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, the limit laws, and the differentiation formulas.
- 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.
- 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*, by Sullivan and Miranda. The following chapters are covered. (See textbook "Contents")

- P. **Preparing for Calculus.** Brief summary of functions, operations on functions, different classes of functions and their properties.
- 1. Limits and Continuity.** Evaluating limits using numerical and graphing techniques, evaluating limits using properties of limits, continuity, limits of transcendental functions, infinite limits.
 - 2. The Derivative.** Rates of change, limit definition of the derivative, the derivative of polynomials, the natural exponential function, and the trigonometric functions, product rule, quotient rule, higher derivatives.
 - 3. More About Derivatives.** The chain rule, implicit differentiation, derivatives of the inverse trigonometric functions and logarithmic functions, differentials, linear approximations.
 - 4. Applications of Differentiation.** Related rates, maximum and minimum values, the Mean Value Theorem, concavity, sketching graphs, L'Hopital's Rule, optimization, antiderivatives.