

Mathematics 3514 – Calculus II

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 II as they pertain to parametric equations, polar coordinates, vectors, infinite series, and multivariate calculus.
- 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, applying calculus operations to parametric and polar equations, convergence and divergence of improper integrals and infinite series, tangent planes and normal lines to surfaces, integral representations of areas and volumes.
- 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 calculate areas, volumes, and surface areas; to find lengths of curves; to analyze problems in physics; to solve 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 II as a prerequisite, or for work in occupational fields requiring a background in Calculus II. 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 7 - Techniques of Integration:** Integration strategies, approximate integration, improper integrals.
- Chapter 8 - Further Applications of Integration:** Arc length, surface area, applications to Physics and Engineering.
- Chapter 10 - Parametric Equations and Polar Coordinates:** Parametric equations: definition, tangents and areas, arc length and surface area; polar equations: definition, areas, and length.
- Chapter 11 - Infinite Sequences and Series:** Sequences and series, integral test and p-series, comparisons of series, alternating series, ratio and root tests, power series, representation of functions by power series, Taylor and Maclaurin series, Taylor polynomials and approximations.
- Chapter 12 - Vectors and the Geometry of Space:** Vectors in the plane, space coordinates and vectors in space, dot product, cross product, lines and planes in space, surfaces in space.
- Chapter 14 - Partial Derivatives:** Functions of several variables, limits and continuity, partial derivatives, differentials, tangent planes, chain rule, normal lines, extrema and applications.
- Chapter 15 - Multiple Integrals:** Iterated integrals, double integrals, polar coordinates, changes of variables.