MAT 135 – Calculus I

Catalog description: (A) Limits, continuity, derivatives and applications of derivatives. Trigonometric, exponential, and logarithmic functions. Integration, the Fundamental Theorem of Calculus, integration by substitution. Prerequisites: A grade of C- or better in MAT 115 or four years of high school mathematics including trigonometry and/or pre-calculus. Fulfills GE 1; LASR. (4 cr. hr.)

Notes: Permission of department required for students with credit for MAT 121.

Goals / Objectives

- Reinforcement of background material: real numbers, concept of function, knowledge of polynomial, root, trigonometric, exponential, and logarithmic functions, analytic geometry, trigonometry
- A basic understanding of limits including how they relate to continuity, asymptotes, differentiation and integration
- An understanding of differentiation as a rate of change and the slope of the tangent line
- Knowledge of basic applications of differentiation
- The ability to find antiderivatives using basic rules including the substitution rule
- An understanding of the definite integral as the limit of a sum
- Knowledge of the Fundamental Theorem of Calculus

Required topics

- Functions and limits: graphing, rates of change, secants, tangents, concept and precise definition of limit, limit laws, continuity, limits involving infinity
- Differentiation: tangents, derivatives of polynomials, trigonometric functions, exponential functions, logarithmic functions, inverse functions, inverse trigonometric functions, product, quotient, chain, and higher derivative rules, rates of change, implicit differentiation, related rates
- Applications of the derivative: extreme values of functions, first and second derivative tests, concavity and curve sketching, optimization, L'Hospital's Rule
- Integration: antiderivatives, area beneath the curve, summation notation, definite and indefinite integrals, Fundamental Theorem of Calculus, u-substitution

Optional topics

- Linearization and differentials
- Newton’s method
- Mean Value Theorem
- Computer algebra systems