

**Course Code:** FE121**Course Name:** Calculus**Credit Hours:** 3**Prerequisite:** Mathematical Foundations**Learning Outcomes:**

To be able to:

1. Understand and apply the concepts of functions, including inverse, exponential, logarithmic, and trigonometric functions.
2. Understand and apply the concept of limits and continuity, including limits at infinity.
3. Differentiate a variety of single-variable functions using standard differentiation techniques.
4. Describe, analyze, and sketch graphs of functions using the first and second derivatives.
5. Apply L'Hôpital's Rule and implicit differentiation to solve problems involving indeterminate forms and related rates.
6. Integrate a variety of single-variable functions using substitution and the Fundamental Theorem of Calculus.
7. Use integration to compute areas, volumes, and other quantities related to functions.

Course Description:

1. **Before Calculus:** Functions, New Functions from Old, Families of Functions, Inverse Functions; Inverse Trigonometric Functions, Exponential and Logarithmic Functions.
2. **Limits and Continuity:** Limits, computing limits, limits at infinity (end behavior of a function), continuity, continuity of trigonometric, exponential and inverse functions
3. **The Derivatives:** Tangent lines and rates of change, the derivative function, introduction to techniques of differentiation, the product and quotient rules, derivatives of trigonometric functions, the chain rule
4. **Topics in differentiation:** Implicit differentiation, derivatives of logarithmic functions, Derivatives of exponential and inverse of trigonometric functions, L'hospital rule (indeterminate forms).
5. **The derivative in graphing and applications:** Analysis of functions I (increase, decrease and connectivity), analysis of functions II (relative extrema, graphing polynomials), absolute maxima and minima.
6. **Integration:** An overview of the Area problem, the indefinite integral, integration by substitution, the definition of area as a limit (sigma notation), the definite integral, the fundamental theorem of calculus, evaluating definite integral by substitution, logarithmic and other functions defined by integrals

Grading:

Home Works:20 %, Midterm Exam:30%, and Final Exam: 50%.

Reference Books:

1. Calculus early transcendental, Anton, Bivens & Davis, 10th edition, John Wiley.
2. Calculus *Early Transcendental Functions*, Smith & Minton, 3rd Edition, McGraw Hill
3. Calculus and Analytic Geometry, Thomas and Finney, 11th Edition, Addison Wesley

Class rules

- ❖ Attendance is mandatory.
- ❖ You are responsible for whatever is taught in the lecture. If you miss a class, it is your responsibility to find out about assignment, quizzes and exam.
- ❖ Punctuality is compulsory
- ❖ You are encouraged to collaborate (not copy) on assignment problems with your "study buddies."
- ❖ Respect and listen during period
- ❖ Ask questions