

MATH 153 Calculus I

This course aims to enhance understanding of concepts and the development of problem-solving skills in the areas of single variable differential calculus and single variable integral calculus. Topics include limits, differentiation, curve sketching, optimization, and introductory integration. Functions studied range from simple algebraic and radical expressions to more sophisticated rational, logarithms, exponentials, and trigonometric functions.

(Pre-requisites: MATH 099)

Course Learning Outcomes:

By the end of the course, students will be able to:

1. Demonstrate generalized knowledge and understanding of the main theories and concepts behind limits, differentiation, and introductory integration.
2. Relate the main theories and concepts behind limits, differentiation, and introductory integration to mathematical problems.
3. Solve simple real-life problems requiring a basic level of mathematical abstraction and sketch functions.

Textbook & Course Materials:

- Calculus by James Stewart, 8th Edition (2015)

Course Content:

1. Four Ways to Represent a Function.
2. Mathematical Models: A Catalog of Essential Functions
3. New Functions from Old Functions
4. The Limit of a Function
5. Calculating Limits Using the Limit Laws
6. Continuity
7. Derivatives and Rate of Change
8. The Derivative as a Function
9. Differentiation formulas
10. Derivatives of Trigonometric Functions
11. Inverse Functions
12. Exponential Functions and their Derivatives
13. Logarithmic Functions
14. Derivatives of Logarithmic Functions
15. Chain rule
16. Implicit differentiation
17. Maximum and minimum values
18. Limits at infinity; Horizontal asymptotes
19. Summary of Curve Sketching
20. Antiderivatives
21. Areas and Distances (briefly)
22. The Definite Integral
23. The Fundamental Theorem of Calculus
24. The Substitution Rule