This course introduces the key concepts of the derivative and the integral. Beginning with the definition of limit, the notion of continuity is developed which is perhaps the most important thread running throughout the calculus. This leads naturally to the process of differentiation and then integration, concluding with the all important Fundamental Theorem of the Calculus. Along the way, applications to classical and modern science, economics, the social sciences and other fields are explored. (Prerequisites: MATH 125 or MATH 130 with a grade of C or higher, or a score of 103 or higher on the College Level Mathematics portion of the Accuplacer test.) (MNTC 4: Mathematical/Logical Reasoning)

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Lecture	3
Lab	1

MATH 125 or MATH 130 with a grade of C or higher, or a score of 103 or higher on the College Level Mathematics portion of the Accuplacer test. (MNTC 4: Mathematical/Logical Reasoning)

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Define function and associated terms precisely
Model linear behavior with linear functions
Model growth and decay behavior with exponential and logarithmic functions

Model circular and cyclic behavior with the trigonometric functions

Graph functions using transformations
Use symmetry properties to expedite graphing
Parameterize plane curves

Deduce properties of inverse functions in general
Parameterize inverse functions
Explain the behavior of the logarithmic functions
Explain the behavior of the inverse trigonometric functions

Apply increments to problems concerning constant rates of change
Approximate change in a variable which varies continuously, using secant lines
Interpret a limit geometrically as constraining a function close to a certain value
Define limit precisely using the delta-epsilon notation
Demonstrate limiting behavior of common functions

Deduce rules for easily finding limits of certain algebraic functions
Define one-sided limits of a function
Compute one-sided limits of a function

Determine where functions may grow without bound near a point
Compute limits of functions when domain values grow or decrease without bound
Explain how a function may fail to have a limit at a certain point in the domain

Interpret the Intermediate Value Theorem geometrically
Apply the Intermediate Value Theorem to root finding

Explain how a function may fail to have a a a a a a a a a a a a a a a a

Show that the derivative is a linear operator
Compute the derivative of a polynomial
Extend differentiation rules to include negative exponents

Compute the derivative of a sum of two functions
Compute the derivative of the difference of two functions
Compute the derivative of the product of two functions
Compute the derivative of the quotient of two functions
Compute the derivative of composite functions using the chain rule

Demonstrate that the antiderivative is a linear operator
Compute an antiderivative using the power rule in integral form
Compute an antiderivative using substitution

Interpret expressions containing the sigma notation
Define the definite integral as the limit of a Riemann sum
Interpret area under a curve as a definite integral
Define average value as a definite integral

Demonstrate linearity for definite integrals
Demonstrate sign reversal when the order of integration is reversed
Explain the Mean Value Theorem for Integrals
Show max-min bounds for a definite integral

Differentiate a definite integral
Evaluate a definite integral by means of an indefinite integral

Use substitution without changing the limits of integration
Use substitution M a t