

Department: Math

Revised: April 2017

Mission Statement

Every student can and should learn higher level mathematics. We will provide a variety of instructional methods and relearning opportunities for students to find success.

How We Will Achieve Our Mission

- All students are expected to complete a standards aligned algebra and geometry curriculum.
- All students will be held to a high standard of learning with relearning opportunities and reassessment opportunities available to those who do not meet the standards initially.
- All students will have the opportunity to earn credit at the post-secondary level while completing high school graduation requirements.

Course: CAPP Calculus (UW Oshkosh)

Precalculus Review

Lines

slopes as rate of change
parallel and perpendicular lines
equations of lines

Functions and Graphs

functions
domain and range
families of functions
piecewise functions
composition functions

Exponential and Logarithmic Functions

exponential growth and decay
inverse functions
logarithmic functions
properties of logarithms

Trigonometric Functions

graphs and basic trigonometric functions
domain and range
transformations
inverse trigonometric functions
applications

Limits and Continuity

Rates of Change

Limits of a Point

properties of limits
two sided limits
one sided limits

Limits Involving Infinity

- asymptotic Behavior
- end behavior
- properties of limits
- visualizing limits

Continuity

- continuous functions
- discontinuous functions
 - removable discontinuity
 - jump discontinuity
 - infinite discontinuity
 - oscillating discontinuity
- instantaneous rates of change
- tangent and normal lines

The Derivative

- Definition of the Derivative and Notation

Differentiability

- locally linear
- numerical derivatives
- differentiability and continuity

Derivatives of Algebraic Functions

- derivative rules
- first, second, and higher order derivative

Applications to Velocity and Other Rates of Change

Derivatives of Trigonometric Functions

Derivatives of Composite Functions (chain rule)

Implicit Differentiation

Derivatives of Inverse Trigonometric Functions

Derivatives of Logarithmic and Exponential Functions

Applications of the Derivative

Extreme Values

- relative (local) extrema
- absolute (global) extrema
- finding extrema values

Using the derivative

- mean value theorem
- increasing and decreasing functions
- antidifferentiation

Analysis of graphs of functions using the first and second derivatives

- critical points
- first derivative test for extrema
- second derivative test for extrema
- concavity and points of inflection

Optimization problems

Linearization and Newton's Method

Related rates

The Definite Integral

Approximating with finite sums

area under a curve

right Rectangular Method

midpoint Rectangular Method

left Rectangular Method

trapezoid Method

volumes formed by rotation.

Definite integrals and antiderivatives

definite integral as a Riemann sum

the existence of a definite integral

notation and terminology of a definite integral

definite integral as an "area accumulator"

rules for definite integrals

average value

mean value theorem

Fundamental Theorem of Calculus part 1 and 2

area connection

analyzing functions of the form $f(x) = \int_a^x g(t)dt$

Differential Equation and Mathematical Modeling

Antiderivatives and Slope Fields

antiderivatives and indefinite integrals

Properties of indefinite integrals

Solving initial value problems

Creating and evaluating slope fields

Integration techniques

Separable differential equations

growth and decay

general equations

Euler's Method

Application of Definite Integrals

Summing rates of change

Analyzing rates particle motion

Areas in a plane

between curves

enclosed areas between intersecting curves

Volume

volumes of known cross sections

volumes of solids formed by revolution

disk method

washer method

shell method

work Problems