

# MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

## COURSE OUTLINE

DEPT. MATH

COURSE NUMBER: 1121

NUMBER OF CREDITS: 4

Lecture: 4 Lab: 0 OJT 0

### Course Title:

Calculus I

### Catalog Description:

Calculus I introduces the basic ideas of differential and integral calculus. Topics include: limits and continuity, differentiation of functions, applications of derivatives, definite and indefinite integrals, numerical integration, and applications of definite integrals.

### Prerequisites or Necessary Entry Skills/Knowledge:

MATH 1113 or placement by multiple measures.

### FULFILLS MN TRANSFER CURRICULUM AREA(S) (*Leave blank if not applicable*)

Goal 4: Mathematics/Logical Reasoning: By meeting the following competencies:

1. illustrate historical and contemporary applications of mathematical/logical systems.
2. clearly express mathematical/logical ideas in writing.
3. explain what constitutes a valid mathematical/logical argument (proof).
4. apply higher-order problem-solving and/or modeling strategies.

### Topics to be Covered (General)

Review of functions of various types.

Families of functions and modeling.

Limits and Continuity

Derivatives as rate of change, slope, and function.

Differentiability and Linear Approximation

Techniques for finding derivatives algebraically.

Using graphing and computer algebra system technology.

Applications for the Derivative including: curve sketching, optimization, economics, other rates of change

Integrals as areas, Riemann sums, functions and accumulators.

The Fundamental Theorem of Calculus and Corollaries.

Constructing antiderivatives graphically, numerically and analytically.

Brief introduction to separable differential equations

Applications for Integrals including velocity, position, areas, volumes, work, forces.

## Student Learning Outcomes

Explain the concept of limit from a graphical, numerical, and algebraic point of view. Be able to illustrate and calculate limits of a variety of algebraic and transcendental functions, and limits involving infinity.

Describe what it means for a function to be continuous. Identify various types of discontinuities.

Compute a derivative using the definition.

Find derivatives using differentiation rules and implicit differentiation.

Recognize the derivative as a rate of change and a slope. Use derivatives to solve application problems such as optimization and related rates.

Use the first and/or second derivative tests and limits to analyze important features of the graph of a function.

Recognize limits in indeterminate forms (quotient, product, difference, power) and apply L'Hopital's Rule appropriately to evaluate them.

Define the definite integral as a limit of Riemann sums.

Describe the relationship between derivative and definite integral as expressed in both parts of the Fundamental Theorem of Calculus, and apply it to evaluate definite integrals using antiderivatives.

**Is this course part of a transfer pathway: Yes  No**

**\*If yes, please list the competencies below**

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Revised Date: 1/11/2024