SECTION HEADING

MATH 1121: Calculus I

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.

Credits

4

Prerequisite

MATH 1113 or placement by multiple measures

Corequisite

None

Topics to be Covered

1. Review of functions of various types.

2. Families of functions and modeling.

3. Limits and Continuity

4. Derivatives as rate of change, slope, and function.

5. Differentiability and Linear Approximation

6. Techniques for finding derivatives algebraically.

7. Using graphing and computer algebra system technology.

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

9. Integrals as areas, Riemann sums, functions and accumulators.

10. The Fundamental Theorem of Calculus and Corollaries.

11. Constructing antiderivatives graphically, numerically and analytically.

12. Brief introduction to separable differential equations

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

Learning Outcomes

1. 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.

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

3. Compute a derivative using the definition.

4. Find derivatives using differentiation rules and implicit differentiation.

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

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

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

8. Define the definite integral as a limit of Riemann sums.

9. 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.

Credit Details

Lecture: 4

Lab: 0

OJT: 0

MnTC Goal Area(s): Goal Area 04- Mathematics/Logical Reasoning

Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal Area 04: Mathematics/Logical Reasoning

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.

Transfer Pathway Competencies

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