

North Hennepin Community College

MATH 1221: Calculus I

A. COURSE DESCRIPTION

Credits: 5

Lecture Hours/Week: *.*

Lab Hours/Week: *.*

OJT Hours/Week: *.*

Prerequisites:

This course requires any of these three prerequisite categories

1. Placement into MATH 1221

Or

2. MATH 1170 - Pre-Calculus (Minimum grade: 1.67 GPA Equivalent)

Or

3. MATH 1180 - College Algebra and Pre-Calculus (Minimum grade: 1.67 GPA Equivalent)

Corequisites: None

MnTC Goals: Goal 04 - Mathematical/Logical Reasoning

This course is a thorough treatment of differentiation and an introduction to integration. Topics include the definition of derivative, limits and continuity, differentiation, applications of the derivative, definite and indefinite integrals, the Fundamental Theorem of Calculus, techniques of integration, and applications of integration.

Prerequisites: College math placement level or successful completion of Math 1170 or Math 1180 with grade of "C" or better

B. COURSE EFFECTIVE DATES: 08/27/1997 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. See Course Description and Course Outcomes

D. LEARNING OUTCOMES (General)

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. (MnTC Goal 4: a, b) (NHCC ELO 1, 2a)
2. Describe what it means for a function to be continuous. Identify various types of discontinuities. (G4: b, d; Goal 2: a, b, d) (NHCC ELO 2a, d; 4c, d)
3. Compute a derivative using the definition. (G4: a, b, d; Goal 2: c) (NHCC ELO 1, 2a, d; 4c, d)
4. Find derivatives using differentiation rules and implicit differentiation. (G4: a, b, d; G2: a, b, c) (NHCC ELO 1, 2a; 4a, d)
5. Recognize the derivative as a rate of change and a slope. Use derivatives to solve application problems such as optimization and related rates. (G4: a, b, d; G2: a, b, c) (NHCC ELO 1, 2a, d; 4a, c, d, e)
6. Use the first and/or second derivative tests and limits to analyze important features of the graph of a function. (G4: a, d; G2: b, c) (NHCC ELO 1, 2a; 4c, d, e);
7. Recognize limits in indeterminate forms (quotient, product, difference, power) and apply L'Hospital's Rule appropriately to evaluate them. (G4: a, b, d) (NHCC ELO 2a, d);
8. Define the definite integral as a limit of Riemann sums. (G4: a) (NHCC ELO 1);
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. Demonstrate understanding of the relationship between differentiation and integration (Fundamental Theorem of Calculus) (G4, a, b, c; G2: c) (NHCC ELO 1, 2a, d; 4c, d, e).
10. Use definite integrals to solve problems such as finding area between curves, work, and volumes of revolution. (MnTC Goal 4: a, b, d; Goal 2: a, b, c, d); (ELO 1; 2a, d; 4a, c, d, e)

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 04 - Mathematical/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.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

1. Knowledge of Human Cultures and the Physical and Natural World--Through study in the sciences, mathematics, social sciences, humanities, histories, languages, the arts, technology and professions.
2. Intellectual and Practical Skills--Including: Inquiry and analysis; Critical and creative thinking; Written and oral communication; Quantitative literacy; Information literacy; Teamwork and problem solving.
4. Integrative and Applied Learning--Including: Synthesis and advanced accomplishment across general education, liberal studies, specialized studies and activities in the broader campus community.