

Naugatuck Valley Community College
STEM Division
Science, Technology, Engineering and Mathematics

Common Course Syllabus
Calculus I MAT*H254

COURSE TITLE: MAT* H254, Calculus I

COURSE DESCRIPTION: A four semester hour course intended to provide the necessary preparation for advanced mathematics and science courses as requirements for all mathematics/science majors. The course begins with a review of the properties of absolute value and inequalities and other algebraic topics. Functions, limits, and continuity are thoroughly covered along with the derivatives. Formulas for calculating derivatives are presented, along with geometrical and physical applications. The antiderivative is introduced along with the definition of the differential and some applications. The course concludes with an introduction to the definite integral and its geometric meaning.

NUMBER OF CREDITS: 4 credit hours

PREREQUISITE: Grade of "C" or better in MAT* H185 (Trigonometric Functions) or an appropriate score on a college placement exam.

COURSE OBJECTIVES:

1. Provide students with a solid foundation of differential and integral calculus.
2. Expose students to a wide variety of real life applications and fields of study that can be modeled with calculus.
3. Provide students with the necessary background for the study of Calculus II.

LEARNING OUTCOMES: At the end of this course the student will be able to do the following:

- A. Precalculus review —
 1. Write sets of numbers using interval notation.
 2. Solve polynomial equations and inequalities.
 3. Solve absolute value equations and inequalities.
 4. Graph points and find the distance between them.
 5. Use the midpoint formula.
 6. Write equations of circles.
 7. Graph equations and identify symmetry.
 8. Graph lines and identify their slope.
 9. Define a function, use function notation, and graph functions.
 10. Identify domains and ranges of functions.
- B. Limits and Continuity —
 1. Give an informal definition of a limit.
 2. Find limits of algebraic functions.
 3. Use the cancellation technique and the rationalization technique to find two-sided and one-sided limits.

4. Define continuity:
 - a. At a point
 - b. On an open interval
 - c. On a closed interval
5. Use properties to test a function for continuity.
6. Use the Intermediate Value Theorem.
7. Define infinite limit and find vertical asymptotes of functions.
8. Use the δ - ϵ definition in proving limits of linear and quadratic functions.
9. Investigate limits involving trig functions and exponential functions.

C. Differentiation —

1. Draw a tangent line to a curve.
2. Define the derivative of a function.
3. Use the definition to find a function's derivative.
4. Use the derivative to find the slope of a function at a point.
5. Calculate average velocity, instantaneous velocity, and acceleration of an object moving in a straight line.
6. Find the second derivative of a function.
7. Apply the meaning of derivative as a rate of change to applications involving functions.
8. Apply the rules for finding derivatives to algebraic functions:
 - a. Constant rule
 - b. Power rule
 - c. Constant multiple rule
 - d. Sum and difference rules
 - e. Product rule
 - f. Quotient rule
 - g. Chain rule
9. Investigate derivatives of $\sin(x)$, $\cos(x)$, and exponential functions.
10. State the derivatives of the six basic trigonometric functions.
11. Find the derivative of a function that is defined implicitly.
12. Use implicit differentiation to solve problems involving related rates.

D. Applications of the derivative —

1. Find the absolute extrema of a function.
2. Find a function's relative extrema.
3. Apply Rolle's Theorem and the Mean Value Theorem to functions.
4. Identify intervals where a function is increasing or decreasing.
5. Use the first derivative test to find relative maximum and relative minimum values of a function.
6. Identify the concavity of a function on an interval and use the second derivative test to find it.
7. Use information from the function, its first derivative, and its second derivative to sketch the graph of the function.
8. Use the first and the second derivatives to solve applications involving optimization.
9. Define differentials.
10. Use differentials as estimates of the change in function values on an interval.

E. Integration —

1. Find an antiderivative of a function.
2. Use rectangles to approximate the area of a plane region.
3. Define definite integral.
4. Use Riemann sums and the definite integral to find the area of a plane region.
5. State the Fundamental Theorem of Calculus and apply it to finding a definite integral.
6. Perform integration by substitution.

GRADING SYSTEM:

For the purpose of computing numerical credit point averages, grades are evaluated as follows for each semester hour of credit. Grades on exams, papers, and quizzes, will be based on this grading system.

Numeric Grade	Acceptable Letter Grade Range to be used by the instructor	Description
90 – 100	A– to A	Excellent
80 – 89	B–, B, B+	Above Average
70 – 79	C–, C, C+	Average
60 – 69	D–, D, D+	Below Average
Below 60	F	Failing

CLASS CANCELLATION PROCEDURE: *If the instructor is late, the class is expected to wait 15 minutes before leaving or until informed of a cancellation by a college official. Information on weather related closings/late openings concerning Naugatuck Valley Community College can be obtained through local radio and television stations, or via the college website (<http://www.nvcc.commnet.edu>). NOTE: An alternative assignment may be given if classes are canceled due to weather.*

ACADEMIC HONESTY STATEMENT: *At NVCC we expect the highest standards of academic honesty. Academic dishonesty is prohibited in accordance with the Board of Trustee's Proscribed Conduct Policy in Section 5.2.1 of the BOT Policy Manual. This policy prohibits cheating on examinations, unauthorized collaboration on assignments, unauthorized access to examinations or course materials, plagiarism, and other proscribed activities. Plagiarism is defined as the use of another's idea(s) or phrase(s) and representing that/those idea(s) as your own, either intentionally or unintentionally. Anyone who is caught cheating on exams, plagiarizing another's work or published material will fail the course regardless of progress made in the course.*

CHILDREN ON CAMPUS: *With permission of the instructor only – Children must be attended at all times by a responsible adult. The student must notify the instructor or supervisor prior to the beginning of the class or activity that a child is present. Instructors and/or supervisors are authorized to ask the student or program participants to leave should the presence of a child be disruptive.*

CELL PHONE/PAGER USE POLICY: *Students are hereby notified that cellular phones and beepers are allowed in class only if they are turned off or turned to a silent mode. Under no circumstances are telephones to be answered in class. Students who ignore this policy may be asked to leave class. When there are extenuating circumstances that require that a student be available by phone or beeper, the student should speak to the instructor prior to class, so that together they can arrive at an agreement concerning the device.*

STUDENTS WITH SPECIAL NEEDS: *Students who may require accommodations on the basis of a learning disability are encouraged to contact the Coordinator of Learning Disabilities. Students who may require accommodations on the basis of all other disabilities should contact the Coordinator of Disability Services. After providing documentation and completing the disability disclosure process, students are then encouraged to meet with their instructor(s) to discuss the accommodations approved by the appropriate Coordinator and to complete the Accommodations Agreement form. Accommodations are not retroactive, students are therefore encouraged to meet with their instructor(s) at the beginning of each semester. Instructors, in conjunction with appropriate college personnel, will provide assistance and/or accommodations only to those students who have completed the disability disclosure and accommodations process.*