

Course Outline for MATH 1261, Calculus I

MATH 1261 Calculus I (4 units)

Prerequisite: Appropriate Math Placement, [MATH 1005](#) with a grade of C- or better, or [MATH 1007](#) with a grade of C- or better.

Limits, continuity, and differentiation of rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions. Optimization and related rates. Introduction to integration. Differential Equations. Applications in physics. Not open to students with credit in [MATH 1264](#). 4 lectures. Cross-listed as HNRS/[MATH 1261](#). Fulfills GE Area 2 with a grade of C- or better. Formerly offered as part of the MATH 141, 142, 143 series, students may not earn credit for both MATH 141 and [MATH 1261](#).

Course Learning Objectives	
1	Compute limits of functions and use them to determine if a given function is continuous or discontinuous at a particular point or on an interval.
2	Describe the meaning of a derivative, and compute derivatives of rational, exponential, logarithmic, trigonometric, and inverse trigonometric functions, and combinations of these.
3	Solve problems involving maxima, minima, related rates, and constrained optimization using differentiation.
4	Interpret and apply the Mean Value Theorem.
5	Apply L'Hospital's rule to compute limits of indeterminate forms.
6	Describe the meaning of the definite integral and compute definite integrals using both the definition and the Fundamental Theorem of Calculus.
7	Use the substitution rule to evaluate definite and indefinite integrals.
8	Compute the area between curves, and use the disk, washer, or shell method to find the volume of a solid of revolution.
9	Solve problems in physics involving work done by variable forces, and solve Hooke's Law using integral calculus.
10	Model physical phenomena with differential equations.
11	Solve separable differential equations.

Expanded Course Content

Textbooks, materials, and/or other resources

Calculus: Early Transcendentals, 9th Edition, by James Stewart, Daniel K. Clegg, Saleem Watson

Week	Readings	Topics of Discussion
1	Sections 1.4, 1.5, 2.2	Exponential functions, inverse functions and logarithms, the limit of a function
2	Sections 2.3, 2.5, 2.6	Calculating limits using the limit laws, continuity, limits at infinity, horizontal asymptotes
3	Sections 2.7, 2.8	Derivatives and rates of change, the derivative as a function
4	Sections 3.1, 3.2, 3.3	Derivatives of polynomials and exponential functions, the product and quotient rules, derivatives of trigonometric functions
5	Sections 3.4, 3.5	The chain rule, implicit differentiation
6	Sections 3.6, 3.9	Derivatives of logarithmic and inverse trigonometric functions, related rates
7	Sections 3.10, 4.1	Linear approximation and differentials, maximum and minimum values
8	Sections 4.2, 4.3	The Mean Value Theorem, what derivatives tell us about the shape of a graph
9	Sections 4.4, 4.5	Indeterminate forms and L'Hospital's rule, summary of curve sketching
10	Sections 4.7, 4.9	Optimization problems, antiderivatives
11	Sections 5.1, 5.2, 5.3	The area and distance problems, the definite integral, the Fundamental Theorem of Calculus
12	Sections 5.4, 5.5	Indefinite integrals, the substitution rule

Week	Readings	Topics of Discussion
13	Sections 6.1, 6.2	Areas between curves, volumes, the disk and washer methods
14	Sections 6.3, 6.4	Volumes by cylindrical shells, work
15	Sections 3.8, 9.1, 9.3	Exponential growth and decay, modeling with differential equations, separable equations

Method of Assessment

The possible methods of assessment are written individual examinations, quizzes, in-class worksheets or presentations, projects, and homework. All exams are to be proctored in-person, and one or more midterms and a cumulative final exam are required.

.

Instructional Mode

The instructional mode for this class is face-to-face. This designation means that the essential academic standards of the course require in-class student engagement, and thus remote instruction is not appropriate.