

Course Outline for MATH 1264, Calculus for Data Science I

MATH 1264 Calculus for Data Science 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. Techniques of integration. Differential equations. Parametric equations and polar coordinates. 4 lectures. Cross-listed as DATA/[MATH 1264](#). Fulfills GE Area 2 with a grade of C- or better.

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, and constrained optimization using differentiation.
4	Apply L'Hospital's rule to limits of indeterminate forms.
5	Describe the meaning of the definite integral and compute definite integrals using both the definition and the Fundamental Theorem of Calculus.
6	Compute lengths of curves, the area between curves, and use the disk or washer method to find the volume of a solid of revolution
7	Integrate combinations of elementary functions using techniques of integration, including the substitution rule and integration by parts.
8	Estimate definite integrals with a bound on error.
9	Compute and describe the meaning of improper integrals.
10	Model physical phenomena with differential equations.
11	Solve separable differential equations.
12	Sketch and find tangent lines to parametric and polar curves.

Expanded Course Content

Textbooks, materials, and/or other resources

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

Week	Readings	Topics of Discussion
1	Sections 1.4, 1.5, 2.2 of Stewart et al	Inverse functions, exponential and logarithmic functions, the limit of a function
2	Sections 2.3, 2.5, 2.6 of Stewart et al	Calculating limits using the limit laws, continuity, limits at infinity, horizontal asymptotes
3	Sections 2.7, 2.8, 3.1 of Stewart et al	Derivatives and rates of change, the derivative as a function, derivatives of polynomials and exponential functions
4	Sections 3.2, 3.3, 3.4 of Stewart et al	The product and quotient rules, derivatives of trigonometric functions, the Chain Rule
5	Sections 3.5, 3.6, 3.10 of Stewart et al	Implicit differentiation, derivatives of logarithmic and inverse trigonometric functions, linear approximation
6	Sections 4.1, 4.3 of Stewart et al	Maximum and minimum values, what derivatives tell us about the shape of a graph
7	Sections 4.4, 4.5 of Stewart et al	Indeterminate forms and L'Hospital's rule, summary of curve sketching
8	Sections 4.7, 4.9, 5.1 of Stewart et al	Optimization problems, antiderivatives, areas and distances
9	Sections 5.2, 5.3, 5.4 of Stewart et al	The definite integral, the Fundamental Theorem of Calculus, indefinite integrals
10	Sections 5.5, 6.1 of Stewart et al	The Substitution rule, areas between curves
11	Sections 6.2, 7.1 of Stewart et al	Volumes of solids of revolution (disk and washer methods), integration by parts

Week	Readings	Topics of Discussion
12	Sections 7.2, 7.7 of Stewart et al	Trigonometric integrals, approximate integration, bounds on error
13	Sections 7.8, 9.1 of Stewart et al	Improper integrals, modeling with differential equations
14	Sections 9.3, 10.1 of Stewart et al	Separable differential equations, curves defined by parametric equations
15	Sections 10.2, 10.3 of Stewart et al	Calculus with parametric curves, polar coordinates

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.