

Course Outline for MATH 1262, Calculus II

MATH 1262 Calculus II (4 units)

Prerequisite: MATH 141B with a grade of C- or better, MATH 142 with a grade of C- or better, or [MATH 1261](#) with a grade of C- or better, or consent of instructor.

Techniques of integration. Sequences and series. Parametric curves and polar coordinates. Vectors and vector functions. Applications in physics. Not open to students with credit in [MATH 1263](#) or [MATH 1265](#). 4 lectures. Cross -listed as HNRS/[MATH 1262](#). 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 143 and [MATH 1262](#).

Course Learning Objectives	
1	Integrate combinations of elementary functions using various analytic techniques including integration by parts, trigonometric substitution, and partial fractions.
2	Estimate definite integrals with a bound on error.
3	Compute and describe the meaning of improper integrals.
4	Compute the arc length of a planar curve, and the surface area of a solid of revolution.
5	Solve problems in physics involving centers of mass, velocity, acceleration, and projectile motion.
6	Determine whether a sequence or an infinite series converges or diverges.
7	Find Taylor series of functions and use them to compute limits, derivatives, and antiderivatives, and to approximate functions with a bound on error.
8	Sketch parametric and polar curves.
9	Compute areas of regions and lengths of curves using polar coordinates.
10	Compute the dot product and cross product of vectors and use these products to solve elementary problems in geometry.
11	Compute derivatives and integrals of vector functions.
12	Find unit tangent and normal vectors of parametric curves, and compute the arc length and curvature of space curves.

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 7.1, 7.2	Integration by parts, trigonometric integrals
2	Sections 7.3, 7.4, 7.5	Trigonometric substitutions, integration of rational functions by partial fractions, strategy for integration
3	Sections 7.7, 7.8	Approximate integration, improper integrals
4	Sections 8.1, 8.2	Arc length, area of a surface of revolution
5	Sections 8.3, 11.1	Applications to physics and engineering (hydrostatic pressure and force, moments and center of mass), sequences
6	Sections 11.2, 11.3	Series, the integral test and estimates of sums
7	Sections 11.4, 11.5	The comparison test, the limit comparison test, alternating series and absolute convergence
8	Sections 11.6, 11.7, 11.8	The root test, the ratio test, strategy for testing series, power series
9	Sections 11.9, 11.10, 11.11	Representations of functions as power series, Taylor and Maclaurin series, applications of Taylor polynomials
10	Sections 10.1, 10.2	Curves defined by parametric equations, calculus with parametric curves
11	Sections 10.3, 10.4	Polar coordinates, graphing polar curves, areas and lengths in polar coordinates
12	Sections 12.1, 12.2, 12.3	Three dimensional coordinate systems, vectors, the dot product
13	Sections 12.4, 12.5	The cross product, equations of lines and planes
14	Sections 13.1, 13.2	Vector functions and space curves, derivatives and integrals of vector functions
15	Sections 13.3, 13.4	Arc length and curvature, motion in space, velocity and acceleration, projectile motion

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.

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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.