

UAF MATH253X – CALCULUS III

Prerequisites:

Placement into MATH253X is through credit for MATH252X with a grade of C- or better, or by the BC Calculus AP exam.

Textbook and Course Content:

Sections of Calculus III offered by UAF campuses (in-person, hybrid, or online) use the textbook *Calculus* by James Stewart, 8th edition, available in Multivariable and Single+Multivariable versions.

Unmarked topics below are taught in all sections. Sections marked with (o) are optional, and may be covered if time permits.

Chapter 12: Vectors and the Geometry of Space

- 12.1 Three-Dimensional Coordinate Systems
- 12.2 Vectors
- 12.3 The Dot Product
- 12.4 The Cross Product
- 12.5 Equations of Lines and Planes
- 12.6 Cylinders and Quadric Surfaces

Chapter 13: Vector Functions

- 13.1 Vector Functions and Space Curves
- 13.2 Derivatives and Integrals of Vector Functions
- 13.3 Arc Length and Curvature (curvature (o))
- 13.4 Motion in Space: Velocity and Acceleration

Chapter 14: Partial Derivatives

- 14.1 Functions of Several Variables
- 14.2 Limits and Continuity
- 14.3 Partial Derivatives
- 14.4 Tangent Planes and Linear Approximation
- 14.5 The Chain Rule
- 14.6 Directional Derivatives and the Gradient Vector
- 14.7 Maximum and Minimum Values
- 14.8 Lagrange Multipliers

Chapter 15: Multiple Integrals

- 15.1 Double Integrals over Rectangles
- 15.2 Double Integrals over General Regions
- 15.3 Double Integrals in Polar Coordinates
- 15.4 Applications of Double Integrals
- 15.5 Surface Area
- 15.6 Triple Integrals
- 15.7 Triple Integrals in Cylindrical Coordinates
- 15.8 Triple Integrals in Spherical Coordinates
- 15.9 Change of Variables in Multiple Integrals (o)

Chapter 16: Vector Calculus

16.1 Vector Fields

16.2 Line Integrals

16.3 The Fundamental Theorem for Line Integrals

16.4 Green's Theorem

16.5 Curl and Divergence

16.6 Parametric Surfaces and Their Areas *****

16.7 Surface Integrals *****

16.8 Stokes' Theorem *****

16.9 The Divergence Theorem *****

Chapter 17. Second-order Differential Equations — material in Math 302 Differential Equations

Assessments and Grading

Individual instructors may choose to structure their courses within the following guidelines:

Exams: At least two proctored Midterm Exams will be given during the semester, in addition to a cumulative Final Exam. These will be closed book/classnotes. Calculators are not allowed on exams, but questions will not emphasize aspects of problems for which they would be useful. The majority of questions require free responses, and will be graded by course instructors. Exams will not be reused from previous semesters, so that they may be provided to students as study materials.

Other Assessed Work: While on-line homework systems are generally used, courses will include regular assessment through written work graded by an instructor or teaching assistant. Possible forms might include quizzes, written homework problems, worksheets, etc. Instructors may choose to assess oral work. Feedback to students will be given on a roughly weekly basis.

The final grade in this course will be determined by weighting assessments within the following ranges:

Written Assessed Work	At least 15% and at most 30%
Online Assessed Work	At most 15%
Midterm Exams	At least 40%
Comprehensive Final Exam	At least 20%

Instructors may use +/- grading for the course at their discretion.