MATH 217: Multivariable and Vector Calculus

Course Outline | Section 101 | 2026W, Term 1
University of British Columbia · Department of Mathematics

Contact and class information

Instructor: Prof. Jim Bryan, jbryan@math.ubc.ca
Teaching assistant: Atonu Mukherjee, atonu@math.ubc.ca

Lectures (in person):
Tuesdays and Thursdays, 9:30-11:00 a.m., P.A. Woodward Instructional Resources Centre (IRC), Floor 1, Room G.
Wednesdays, 11:00 a.m.-12:00 p.m., Mathematics Building (MATH), Floor 1, Room 100.

Office hours: Jim Bryan: Mondays, 11:00 a.m.-12:00 p.m., Math 226.
TA: Mondays, 12:00-1:00 p.m., Math Annex 1109.
Course website: https://canvas.ubc.ca/courses/192194

Learning materials and communication

The main texts are *CLP-3 Multivariable Calculus* and *CLP-4 Vector Calculus*, by Joel Feldman, Andrew Rechnitzer, and Elyse Yeager. These locally developed texts and companion problem books are available at math.ubc.ca/~CLP.

Lecture notes will be posted on Canvas under **Pages** → **Notes**. Practice midterms and finals will be posted before each midterm and the final exam. Access Piazza through Canvas; the teaching team will answer questions there.

WeBWorK

Weekly WeBWorK assignments will appear on the Assignments tab in Canvas. A new assignment will normally open each Tuesday and be due two Mondays later at 11:59 p.m. **Always access each assignment through its link in Canvas** so that grades sync correctly.

Assessment of learning

There will be weekly WeBWorK assignments and two midterms. Two midterms are currently scheduled, although this may change. The course grade will normally be the **better** of the following two schemes:

1. 50% final exam + 35% midterm grades + 15% WeBWorK grade; or
2. Scaled final-exam grade minus 10.

Grades may be scaled. The midterms are tentatively scheduled in class for **Thursday, October 22** and **Thursday, November 19**. The final exam date is to be determined.

Missed midterms

There are no make-up midterms. Missing a midterm for a valid reason normally results in its weight being redistributed to the remaining midterm and final exam. Any student who misses a midterm must submit the Department of Mathematics self-declaration form to the instructor within **72 hours** of the midterm date. This policy conforms with UBC Vancouver Senate Academic Concession Policy V-135.

Learning outcomes

A student successfully completing MATH 217 should be able to:

- Understand vector functions of one variable and use them to describe space curves, tangent vectors, arc length, and motion in space (position, velocity, speed, and acceleration).
- Recognize equations of and roughly sketch simple surfaces, including planes, spheres, ellipsoids, paraboloids, and hyperboloids.
- Understand functions of several variables: domains, ranges, graphs, level curves and surfaces, limits, and continuity.
- Understand the definition, computation, and interpretation of partial derivatives; their relation to tangent planes and linear approximation; and higher partial derivatives and equality of mixed partials.
- Know and use the various forms of the chain rule for functions of several variables.
- Understand the gradient vector, its meaning, and its relation to level curves and surfaces and to directional derivatives.
- Find local and global maximum and minimum values of functions of several variables, and use Lagrange multipliers for constrained problems.
- Understand double and triple integrals and simple applications, including volumes and centres of mass; compute them as iterated integrals using rectangular, polar, cylindrical, or spherical coordinates.
- Understand vector fields and represent them graphically.
- Compute line integrals of functions (with respect to arc length or a coordinate) and of vector fields by parameterizing a curve.
- Understand conservative vector fields, detect them using curl (or its two-dimensional version), and understand path independence and the fundamental theorem for line integrals.
- Understand parametric surfaces, normals, and surface areas; compute surface integrals of scalar functions and vector fields by parameterizing a surface.
- Compute curl and divergence, use the basic calculus of divergence, gradient, and curl (including product rules involving dot and cross products), and know that curl of a gradient and divergence of a curl are zero.
- Understand and apply the theorems of Green, Stokes, and Gauss (the divergence theorem) to compute and relate line, surface, double, and triple integrals.
- Understand basic differential forms in three-dimensional space: wedge products, exterior differentiation, their correspondence with functions, vector fields, dot and cross products, gradient, curl, and divergence, and the generalized Stokes theorem in this context.

Adapted from the learning-goals handout linked on the course Canvas syllabus.

Provisional schedule of topics

Each full week contains roughly four lecture hours. This schedule is provisional and may be adjusted as the term progresses. CLP3 and CLP4 refer to the two course texts.

Week / dates	Topics and reading
0 and 1 Sept. 9-17	Introduction, coordinates, vectors, dot and cross products, lines and planes. *CLP3: 1.1-1.5*
2 Sept. 22-24	Curves, tangents, arc length, and sketching surfaces. *CLP3: 1.6-1.9*
3 Sept. 29-Oct. 1	Functions of several variables; partial and higher-order derivatives; equality of mixed partials; tangent planes and linear approximation; chain rule. **No class September 30.** *CLP3: 2.1-2.3, 2.5-2.6, 2.4*
4 Oct. 6-8	Directional derivatives and the gradient; classification of critical points. *CLP3: 2.5-2.7, 2.9*
5 Oct. 13-15	Maxima and minima; Lagrange multipliers. *CLP3: 2.9-2.10*
6 Oct. 20-22	Double integrals, volumes, and double integrals in polar coordinates. **Midterm 1: Thursday, October 22 (tentative, in class).** *CLP3: 3.1-3.2*
7 Oct. 27-29	Applications of double integrals; triple integrals, including cylindrical and spherical coordinates. *CLP3: 3.3-3.7*
8 Nov. 3-5	Vector fields, line integrals, and path independence. *CLP4: 2.1-2.4, 1.6*
Break Nov. 9-11	**Midterm break: no classes.**
9 Nov. 12	Parameterized surfaces and surface integrals. *CLP4: 3.1-3.5*
10 Nov. 17-19	Surface integrals continued; gradient, divergence, and curl. **Midterm 2: Thursday, November 19 (tentative, in class).** *CLP4: 4.1*
11 Nov. 24-26	The divergence theorem, Green's theorem, and Stokes' theorem. *CLP4: 4.2-4.4*
12 Dec. 1-3	Differential forms and review. *CLP4: 4.7*

Final exam: Date to be determined.

Course information reflects the Canvas syllabus as of September 17, 2026. Consult Canvas for updates.