

COURSE OUTLINE 2004-2005  
**MATHEMATICS 263** (4 credits)  
**MULTIVARIABLE and VECTOR CALCULUS**

**Prerequisites:**

One of SCIE 001, PHYS 101, 107, 121, 153 and one of SCIE 101, PHYS 102, 108, 122, 153 and one of SCIE 001, MATH 101, MATH 103, MATH 105, MATH 121. Corequisite: one of MATH 152, 221, 223.

**Instructor:**

Joel Feldman

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office hours	Tue 9:00–10:00, Tue 15:00–16:00, Th 15:00–16:00

**Text:**

**Robert A. Adams, Calculus of Several Variables**, 5<sup>th</sup> edition, Pearson Education Canada.

I will post all handouts, problem sets etc. on the web at

<http://www.math.ubc.ca/~feldman/m263/>

**Topics:**

1. Vectors and the Geometry of Space (§10.1–10.4) 3 hours  
 Three dimensional coordinate systems,  
 Vectors, dot and cross products, projections  
 Equations of lines and planes.
2. Vector Functions (§11.1, 11.3) 3 hours  
 Vector functions and space curves, parametrization  
 Derivatives and integrals of vector functions,  
 Arc length, speed, velocity and acceleration. Exclude curvature, normal, binormal, torsion.
3. Partial Derivatives (§10.5, 12.1–12.9, 13.1–13.3, 13.6) 14 hours  
 Functions of several variables: visualization, quadrics,  
 Limits, partial derivatives,  
 Tangent planes and linear approximations,  
 Chain rule, directional derivatives, gradient,  
 Higher order derivatives, quadratic approximation  
 Local maxima and minima, Lagrange multipliers,  
 Newton's method.
4. Multiple Integrals (§14.1–14.6) 8 hours  
 Double and iterated integrals, polar coordinates, changing the order of integration  
 Applications,  
 Triple integrals, changing the order of integration  
 Cylindrical and Spherical co-ordinates.
5. Vector Fields and Line Integrals (§15.1–15.4) 4 hours  
 Vector fields, conservative fields, potentials, line integrals.
6. Surface integrals (§15.5, 15.6) 4 hours  
 Surfaces, parametrization, flux integrals, surface area, applications.
7. Integral Theorems (§16.1–16.6) 9 hours  
 Gradient, divergence and curl, vector identities, divergence theorem,  
 Green's theorem, Stokes' theorem, applications.

Midterms	3 hours
Review	<u>2 hours</u>
	50 hours

## Grading

There will be three midterms (September 29, October 27 and November 17), accounting for 45% of the final mark. There will be weekly homework assignments, accounting for 5% of the final mark. The final exam will account for 50% on the final mark. All grades will be scaled. Fairness across the four sections of the course will be a high priority.

## Policies

- All midterms and the final examination will be strictly closed book: no formula sheets or calculators will be allowed.
- There is no supplemental examination in this course.
- Late homework assignments receive a grade of 0.
- Missing a midterm normally results in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor or a medical emergency. In the latter case, the instructor must be notified within 48 hours of the missed test, and presented with a doctor's note immediately upon the student's return to UBC.

## Schedule

	Mon	Wed	Fri
Sep	6 no class	8	10
	13	15 Assignment 1	17
	20	22 Assignment 2	24
	27	29 Midterm 1	1
Oct	4	6 Assignment 3	8
	11 holiday	13 Assignment 4	15
	18	20 Assignment 5	22
	25	27 Midterm 2	29
Nov	1	3 Assignment 6	5
	8	10 Assignment 7	12
	15	17 Midterm 3	19
	22	24 Assignment 8	26
Dec	29	1 Assignment 9	3