18.024 (HONORS MULTIVARIABLE CALCULUS)

Lecture: T, Th 1, F 2, 2–147, Ravi Vakil (vakil@math, 2–271). Office hours TBA, but likely roughly the same as last semester (Thursday afternoons).

Recitation: T, Th 12, 2–136, Benoit Charbonneau (benoit@math, 2–251). Office hours TBA.

The work for this subject will consist of:

1. Three lectures and two recitations per week.
2. Reading and homework assignments with each lecture. This will be discussed in the following recitation. They are not to be handed in. You may work together on the homework assignments.
3. Problem sets, basically one each week when there is no quiz. These are to be handed in and graded. About working together: As you probably have noticed, problem sets are a tremendous help in preparing for quizzes. So I'd strongly suggest you think about the problems on your own first; then feel free to brainstorm together (if it helps). You will be expected to write up solutions on your own (so the grader will not expect to see nearly identical solutions, although I know from last semester that this won't be a problem).
4. Four quizzes. These will be based on the reading and the homework assignments.

The final grade will consist of four quizzes worth 100 points each, nine problem sets worth 21 points each, and participation in recitation worth 50 points, for a total of 639 points.

The text for the course will be Apostol's **Calculus** (vol. I for the first three units, and vol II for the rest of the semester), and the notes available in 11–004 (hopefully sooner than last semester!). The dates on the syllabus (on the next page) in **bold face** are when homework is due. Take this syllabus as a first approximation; it may vary somewhat as the term progresses.

Date: Spring 2001.

		I. Vector algebra and geometry.
Feb.	T 6	Vectors in V_n, dot product, Vol. I, 12.1–12.7.
	Th 8	Linear spaces, 12.9–12.10, Notes A.
	F 9	Linear independence, Notes A.
	T 13	Gauss-Jordan reduction, lines, Notes A.
		II. Linear algebra.
	Th 15	Planes, matrix algebra, Notes B.
	F 16	Systems of linear equations, Notes B, 16.18.
	Th 22	Inverse of a matrix, Notes B.
	F 23	Determinants, Notes B.
	T 27	Cross product, Notes B.
		III. Differentiation of vector functions.
Mar.	Th 1	Vector functions of a single variable, 14.1–14.6.
	F 2	QUIZ on Units I and II.
	T 6	Arc length, 14.10–14.12.
	Th 8	Tangent, normal, curvature, 14.8, 14.14.
	F 9	Polar coordinates, planetary motion, 14.16, Notes B.
		IV. Differentiation of functions of several variables.
	T 13	Scalar and vector fields, Vol. II, 8.1–8.8.
	Th 15	Total derivative, gradients, 8.10–8.13.
	F 16	Tangent plane, extreme values, 8.15, 8.16, 9.9.
	T 20	Chain rule, Notes C.
	Th 22	Implicit differentiation, 9.6, 9.7, 8.23.
	F 23	Mixed partials, second derivative test, 8.23, Notes C.
		Spring vacation.
		V. Line integrals.
Apr.	T 3	Line integrals, 10.1–10.7.
	Th 5	QUIZ on Units III and IV.
	F 6	The integral of a gradient, 10.8–10.12.
	T 10	The gradient of an integral, 10.14–10.16.
	Th 12	Construction of potential functions, 10.17, 10.21.
		VI. Multiple integrals.
	F 13	Double integrals over rectangles, 11.1–11.8, Notes D.
	Th 19	Double integrals over general regions, 11.10–11.14.
	F 20	Applications; triple integrals, 11.16, 11.31.
	T 24	Existence of double integrals, Notes D.
		VII. Green's theorem and applications.
	Th 26	Green's theorem in the plane, 11.19, 11.20, 11.23, Notes E.
	F 27	QUIZ on Units V and VI.
May	T 1	Application — conservative fields, Notes E.
	Th 3	Application — change of variables, 11.27, Notes E.
	F 4	Cylindrical and spherical coordinates, 11.32, 11.33.
		VIII. Stokes' and Gauss' theorems.
	T 8	Surfaces, 12.1–12.5.
	Th 10	Surface integrals, 12.7–12.9.
	F 11	Stokes' theorem, 12.12, 12.18, Notes F.
	T 15	Gauss' theorem, 12.19.
	Th 17	Grad, curl, div and all that, 12.16, 12.20, Notes F.
Finals Wk		QUIZ.