Mathematics V1202
Calculus IV
Fall 2006

Instructor: Prof. Michael Thaddeus
414 Mathematics; (212) 854-4308
Office hours: Monday 4–6, or by appointment

Course Sections:

§1 M.W. 1:10–2:25 203 Mathematics
§2 M.W. 2:40–3:55 417 Mathematics

Course Outline: An introduction to integral calculus of several variables. We will cover multiple integrals and vector calculus, including the famous theorems of Green, Gauss and Stokes. Time permitting, at the end of the course we will discuss the rudiments of complex analysis, including the Cauchy integral formula.

Prerequisites: Calculus II and Calculus III, or comparable preparation at another school with the instructor's permission.

Text: James Stewart, *Calculus: early transcendentals*, 5th edition, Brooks/Cole. Available at Columbia University Bookstore. Towards the end of the course, notes and exercises covering the complex analysis material will be posted on the course home page:
`http://www.math.columbia.edu/~thaddeus/iv.html`

Help room and office hours: Two course assistants (names to be announced) are assigned to each section. You are encouraged to take any questions to them during their hours in the mathematics help rooms at Columbia (406 Mathematics) or Barnard (333 Milbank). You are also welcome to bring questions to my office hours.

Midterm Examinations: Two midterm exams will take the place of the lectures on October 9 and November 20. *Makeups will not be given for the midterm exams.* Moreover, students can only be excused from the midterms because of serious illness or a family emergency of comparable gravity; you will need a note from your doctor or dean, and the weight given to the final exam will be increased.

Final Examination: There will be a three-hour final examination at the end of the term. *All students must take the final examination at the time scheduled by the University; no final exams can be given earlier or later.* The only exception is for students who have another scheduled examination at the same time, or three scheduled examinations on the same calendar day. If this is the case, inform the instructors in all relevant courses no less than two weeks before the exam. Final examinations cannot be rescheduled because of travel arrangements, however: so make your travel plans early!

As currently planned by the University, the final exam schedule is as follows:

§1 Monday, December 18, 1:10–4
§2 Wednesday, December 20, 1:10–4

Homework: Homework problems and a reading assignment will be posted (at the URL given above) every week on Wednesday and will be due 9 days later on Friday at 5 pm in the mailboxes outside of 407 Mathematics. *Late homeworks will not be accepted.* Unstapled homeworks will be frowned upon. The three lowest homework scores (including zeroes) will be dropped.

Grading. The course grades will be computed as follows: Each midterm 25%, homework 10%, final 40%.

Tentative schedule of lectures

Date		Section	Topic
September	6	15.1	Introduction; Double integrals
	11	15.2	Double integrals as iterated single integrals
	13	15.3	Double integrals over general regions
	18	15.4	Double integrals in polar coordinates
	20	15.5	Applications of double integrals
	25	15.6	Surface area
	27	15.7	Triple integrals
October	2	15.8	Triple integrals in cylindrical and spherical coords.
	4	15.9	Change of variables in multiple integrals
	9		MIDTERM EXAM #1
	11	16.1	Vector fields
	16	16.2	Line integrals
	18	16.3	Fundamental theorem for line integrals
	23	16.4	Green's Theorem
	25	16.5	Curl and divergence
	30	16.6	Parametric surfaces and areas
November	1	16.7	Surface integrals
	6		Election Day holiday
	8	16.8	Stokes's Theorem
	13	16.9	The Divergence Theorem
	15		Maxwell's Equations
	20		MIDTERM EXAM #2
	22	App. G	Complex numbers
	27		Holomorphic functions
	29		The Cauchy-Riemann Equations
December	4		Line integrals of complex functions
	6		Cauchy's Theorem
	11		Cauchy's Integral Formula

HOMEWORK ASSIGNMENT #1

Read §§15.1–3.
Do §15.1: 1, 6, 10, 13, 18; §15.2: 16, 19, 28, 33, 35 (optional), 36(a); §15.3: 9, 14.
Due Friday, September 15 at 5 pm.