

Math 267, Fall 2009
Analysis III
9:00 MWF, CNS E101

Professor: Lawrence Stout
Office: C209C CNS
Office Hours: T 11-12, W 1-2,3-4, F 10-12,
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Required Texts: Small and Hosack **Calculus, an Integrated Approach**
Spivak **Calculus on Manifolds**

Course Description

This course covers integration for functions of several variables, starting with line integrals, then multiple integrals, then surface integrals, and integrals over higher dimension manifolds. These are typically evaluated by reducing them to integrals in one dimension, or iterated integrals. Sorting out what these kinds of integrals mean and how they are related will take about 2/3 of the class. The high point is Stokes's theorem and it's lower dimensional variants (Green's theorem and the Divergence theorem) relating the integral of a form over an oriented manifold with boundary to a related form on the boundary of the manifold. Much of this material is in chapter 8 of Small and Hosack and chapters 3,4,and 5 of Spivak.

The remaining third of the course covers series representation of functions and the tests for convergence of series that are used to see when those representations make sense. Most of this is in chapter 9 with some supplementary material in handouts.

While what I've just given is the order of the topics in Small and Hosack, it is not the order we'll take. I plan to do series representations first, then multiple integrals, then line integrals, then Stokes' theorem.

Written work and grading:

I anticipate three exams of equal weight, each worth 100 points. One on line and multiple integrals, one on the variants of Stokes's theorem, and

one on series representation of functions. I will also be assigning regular homework and projects which I will grade for another 100 points.

I will use a straight scale for determining grade. To allow flexibility at boundaries, I reserve the right to change the boundaries, but will draw them no higher than:

- A : 90% or over
- A-: [87,90)
- B+: [83,87)
- B : [78,83)
- B-: [75,78)
- C+: [70,75)
- C : [65,70)
- C-: [60,65)
- D : [50,60)
- F : below 50%

Note: The line for passing will not move, the others *may* move downward.

Tentative calendar

There is a running calendar which will be updated regularly with assignments at <http://www.iwu.edu/lstout/Analysis3/Analysis3F09Cal.html>
A rough plan of topics follows:

1. Series representation of functions: weeks 1-4 Exam 1 on Monday, 9-21-09
 - Geometric Series
 - Taylor Series
 - When power series converge:
 - (a) Ratio test and radius of convergence
 - (b) Integral test and alternating series test for endpoints
2. Multiple integrals: weeks 5-7
 - Definitions and integrability of functions continuous almost everywhere
 - Fubini's theorem and iterated integrals

- Change of variables
3. Line integrals weeks 7-8.5 Exam 2 on Wednesday 10/28/09
 - Path independence
 - Fundamental Theorem
 - Recovering potentials
 - 1-forms on 1-chains
 4. Stokes' Theorem: weeks 8-14: Exam at time of final 12/10
 - Differential forms, exterior algebra, chains
 - Green's theorem
 - Divergence Theorem
 - Stokes' Theorem
 - Generalized Stokes' Theorem

Attendance Policy

I expect you to read the relevant sections of the book before the class where we will be discussing them. Classes and office hours are what you pay tuition for, so take advantage of them.

There is no deduction of points for classes missed.

Policy on Academic Integrity

Work handed in for a grade is expected to be your own work. On exams and individual projects there should be no collaboration: this will be made explicit on the assignment sheet. On daily homework there is something to be gained by talking and working with your fellow students; the writeup, however, should be your own. If you use outside sources, cite them. If you get help from an individual, give credit. It is not wise for you to neglect learning how to do the work on your own, since exams will all require all work to be done individually. Any cheating on exams or collaboration on assignments where it has been explicitly prohibited will be treated as a violation of the policy on academic dishonesty in the student handbook and will be reported to the Associate Provost.