

16 HONORS CALCULUS IV

SYLLABUS

Time and place of course: MWF 10:10 -11:00 AM Room 326 Math.

Lab: Tue 12:20- 1:10 PM Room TBA

Name of Professor: Frank Connolly, Room 205 Math

Text: Calculus, volume II, by Tom Apostol, second edition

Material to be covered:

Chapter 9 sections 10- 17. Applications of Differential Calculus: Maxima and minima of scalar fields; saddle points; the Hessian quadratic form; the second order Taylor's formula for scalar fields; Tests for positive definite and negative definite matrices; the second derivative test; constrained extrema and Lagrange multipliers.

) Chapter 10, sections 1- 18. Line Integrals:

Line integral of a vector field; Line integral of a scalar field; Line integral of a differential 1-form; mass and centroid of a wire; moment of inertia; work and line integrals; connected open sets; the fundamental theorems of calculus for line integrals; potential functions for vector fields and integrals for differential 1-forms; how to construct potential functions; how to solve an exact differential equation; integral curves for differential 1-forms; closed 1-forms are exact on convex open sets.

) Chapter 11 (sections 1 through 23, and 26 through 34). Multiple integrals: Definition of multiple integrals; their application to computing volumes, areas, moments, and centroids; Green's theorem, and the change of variables formula for integrals. The volume of the n-dimensional ball using the Gamma function.

) Chapter 12 (sections 1 through 21) Surface integrals; surface areas; Gauss' Theorem; Change of Variable Theorems for surface integrals. Differential 2-forms and their surface integrals; Stokes theorem for surface integrals; Divergence and Curl of a vector field; Stokes theorem in three dimensions. Differential 3-forms in 3-space, and Gauss theorem.

TESTS: Tue. Feb.12, Tue. Mar. 19, Tue. Apr. 23

FINAL EXAM: Tue. May 7 , 8:00-10:00 AM

Grades: Each test will be worth 100 points; the final exam will be worth 100 points; homework will be worth 50 points. Quizzes (which will always be announced beforehand) will be worth a total of no more than 50 points. Work on all tests and quizzes should, of course, be strictly your own.

All homework should be done on looseleaf paper. Sheets torn out of

notebooks, with ragged edge, will not be accepted. Homework which is written in an illegible script, or in a disorganized manner, will not be accepted. Use complete English sentences in all written work. Special care should be taken to use the appropriate logical connectives, in order to make arguments coherent.

Students may ask others for help with their homework. However, it is unwise to do the homework exclusively in a group; there is no substitute for the insight that comes from individual concentration.