

University of Glasgow
School of Mathematics and Statistics

Level-2 2010/2011

2A - Multivariable Calculus
Course information

Class Head

Dr C.A. Cobbold (Mathematics Building, room 508, email: christina.cobbold@glasgow.ac.uk)

Lectures and tutorials

Section	Lecturer	Lecture days	Tutorial day	Time	Room
2A(1)	Dr C.A. Cobbold	Tuesday & Thursday	Monday	10am	257 Kelvin Blg
2A(2)	Prof. K.A. Brown	Tuesday & Thursday	Monday	11am	109 Gregory Blg

About the course

The course deals with calculus of functions of more than one variable, in contrast to First Year Calculus, which is entirely concerned with functions of one variable. The generalisation to two variables is the crucial step. Once this is achieved the generalisation to any number of variables is fairly routine.

This course covers mathematical methods useful in the Physical and Chemical Sciences and in Statistics. The emphasis is on being able to apply these methods rather than on the underlying theory.

Books

No purchase is essential, but the following will be referred to in class and contains many additional examples and an on-line resource which allows you to get instant feedback and help with solving problems from the book. The book also contains material which covers the Calculus topics dealt with in the semester 2 class 2D.

Robert A. Adams, Calculus, a complete course (Sixth or Seventh Edition), Addison Wesley / Pearson.

Assessment

Assessment is via one class test worth 20% of the final assessment and is a requirement for course completion, and the final degree examination worth 80% of the final assessment. Dates will be announced.

Course Contents

1. Partial differentiation.
2. Double and triple integration.
3. Differentiation of vectors.
4. Line and surface integrals.

Learning Objectives

In General: Students should be able to solve problems using the methods covered in the lectures.

In Particular: Students should be able to:

- find the parametric description of lines, circles, ellipses and parabolas in two and three dimensions and draw surfaces in three dimensional space;
- find partial derivatives of functions of two or more variables using standard techniques such as the product and quotient rules and, in particular, the chain rule;
- solve first order partial differential equations by a given change of variables;
- solve double and triple integrals in both Cartesian and polar coordinates;
- solve a double integral by change of variables using the Jacobian;
- use beta functions to solve integrals of powers of sine and cosine;
- find the gradient, directional derivative and Laplacian of a scalar field and the divergence and curl of the a vector field;
- prove and use identities involving grad, div and curl;
- determine whether or not a vector field is conservative and find a potential if it is;
- find line and surface integrals and using Green's Theorem and Gauss's Divergence Theorem.