MATH 200 Multivariable Calculus (Fall 2018)

All the basic information about the course, including the information below, can be found at the common course site: `http://www.math.ubc.ca/chau/MATH_200_2018/MATH_200_common.html`

TOPIC OUTLINE

The following is an outline of the topics to be covered in the course. Look at the common course site for additional information, and also suggested problems.

PART I: 3-DIMENSIONAL GEOMETRY

Coordinate systems, equations and surfaces, vectors. Think of this section as pre-multivariable Calculus.

TOPICS:

-three dimensional coordinate systems
-equations and surfaces in space
-vectors; arithmetic, dot product, cross product
-lines and planes

PART II: DIFFERENTIATION OF MULTIVARIABLE FUNCTIONS

The differentiability of a two variable function $f(x, y)$ at a fixed point $(x, y) = (a, b)$ is symbolically expressed by the equation

$$df = Adx + Bdy$$

asserting that: for some fixed numbers A and B, any infinitessimal(tiny) changes dx, dy in the variables produce a corresponding change df in the function satisfying the symbolic equation. A very similar equation is used in the case of a function of 3 or more variables. We will learn the precise meaning of the above symbolic equation, how to use it, and how it encodes almost all the important formulas from multivariable Calculus.

TOPICS:

-Functions of several variables
-limits and continuity
-Partial derivatives
-Tangent planes and linear approximations
-chain rule
-directional derivatives and gradient vector
-Maximum and minimum values, Lagrange multipliers

PART III: INTEGRATION OF MULTIVARIABLE FUNCTIONS

The double integral of a two variable function $f(x, y)$ over a region R in the plane is denoted symbolically as

$$\int\int_R f(p)dA$$

and represents an area-weighted continuous summation of f over R where in particular: p represents a point in R, dA the area of an infinitessimal(tiny) patch around p, and $\int\int R$ a continuous summation over all points p in R. We will give a more precise definition of double integrals, interpret them in various different contexts, and learn to calculate them explicitly. We will then similarly define and treat triple integrals of three variable functions over regions in space.

TOPICS:

-double integrals over rectangles
-double integrals over general regions
-Double integrals in polar coordinates
-applications of double integrals
-triple integral
-Triple integrals in cylindrical and spherical coordinates