3109 (Multivariable Analysis)

Year:	2014–2015
Code:	MATH3109
Level:	Advanced
Value:	Half unit (= 7.5 ECTS credits)
Term:	2
Structure:	3 hour lectures per week. Assessed coursework.
Assessment:	90% examination, 10% coursework
Normal Pre-requisites:	MATH7102
Lecturer:	Dr F Schulze

Course Description and Objectives

This course develops rigorously the important notions and theorems of analysis in $\mathbf{R}^n$. The aim is to unify the classical theorems of vector analysis, applications of which the students have already seen in electromagnetism, with the modern terminology of differential forms.

Recommended Texts

Recommended books are (i) Michael Spivak, *Calculus on Manifolds: A Modern Approach to Classical Theorems of Advanced Calculus* (Harper Collins Publishers, June 1965); (ii) Walter Rudin, *Principles of Mathematical Analysis* Chapters 9 and 10.

Detailed Syllabus

Vector functions, limits and continuity, vector derivatives, total derivative, chain rule, partial derivatives, gradient, inverse function theorem, implicit function theorem.

Multiple integrals, Fubini theorem, change of variables.

Differential forms, closed and exact forms, wedge product, simplexes and chains, integration on chains, manifolds, integration on manifolds, Stokes Theorem. The volume element, connections with the classical theorems of vector calculus.