

School of Mathematics

Module MA2321 — Analysis in several real variables 2010-11
(SF Mathematics, SF Theoretical Physics, JS & SS Two-subject Moderatorship)

Lecturer: Prof. David Simms

Requirements/prerequisites: prerequisites: MA1212 (Linear algebra), MA1122 (analysis)

Duration: Michaelmas term, 11 weeks

Number of lectures per week: 3 lectures including tutorials per week

Assessment:

ECTS credits: 5

End-of-year Examination: This module will be examined jointly with MA2322 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination.

Description: Derivative as a linear operator, partial derivatives, C^1 functions are differentiable, equality of mixed partials, inverse function theorem, implicit function theorem. May also include multilinear algebra.

See first half of previous module 224. Refer to <http://www.maths.tcd.ie/pub/official/Courses08-09/224.html>

Learning Outcomes: On successful completion of this module, students will be able to:

- prove the chain rule for functions defined on finite dimensional real vector spaces
- prove the inverse function theorem for functions defined on finite dimensional real vector spaces
- prove the implicit function for functions defined on finite dimensional real vector spaces
- define smooth manifolds, tangent spaces, vector fields, 1-forms, push-forward of tangent spaces and pull-back of 1-forms
- define the differential of a scalar field, show that the differentials of coordinates are dual to the partial derivatives, and show that the differential commutes with the pull-back.

November 10, 2011