

**School of Mathematics****Course 221 — Real and Complex Analysis**

2002-03

(SF Mathematics, SF Theoretical Physics, SF Two-subject Moderatorship with Economics & JS Two-subject Moderatorship )

**Lecturer:** Prof. D.J. Simms**Requirements/prerequisites:** 121**Duration:** 24 weeks**Number of lectures per week:** 3**Assessment:** Some assignments, which do not contribute to the final grade**End-of-year Examination:** One 3-hour end of year examination**Description:**

Introduction to measures. Definition of Lebesgue integral on the real line. General integration, monotone and dominated convergence theorems, Fubini's Theorem.

Schwartz space, (tempered) distributions, inverse of Fourier transform

Derivative as a linear operator for functions between finite dimensional real vector spaces, partial derivatives in  $\mathbf{R}^n$ , chain rule, equality of mixed partials, criterion for differentiability.

$C^n$  functions, coordinate systems and partial derivatives, manifold, tangent space, differentials and vector fields, push-forward, pull-back.

Functions of a complex variable, differentiability, contour integration. Cauchy's integral formula, Taylor and Laurent series, conformal property, zeros and poles, residues, evaluation of integrals, analytic continuation.

Inverse function theorem, implicit function theorem, Lagrange multipliers.

March 27, 2003