ath 606, Spring 2002

Xavier

SYLLABUS

The Poisson kernel, The harmonic conjugate kernel, the Dirichlet problem in the unit disc. Boundary behavior of harmonic and holomorphic functions, non-tangential convergence. Fatou's theorem and other boundary representation of harmonic functions satisfying various integrability conditions. Intoduction to the Hardy spaces H^p. The F. and M. Riesz theorem on measures orthogonal to $e^{in\theta},\ n \geq 1$. The Privalov localization construction, the local fatou theorem, the Privalov uniqueness theorem, The Marcinkiewicz- Zygmund-Spencer theorem on existence of non-tangential limits in terms of the area integral.

A short introduction to the theory of minimal surfaces in differential geometry and its connections to complex analysis. Applications to minimal surfaces of Runge's theorem and of the theory of boundary behavior of holomorphic functions; the role of curvature.

The Mittag-Leffler theorem, the Picard theorem, Beurling's theorem on the invariant subspaces of the shift operator. Subharmonic functions, solution of the Dirichlet problem by Perron's method. Definition of Riemann surfaces, examples.

Textbook: Conway's Functions of one complex variable, Rudin's Real and complex Analysis and Koosis's Introduction to H^p spaces.