

*Math689-603: Introduction to the
 $\bar{\partial}$ -Neumann problem, Spring 2006*

Professor Emil J. Straube

MWF 10:20 - 11:10, ENPH 205

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Office hours: MWF 1:00 - 2:00, but feel free to come and see me any time.

Course Content: The course treats the L^2 -Sobolev regularity theory of the $\bar{\partial}$ -Neumann problem on bounded pseudoconvex domains in complex Euclidean space. Starting with some classical results from the sixties which form the bedrock of the theory, the course leads to current developments in the area. A tentative list of topics covered is as follows:

The L^2 -theory: the twisted Kohn-Morrey-Hörmander formula, Hörmander's basic L^2 -estimate, the complex Laplacian, the $\bar{\partial}$ -Neumann operator, the canonical solution operators to $\bar{\partial}$ and $\bar{\partial}^*$.

Strictly pseudoconvex domains: the subelliptic 1/2-estimate, estimates for operators related to the $\bar{\partial}$ -Neumann operator, Kohn's theorem, solution of the Levi problem.

Compactness: compactness estimates, compactness implies global regularity, locality of compactness, Catlin's and McNeal's sufficient conditions for compactness.

Regularity in Sobolev spaces: equivalence of estimates for the $\bar{\partial}$ -Neumann problem with estimates for the Bergman projection, the vector field method, plurisubharmonic defining functions, failure of regularity on the worm domains.

Prerequisites: It is expected that students know the basics of real, functional, and (one variable) complex analysis.