MAT - 674

NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS –
AN INTRODUCTION TO VISCOSITY METHODS

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I will give an introduction to the viscosity approach to first and second order nonlinear PDE's pioneered by Lions, Iishi, Crandall, Evans, Jensen and others. The theory is quite effective for establishing existence and uniqueness of solutions for degenerate elliptic equations. New techniques will be introduced for applying the theory to universal equations in real and complex geometry. Results on the removability of singularities will be also proved. Areas of particular interest will include:

• The Dirichlet Problem for degenerate elliptic, second-order equations on domains in riemannian manifolds. This will include all branches of the homogeneous Monge Ampere equations in the real, complex and quaternionic cases.

• The theory of subharmonic functions in calibrated geometry, and its associated harmonic theory.

• Mean curvature flow by the level set method. .

Prerequisites are basic real analysis and elementary differential geometry.