

The notion of subharmonic function will be presented first, starting from the construction of the Green kernel, the Green-Riesz representation formula and the Poisson-Jensen formula relating the average value of a function on a sphere to the average on the ball of the Laplacian of that function.

After the basic properties of subharmonic functions have been thoroughly studied, including the maximum principle, the stability under non-increasing passages to the limit and the positivity in the sense of measures of their Laplacians.

Then the study will be refined by considering plurisubharmonic (psh) functions and the positivity property of their complex hessian. Basic facts about positive currents will be presented and many examples given, namely the current of integration on (singular) analytic sets that provides an important link with complex geometry.

The complex Monge-Ampère operator will be introduced starting from the original definition of Bedford-Taylor in the case of locally bounded plurisubharmonic functions.

A general maximum principle as well as various comparison principles for the complex Monge-Ampère operator will be proved and the Dirichlet problem for the complex Monge-Ampère operator on strongly pseudoconvex domains will be solved using the Perron method.

If time permits, some facts on pluripotential Theory on compact Kähler manifolds will be given as well as some applications to Kähler Geometry.