ICTP DIPLOMA PROGRAMME IN MATHEMATICS 2018-19

Partial Differential Equations

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Lecture 1
Divergence theorem.
Dirichlet principle. Harmonic functions. Examples.

Lecture 2
Fundamental solution of the laplacian.
Green's identity.

Lecture 3
Surface mean values formula for harmonic functions.
Volume mean values formula for harmonic functions.

Lecture 4,
Volume mean value formula. The gradient estimate for harmonic functions.

Lecture 5
Estimates of all derivatives. Analiticity of harmonic functions.
Limits of harmonic functions: the closure and the compactness theorem for harmonic functions.

Lecture 6
Volume mean value formula for sub/super harmonic functions.
The weak maximum/minimum principles for sub/super harmonic functions.
The strong maximum/minimum principles for sub/super harmonic functions.
The strong loca maximum/minimum principles for harmonic functions.
The weak comparison principle.

Lecture 7
Existence of minimizers of Dirichlet problem in Lip_k.
Super/sub minima.

Lecture 8
Comparison principle for sub/super minimizers.
Exercise.

Lecture 9, Existence of minimizers in Lip.

Lecture 10 Poisson formula for the ball.