ICTP DIPLOMA PROGRAMME IN MATHEMATICS 2011-12

Real Analysis

E. Sincich (20 lectures : 30 hrs)

Abstract : The course covers the basic topics on Lebesgue measure and integrals, differentiation and integration as well as L^p spaces. The analysis is carried over in the one dimensional space.

Summary (syllabus): Outer measure; Measurable sets and Lebesgue measure; the Cantor set and the Cantor function; a non measurable set; measurable functions; Egorooff-Severini's theorem and Lusin's theorem; the Riemann integral; the Lebesgue integral of bounded functions over a finite measure set; the integral of non-negative functions; Fatou's lemma and the monotone convergence theorem; absolute continuity of the integral; the Chebyshev inequality; the general Lebesgue integral; the Lebesgue convergence theorem and its generalized version; convergence in measure; Vitali's lemma and differentiation of monotone functions; functions of bounded variations; differentiation of an integral; absolutely continuous functions; convex functions and the Jensen's inequality; L^p spaces; Minkowsky and Holder inequality; the Riesz-Fischer therorem; bounded linear functionals on the L^p spaces.