# Complex Analysis (Analisi Complessa) - 2011-2012

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It is open to students of the **Mathematics Master's Degree (Laurea Magistrale)**, and of the **Erasmus Master Mundus ALGANT program**.

**When**: From March 5th to June 15th: Tuesday 11.30-13.30 and Wednesday 9.30-11.30.

**Where**: 2AB40

**Total number of hours**: about 48 (6 credits).

**Examination**: oral.

## Program

Applications of the maximum modulus theorem: three lines and three circles theorem; Phragmen-Lindelöf method; Schwarzs lemma and holomorphic automorphisms of the unit disc.

Topology of uniform convergence on compacta; compact sets of holomorphic mappings and Montels theorem. Riemann mapping theorem.

Infinite products and Weierstrass factorization theorem. Jensen formula and Blaschke products. Eulers Gamma function as an infinite product and as an integral. Riemanns zeta function and relations to the Gamma function.

Approximation with rational functions; Runges theorem. Simple connectedness. Mittag-Lefflers theorem.

## Prerequisites

Cauchy-Riemann identities and complex differentiation; holomorphic functions. Line integrals of complex functions and their homotopy invariance. Logarithm of a path and winding number. Cauchy formula for a circle. Analiticity of holomorphic functions. Zero-set of a holomorphic function; the identity theorem. Open mapping theorem and maximum modulus theorem. Laurent series and isolated singularities. Residue theorem, and its use for the computation of integrals. Argument principle.

## References

1) J.B. Conway, *Functions of One Complex Variable*, Second edition, Springer, 1978.
2) R. Remmert, *Theory of Complex Functions*, Springer, 1991.
3) R. Remmert, *Classical Topics in Complex Function Theory*, Springer 1998.