

# COMPLEX ANALYSIS

## Course Content

July 20-August 14, 2026-SMI Summer School Perugia  
Professor Cinzia Bisi, Università degli Studi di Ferrara

Textbook: Theodore Gamelin, "Complex Analysis", Springer.

Program: Chapter II-XI.

Remark: The course is completely self-contained and presumes no previous knowledge of complex analysis.

Further indication for suggested reading before the course: Reviewing basic knowledge about one and two real variable calculus. We will use tools from calculus such as integration on curves, sequences and infinite sums and radius of convergence of power series.

More detailed (tentative) program :

1. Elementary Properties of Analytic Functions
2. Complex Differentiation
3. Linear Fractional Maps and conformal mappings
4. Integration over Paths and Cauchy Integral Formula
5. Power Series Representation
6. Liouville's and Morera's Theorem
7. Zeroes of Holomorphic Functions and Analytic Continuation
8. The Maximum Modulus Principle
9. Laurent Series
10. Isolated Singularities
11. The Residue Theorem
12. The Argument Principle
13. Rouché's Theorem
14. The Open mapping and Inverse Function Theorems
15. Winding Numbers
16. The Schwarz lemma and the Automorphisms of the Unit Disk
17. Automorphisms of the Complex Plane and Complex Tori
18. Regular functions on domains of the quaternions  $\mathbb{H}$