



## Programme of Module "Complex analysis (Istituzioni di Analisi Superiore mod. 2)"

- Code: DT0027
- Type of course unit: Compulsory (Bachelor Degree in Mathematics curriculum Generale)
- Level of course unit: Undergraduate Degrees
- Semester: 2

Number of ects credits: (Bachelor Degree in Mathematics) 6 (workload 150 hours)

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1	<b>Course objectives</b>	Knowledge of basic topics of complex analysis: elementary functions of complex variable, differentiation, integration and main theorems on analytic functions . Ability to use such knowledge in solving problems and exercises
2	<b>Course content and learning outcomes (dublin descriptors)</b>	Topics of the module include: <ul style="list-style-type: none"> <li>• Complex numbers. Sequences. Elementary functions of complex numbers. Limits, continuity. Differentiation. Analytic functions. Armonic functions</li> <li>• Contour integrals. Cauchy's Theorem. Cauchy's integral formula. Maximum modulus theorem. Liouville's theorem. Morera theorem.</li> <li>• Series representation of analytic functions. Taylor's theorem. Laurent's series and classification of singularities</li> <li>• Calculus of residues. The residue theorem. Application in evaluation of integrals on the real line and Principal Value. The logarithmic residue, Rouche's theorem.</li> <li>• Fourier transform for <math>L^1</math> functions. Applications. Fourier transform for <math>L^2</math> functions. Plancherel theorem.</li> <li>• Laplace transform and applications.</li> </ul>
3	<b>Course prerequisites</b>	Knowledge of all topics treated the Mathematical Analysis courses in the first and second year : real function of real variables, limits, differentiation, integration; sequences and series of functions; ordinary differential equations
4	<b>Teaching methods and language</b>	theoretical lectures and exercises <b>Language:</b> English <b>Reference textbooks</b> <ul style="list-style-type: none"> <li>• J.E. Marsden, M.J. Hoffman, <i>Basic complex analysis</i>. Freeman New York.</li> <li>• W. Rudin, <i>Real and complex analysis</i>. Mc Graw Hill.</li> </ul>
5	<b>Assessment methods</b>	Written exam and oral exam