# . – Complex Analysis

## Prof. Giuseppe Nardelli

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The course's main objective is to introduce the student an array of the main subjects of complex analysis and to provide them with the main computational techniques. A special emphasis is placed on solving problems (integral calculus, series, infinite products, Mittag-Leffler expansions).

At the end of the course, students will be able to calculate integrals and add series relevant to the study of mathematics and physics, as well as identifying, classifying and treating the structure of analytical functions in the complex plane (position of poles, residues, branch points, cuts etc. etc.).

***COURSE CONTENT***

Holomorphic functions: Cauchy Riemann conditions and properties of harmonic functions.

Cauchy theorem and Cauchy integral representation

Developments in Taylor and Laurent series.

Theorem of residuals and applications to integral calculus, Mittag-Leffler sums and infinite products.

Multi-valued functions and Riemann surfaces. Applications to integral calculus.

Euler gamma function and Riemann zeta function.

Elliptic functions and Weierstrass P function.

***READING LIST***

T.W. Gamelin, *Complex Analysis,* Springer, 2001.

L.V. Ahlfors, *Complex Analysis,* McGraw-Hill, 1979.

M.R. Spiegel, *Complex Variables,* McGraw-Hill, 2009.

***TEACHING METHOD***

Lectures.

***ASSESSMENT METHOD AND CRITERIA***

Interview. The interview is designed to ascertain the student's assimilation of the concepts taught during the course, and it will focus on the student's discussion/explanation of several course topics. The grading of the interview will take into account: the accuracy of the responses, their logical and methodical rigour, and the effectiveness of the explanation.

Given the importance of the "applications" part of the course, the interview will be preceded by a written test in which the student will be required to solve several exercises in relation to the course programme. The grading of this preliminary test will take into account the accuracy of the results and the procedures used to obtain them.

***NOTES AND PREREQUISITES***

Students should possess a basic knowledge of real analysis and complex numbers.

S*tudent reception.*

Prof. Giuseppe Nardelli receive students after the lectures in his office.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG or on the Faculty notice board.