Universidad Zaragoza

Academic Year/course: 2023/24

27014 - Complex Analysis

Syllabus Information

Academic year: 2023/24
Subject: 27014 - Complex Analysis
Faculty / School: 100 - Facultad de Ciencias
Degree: 453 - Degree in Mathematics
ECTS: 9.0
Year: 3
Semester: Annual
Subject type: Compulsory
Module:

1. General information

The objectives and the approach of the subject respond to its mandatory nature within the Degree of Mathematics. The subject it covers is present in any branch of mathematics and in all natural and social sciences, hence its great importance, both theoretical and applied.

A good part of the course will deal with understanding the similarities and differences of the subject with the real analysis of one and several variables. Applications to the computation of relevant series and improper integrals are also provided.

The approaches and objectives of this module are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda; the learning activities could contribute to some extent to the achievement of the goals 4 (quality education), 5 (gender equality), 8 (decent work and economic growth), and 10 (reducing inequality).

2. Learning results

- Know, understand and learn the definition, first properties and basic theory of holomorphic or analytic functions, meromorphic functions, as well as the basics in complex integration and local Cauchy's theory.
- Comprehend and handle power series and Laurent series, and their convergence conditions.
- Compute residues and some of its applications.
- Know the geometric and analytic aspects of conformal representation and possible applications.

3. Syllabus

I. First term.
   1. Holomorphic functions. Cauchy-Riemann conditions. Harmonic functions.
   2. Analytic functions. Power series. Elementary functions.
   3. Complex integration. Cauchy local theory.

II. Second term.
   4. Cauchy global theory. Cycles and homology. Simple connection.
   5. Zeroes and singularities. Meromorphic functions. Laurent expansions.
   6. Residue theorem and applications.
   7. Conformal mappings.

4. Academic activities

Master classes: 60 hours.
Problem solving: 30 hours.
Study: 124 hours.
Assessment tests: 11 hours.

5. Assessment system

The assessment of the course is divided in two terms. In order to pass the course each of both terms must be passed. With this requisite, the final mark will be the mean of the marks in both terms.

In each term, several continuous evaluation examinations will take place during some lecture hours, and a long exam in the official assesment calls.

The estimated number of continuous evaluation examinations will be one in each term, although this number could vary if the circumstances so require. The total weight of the marks in these continuous evaluation examinations will be 20 per cent. Such continuous evaluation examinations will be fundamentally theoretical and will consist in the presentetation of some topics explained during the course.

In the first term there will also be a long exam in the first exam period of the course, giving the student the possibility to pass the first term in this exams period.

Those students who have not passed some of the terms will take a long exam on the corresponding term in the official assesment calls. The mark of a passed term will be kept through the whole academic year.

According to the University regulations, the students can refuse the aforementioned system and take only a global test in the official exam periods.