Instructor   Amites Sarkar

Text   Complex Analysis for Mathematics and Engineering
                John H. Mathews and Russell W. Howell

Course content

Complex analysis is one of the great theories of mathematics. The goal of this course will be the classic sequence of results which begins with Cauchy's integral theorem and leads to the residue theorem. We will spend the first half of the course on preliminaries, which are of substantial interest and importance in their own right.

Final   Thursday 1 August 2–4 pm

Grading

There will be four homework sets, which will be assigned each Wednesday (starting 26 June), and collected the following Wednesday. These will each be worth 15% of the overall grade. The final will be worth the remaining 40%.

Office hours

My office hours are 4–5 pm on Mondays, Tuesdays, Wednesdays and Thursdays, in 216 Bond Hall. My phone number is 650 7569 and my e-mail is amites.sarkar@wwu.edu

Course Objectives

The successful student will demonstrate:

1. Mastery of the algebra of complex numbers, including powers and roots.

2. Understanding of the geometry of the complex plane, using both rectangular and polar coordinates, and the connection between polar coordinates and the complex exponential function.

3. Familiarity with elementary functions of a complex variable and their properties. These include polynomials, rational functions, the complex exponential and logarithm, and the trigonometric functions.

4. Understanding of the basic theory of analytic functions. This includes the differentiation of functions of a complex variable, the Cauchy-Riemann equations, and the connection between analytic functions and harmonic functions.

5. Understanding of the theory of integration of functions of a complex variable.

6. Knowledge of Cauchy's integral formula, its consequences, and its use.

7. The ability to use power series representations for analytic functions and Laurent series representations for functions of a complex variable with isolated singularities.

8. Knowledge of the residue theorem and the ability to use it in the calculation of real and complex integrals.

Relation to Overall Program Goals

Among other things, this course will (i) enhance your problem-solving skills; (ii) help you recognize that a problem can have different useful representations (graphical, numerical, or symbolic); (iii) increase your appreciation of the role of mathematics in the sciences and the real world; (iv) inform you about the historical context of the area of mathematics studied.