

**MATHEMATICS 3111**  
**APPLIED COMPLEX ANALYSIS**

The theory of functions of a complex variable, for brevity called *complex variables*, is one of the most beautiful as well as useful branches of mathematics. Although originating in an atmosphere of mystery, suspicion and distrust, as evidenced by the terms *imaginary* and *complex* now standard in the literature, it was finally placed on a sound foundation in the 19th century through the efforts of Cauchy, Riemann, Weierstrass, Gauss and other great mathematicians.

Today, this subject is recognized as an essential part of the mathematical background of engineers, physicists, mathematicians and other scientists. This course gives sufficient stress to the mathematical theory but its main goal is to show the tremendous value of complex analysis in the solution of problems of heat flow, potential theory, fluid mechanics, electrostatics and aerodynamics.

An important problem in fluid flow is that of determining the flow pattern of a fluid initially moving with uniform velocity into which an obstacle has been placed. Using complex analysis, we can describe the flow pattern around variously shaped airfoils and thus describe, for instance, the motion of an airplane in flight.

**Text.** The instructor will generally use the text for the prerequisite course MATH 3210. The student will then know all the material in a book approximately 300 pages long and, of course, will not need to purchase another book. A likely text is *Complex Variables and Applications*, by R. V. Churchill and J. W. Brown (McGraw-Hill Publishing Company).

**Marks.** Usually 50% is assigned to a comprehensive final examination, 35% to a one-hour midterm test and 15% to assignments.

**Calendar description.** **3111 Applied Complex Analysis** examines mapping by elementary functions, conformal mapping, applications of conformal mapping, Schwartz-Christoffel transformation, Poisson integral formula, poles and zeros, Laplace transforms and stability of systems, analytic continuation. Prerequisite: Mathematics 3210.

**Offered.** Winter