

Math 555 Outline

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Prerequisites. Advanced Calculus (partial derivatives, Green's Theorem, uniform convergence and uniform continuity). It is assumed that students have encountered Fourier series and Fourier integrals. Topics will be briefly recalled when used. Math 555 is an opportunity to deepen understanding of advanced calculus.

Text. Churchill and Brown, *Complex Variables and Applications*. This book has many editions and students could likely use almost any of them. A substantial number of homework problems will be taken from the newest edition. It will be on reserve at the library and available in my office.

Audience. Mathematics, science, and engineering undergraduates and graduate students.

Goals. This course is an introduction to the theory of functions of a complex variable *with special attention to applications in science and engineering*. In addition to the presentation of the often amazing fundamental principles, the importance and utility of these principles in applications is emphasized. The usual applications to the evaluation of definite integrals and to the solutions of boundary value problems associated to solving boundary value problems for Laplace's equation arising in fluid mechanics, heat conductivity and electrostatics will be presented. The surprising and rich interactions with Fourier analysis will be presented in supplements to the text. For example, Shannon's Sampling Theorem. Students will be expected to learn to use the methods of Complex analysis with facility. Proofs will be presented and complete. Students will not be expected to reproduce the harder proofs. That is the province of Math 596.

Content. Chapters 1-10 of the classic text of Churchill-Brown form the core of the course. Supplementary materials from 555 in 2001 can be consulted on my web page under the rubric "Course Materials". The materials are in chronological order so you'll need to scroll pretty far down.

Grading. Grades are based on Homework, Midterm Exam, and a Final Exam. The relative weighting will depend on the availability of graders. If there is good grader support, homeworks will count more.