Course Announcement

Spring 2009

MATH 630 - Complex Variables I

Complex analysis is a necessary ingredient in education of a modern mathematician as well as a powerful tool for physicists and engineers. Many problems in algebra, analysis and their applications, formulated originally in terms of real variables, either could not be solved or have too complicated solution without extension to the setting of complex variables.

This one-term course is meant for graduate students majoring in mathematics, engineering or one of physical sciences, which have different backgrounds, however take common interest in both theoretical and applied aspects of complex analysis. The course covers:

- geometry and topology of regions and curves in the complex plane;
- basic topics of the theory of analytic functions of one variable (the Cauchy–Riemann equations, integration, power series expansions, the Cauchy theorem, the maximum modulus principle, etc.);
- conformal mappings and their applications in physics;
- analytic continuation;
- residues;
- Laplace transformation and its application to ordinary differential equations;
- applications of complex analysis to boundary value problems in mathematical physics (optional).

The course is based on the book by James W. Brown and Ruel V. Churchill, Complex Variables and Applications, 8th edition, McGraw-Hill, 2008. An additional literature will be recommended later on.

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