Theory of Complex Variables

MTH 5130–E1, Fall 2011, TR 5:00 - 6:15pm

George M. Skurla Hall 106

Professor Dr. Ugur G. Abdulla

Office Hours: S311, TR 4-5pm and by appointment

COURSE DESCRIPTION

Complex Analysis, or Theory of Functions of a Complex Variable is one of the outstanding accomplishments of classical mathematics. Its foundations emerged in eighteenth and nineteenth centuries due to investigations of Euler, d'Alembert, Cauchy, Riemann and Weierstrass. The methods of complex analysis are widely applicable in many branches of mathematics, ranging from number theory to partial differential equations, and physics, including fluid dynamics, elasticity theory and electrodynamics.

Course presents the fundamental ideas and methods of the theory of functions of a complex variable. It is intended for graduate students of both science and engineering majors to learn the fascinating theory in depth. At the same time a great importance will be given to develpoment of skills in the practical applications of the methods covered.

TEXTBOOK

• 'Theory of Functions of a Complex Variable' by A.I.Markushevich, Vol.1-3, AMS Chelsea Publishing, 2005.

• 'Functions of a Complex Variable and some of their Applications' by B.A. Fuchs and B.V. Shabat;

GRADING POLICY

Homework will be assigned periodically. Your performance will contribute to 20% of your final grade.

There will be two midterm exams and a final exam. Midterm exams will be administered during class time and will be announced at least one week in advance. Your performance in each midterm exam will contribute to 25% of your final grade.

The two hour final exam is comprehensive. It will be administered on the date below, in the same classroom. Final exam is cumulative. Your performance in final exam will contribute to 30% of your final grade.

Total score of 60 will be available from homework and quizzes; each midterm exam will be graded in 75's and final will be graded in 90's (i.e., the maximum score is 300). Your final grade will be determined by curving all final scores.

Final Exam: Tuesday, December 13, 6-8pm, George M. Skurla Hall 106.

• **Topics covered: 1.** Complex Number Field.

2. Infinity and Stereographic Projection.

3. Differentiation and Cauchy-Riemann Equations. Analytic Functions

4. Elementary Entire and Meromorphic Functions

5. Integrals of Complex-Valued Functions. Cauchy's Integral Theorem.

6. Power and Laurent Series.

7. The Calculus of Residues and its Applications.

8. Conformal Mapping. Applications of Conformal Mapping.

9. Riemann Surfaces. Analytic Continuation.

10. Appplication of Complex Analysis in Mathematical Physics.