Conformal Mapping

MATH 5399-3 Spring 2016

Course instructor: Dr. Alexander Solynin

MATH 109 MWF 2:00 – 2:50 pm

Office hours: **M**WF 3:00-4:00 pm or by appointment

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TEXT: Your lecture notes.

Complementary text: **Conformal mapping**, Dover Books on Mathematics, 1952, by Zeev Nehari.

- **Course Description:** We will study geometric properties of conformal mappings in the plane and their relations with analytic functions. First, we will study mapping properties of elementary functions and discuss standard procedures on how to construct a mapping from one planar domain onto another. Properties of Möbius transformations also will be discussed in this part. In the second part, we will study Riemann Mapping Theorem and some of its generalizations for simply connected and multiply connected domains. Applications to extremal problems also will be discussed here. Then we will study Schwarz-Christoffel integrals and conformal mappings onto rectilinear and circular polygons. Conformal mappings generated by quadratic differentials also will be mentioned in this part. In the last part, we will discuss mapping properties of hypergeometric and some other special transcendental functions.

This course is designed to complement existing courses of *Complex Variable I* and *Complex Variable II*. It could be a good source of information and problems while preparing for preliminary exam. An undergraduate course of *Complex Analysis* or graduate course in *Complex Variable I* is required.

Learning Outcomes: Upon completion *Conformal Mapping* students will master concepts and theories of conformal mappings of simply connected and multiply connected domains. They will learn mapping properties of elementary functions and mapping properties of some special transcendental functions. They will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.

Methods for Assessment of Learning Outcomes: The expected learning outcomes for the course will be assessed through graded activities and ungraded activities. The graded activities include homework, quizzes, and research projects. The ungraded activities will be used to monitor your progress. A variety of these ungraded assessment techniques may be employed, including problems to be completed during class, direct questioning of students, answering students questions in class, one-minute classroom assessment techniques, and discussions during office hours.

Students with Disabilities: Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Students should present appropriate

verification from AccessTECH. No requirement exists that accommodations be made prior to completion of this approved university procedure.

Absence due to religious observance: The Texas Tech University Catalog states that a student who is absent from classes for the observance of a religious holy day will be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. Notification must be made in writing and delivered in person no later than 15th class day of the semester.

Absence due to officially approved trips: The Texas Tech University Catalog states that the person responsible for a student missing class due to a trip should notify the instructor of the departure and return schedule in advance of the trip. The student may not be penalized and is responsible for the material missed.

Academic Integrity: It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. There will no tolerance for cheating or plagiarism. Texas Tech University policies will be enforced in such cases.

STUDENT EVALUATION:

- Students will work on their research projects related to the theory of Conformal Mappings and present results upon completion.

♦ **Final Exam (Optional!)** **40 pts**
These 40 pts can be used to substitute any other assignments of your choice.

♦ **Final Presentation /Final Project** **60 pts**

- **Midterm Presentation/Midterm Project:** 30 **pts**
- **Homework**: **30 pts**
- **5 min Quizzes**: **30 pts**
- **MAXIMAL TOTAL:** **150 pts**

GRADING PROCEDURE:

A - 90 - 100%

B - 80 - 89%

C - 70 -79%

D - 60 - 69%

F - ≤ 59%

Important Dates:

March 12-20 - Spring Vacation.
March 31 - Final day to drop a course.
March 28 - No Classes.
May 10 - Last Day of classes.

Tuesday, May 17 - 4:30 – 7:00 pm. Final Exam (Examinations will be given in the rooms in which the individual classes have been meeting unless otherwise announced**).**