Geometric Function Theory I

MATH 5399-01   **Spring 2023**
Course instructor: **Dr. Alexander Solynin**
MATH 010   **TT**   **11:00am – 12:20 pm**
Office hours: MW 12:00-2:00 or by appointment
Office: MA 231   **email: alex.solynin@ttu.edu**

TEXT: Your lecture notes.
Complementary text: "Univalent Functions" by P.L. Duren, Springer, New York,1980; "Univalent Functions" by Ch. Pommerenke, Vandenhoeck and Ruprecht, Gottingen 1975.

• Course Description: This is an introductory course on the Geometric Function Theory of one complex variable. We will study mapping properties of analytic functions. In particular, we will study several elementary and transcendental conformal mappings. Then we will discuss Riemann mapping theorem and some of its applications. Among other topics, we will work with quadratic differentials and their relations to solutions of certain ODE's in the complex plane and with several extremal problems related to the classical Schwarz lemma and hyperbolic metric.
An undergraduate course of Complex Variable or graduate Complex Variable I course is required.

Learning Outcomes: Upon completion *Geometric Function Theory I* students will master concepts and theories of conformal mappings and extremal problems for some classes of analytic functions. They will learn properties of some special functions and understand geometric structure of integral curves and corresponding quadratic differentials.
.

 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 analytic functions and conformal mappings in the Complex Plane. They are encouraged to present their results in the class upon completion. The presentation of the Midterm Project can be used to substitute for the Midterm Exam and presentation of the Final Project can be used to substitute for the Final Exam.

♦**Final Exam /Final Project:** **40 pts**

• **Midterm Exam/Midterm Project:** **30 pts**
• **Homework** (Problems and Exercises): **30 pts**
• **MAXIMAL TOTAL:** **100 pts**

GRADING PROCEDURE:

A - **90 - 100%**

B - **80 - 89%**

C - **70 -79%**

D - **60 - 69%**

F - **≤ 59%**

Important Dates:
January 16 - Martin Luther King Jr. Day.
March 11-19 - Spring Vacation.
April 18 - Last day to drop a course.
April 10 - No Classes.
May 2 - Last Day of classes.
Saturday, May 6 at 1:30pm – 4:00 pm. Final Exam (Examinations will be given in the rooms in which the individual classes have been meeting unless otherwise announced**).**