King Fahd University of Petroleum and Minerals Department of Mathematics

Math 445 Syllabus, Term 212 Instructor: Dr. Muhammad Imran Qureshi

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The Course Code and Name: Math 445, Introduction to Complex Variables

The Course Credit Hours: 3-0-3 (Three lecture hours per week.)

Text: Fundamentals of Complex Analysis (Saff & Snider, 3rd ed.).

The Course Objective: The objective of the course is to introduce students to the concepts and fundamental properties of complex analytic functions and applications.

The Course Content: Complex numbers, Analytic functions, Harmonic functions and Harmonic conjugates, Cauchy's theorem and Cauchy integral formulas, Power series, Laurent series, Isolated singularities, Residues, Applications of the residue theorem to real integrals, Conformal transformations.

The Course Prerequisite: Math 101, 102, 201, 202, and 333 (line integrals, Vector fields, Green's theorem)

The Course Learning Outcomes: Upon the completion of the coursework, Students are expected to be able to

1. Explain the geometry of the complex plane
2. State the main properties and examples of analytic functions.
3. Evaluate line integrals using parameterization
4. Compute the Taylor and Laurent expansions of standard functions.
5. Determine the nature of singularities and calculate residues.
6. Use Residue Theorem to evaluate integrals and series.
7. State main properties of conformal mappings.

The Grading Policy: Exam-1 (20%), Exam-II (20 %), Homework (20%), Final (40 %)

Office Hours: Tuesday-Thursday 10.15- 11.30

Attendance Policy: Any student with 9 unexcused absences will be awarded a DN grade. An official excuse from student affairs will be needed, in case of excused absence.

Guidance/Additional Help: The students are welcomed to visit my office to seek guidance on the course material, homework and study habits. To discuss a homework problem, the student must come up with the partial solution/attempt.

Missing an Exam: If a student misses an Exam due to a legitimate reason (medical emergency etc.), he must present an official excuse as early as possible. The make-up exam will be given within 10 days from the exam date.

Homework:
Section-wise Homework Problems will be posted on the KFUPM Black Board. Students are advised to solve HW problems after the completion of relevant Text section. The only way to *learn* the course material is to *attempt* the HW problems with self-effort. The homework assignments **will be collected** on the due date **in the class.** Late homework will be accepted with a **25% reduction** of points **for each day of delay**. If you plan to miss the class, drop the homework in my office prior to the due date.

Copying/Cheating
Students are advised to refrain from copying the HW solution or cheating in the exams. Copying/cheating cases will be dealt with strictly according to the KFUPM policy