King Fahd University of Petroleum and Minerals

Department of Mathematics

Math 445 Syllabus, Term 231

Instructor: Dr. J. Joo (jcjoo@kfupm.edu.sa)

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: HW (40%), Midterm (30%), Final (30%)