DE LA SALLE UNIVERSITY – MANILA
COLLEGE OF SCIENCE
Mathematics Department

SYLLABUS

COURSE CODE	MTH643M/D
COURSE TITLE	Modern Complex Analysis 1
CLASS DAY & TIME	
ROOM	
NAME OF FACULTY	
COURSE CREDIT	3 units
CONTACT NO. (DEPT)	(02) 536-0270, (02) 524-4611 loc. 420/413
TERM/SCHOOL YEAR	

COURSE DESCRIPTION

This is a course on complex numbers and complex plane, Cauchy-Riemann equations, Riemann surface and conformal mappings, infinite series, complex integration, singularities, integration, Cauchy integral theory, singularities, residue theory.

COURSE OBJECTIVES

The students will:

1. present complex numbers in various forms;
2. perform computations involving the elementary functions of a complex variable;
3. evaluate limits and determine the continuity or discontinuity of functions of a complex variable;
4. prove statements about functions of a complex variable that are consequences of the basic theorems in complex analysis;
5. apply the Cauchy Integral Theorems in the evaluation of certain integrals;
6. determine the region of convergence of a given power series;
7. state and apply the Residue Theorem in the evaluation of certain integrals.
8. Exhibit values that will allow the students to:
    - develop in the student interest and patience in reading and understanding, by himself/herself, printed materials in complex analysis.
    - develop the values of diligence, persistence and determination to succeed in solving the exercise problems presented in the course.
    - realize that the method of analytical thinking learned and developed while studying complex analysis my be adapted to real-life situations when the need to analyze realities to solve a concrete (nonmathematical) problem arises.

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting/ Hours
I. THE COMPLEX NUMBER FIELD	Lecture Group Discussion	6 Hours

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting/ Hours
1.1 Complex Numbers as Ordered Pairs 1.2 The Rectangular Form of a Complex Number 1.3 The Polar and Exponential Forms 1.4 Powers and Roots of Complex Numbers 1.5 The Extended Complex Plane, Stereographic Projection	Problem Set	
II. FUNCTIONS OF A COMPLEX VARIABLE 2.1 Functions as Mappings 2.2 Limits of Functions 2.3 Continuous Functions 2.4 Differentiation of Functions 2.5 Cauchy-Riemann Conditions for Analyticity 2.6 Harmonic Functions	Lecture Group Discussion Problem Set	6 Hours
LONG TEST 1		1.5 Hours
III. THE ELEMENTARY FUNCTIONS AND THEIR PROPERTIES 3.1 The Exponential Function 3.2 The Trigonometric Functions 3.3 The Hyperbolic Functions 3.4 Inverse Relations/Functions 3.5 Multiple-valued Functions	Lecture Group Discussion Problem Set	6 Hours
IV. INTEGRALS 4.1 Definite Integrals 4.2 Arcs and Contours 4.3 Contour Integrals 4.4 Antiderivatives & Independence of Paths	Lecture Group Discussion Problem Set	6 Hour
LONG TEST 2		1.5 Hours
V. SEQUENCES AND SERIES 5.1 Definitions and General Properties 5.2 Power Series, Region of Convergence 5.3 Functions as Power Series – Taylor's Series, Laurent's Series 5.4 Uniform Convergence 5.5 Algebraic Operation on Series 5.6 Differentiation and Integration of Power Series	Lecture Group Discussion Problem Set	6 Hour
VI. THEORY OF RESIDUES 6.1 Definitions of Residue and Poles 6.2 The Residue Theorem 6.3 Residue at Poles 6.4 Improper Integrals	Lecture Group Discussion Problem Set	6 Hours
FINAL EXAMINATION		3 Hours

*OPTIONAL

TEACHING STRATEGIES/METHODOLOGY

To achieve the course objectives, a combination of lecture, group discussion and solutions of problem sets will be used.

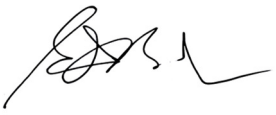
COURSE REQUIREMENTS

- Long Tests 50%
- Final Examination 30%
- Problem Sets 20%

SOURCES

- Ahlfors, Lars. *Complex Analysis*, McGraw-Hill Education, 1979.
- Brown, James. *Complex Variables and Applications*, McGraw-Hill Education (Asia), 2009.
- Churchill, Ruel Vance. *Complex Variables and Applications*, McGraw-Hill NewYork, 1984
- Gherardell, F. *Complex Analysis*, Springer Berling Heidelberg, 2011.
- Lang, Serge. *Complex Analysis*, Springer, New York, 1999.
- Pennisi, Louis. *Elements of Complex Variables*, Holt, Rinehart and Winston, 1976.

Noted by:



DR. ISAGANI B. JOS
Chair, Mathematics Department

DR. JOSE SANTOS R. CARANDANG VI
Dean, College of Science