King Fahd University of Petroleum and Minerals
Department of Mathematics
SYLLABUS, Semester I, 2022-2023(221)
(Dr. Izhar Ahmad)

Course #: Math 533
Title: Complex Variables I
Textbook: Complex Analysis by Lars V. Ahlfors (Third Edition)

Course description: Analytic functions. Cauchy's theorem and consequences. Singularities and expansion theorems. Maximum modulus principle. Residue theorem and its application. Compactness and convergence in space of analytic and meromorphic functions. Elementary conformal mappings.
Objective: This course aims to strengthen the introductory concepts of complex analysis taken in the undergraduate course.
Course Learning Outcomes:

Upon successful completion of this course, a student should be able to:
1. Discuss basic concepts of complex analysis

2. Prove basic results in complex analysis
3. Apply the methods of complex analysis to evaluate definite integrals and infinite series
4. Explain how different theorems and concepts are connected and deduce relationships from the given theorems.

Wk		Chapters	Material
1	SAug.28-Sept 01	Chapter 1,2	The Algebra of Complex Numbers. Concept of Analytic Functions: Limits Continuity-Analyticity
2	Sept 04-08	Chapter 2	The Cauchy-Riemann Equations, Harmonic functions
3	Sept 11-15		The Exponential, Trigonometric and Logarithmic Functions.
4	Sept 18-21 Sept 22 (National Day Holiday)	Chapter 4	Fundamental Theorems
5	Sept 25-29		Cauchy's Integral Formula
6	Oct 02-06		Local Properties of Analytical Functions
7	Oct 09- 13		General Form of Cauchy' Theorem
8	Oct 16-20		Calculus of Residues
9-10	Oct 23-Nov.03		Harmonic Functions
11	Nov 06-10	Chapter 5	Power Series Expansions
12	Nov 13-17		Partial Fraction and Factorization
13	Nov 20-24	Chapter 3	Linear Transformations
14	Dec 08-15	Chapter 6	Conformal Mapping. Dirichlet's Problem
15-16	Dec11-18	Presentations	

Evaluation Policy: Presentation and Assignments: 25%, Midterm Exams: 30%, Final 45%.
References
1) Ponnusamy and Silvermann, *Complex Variables with applications*, Birkhauser 2006
2) E. Freitag, R. Busam, *Complex analysis*, Universitext, 2nd edition, 2009, Springer
http://www.springerlink.com/content/978-3-540-93982-5/
3) R.E. Greene, S.G. Krantz, *Function Theory of One Complex Variable*, AMS, 2001.
4) Elias M. Stein and R. Shakarchi, *Complex Analysis*, Princeton University Press, 2003