King Fahd University of Petroleum and Minerals
Department of Mathematics
SYLLABUS
Semester I, 2021-2022 (Term 211)
(Dr. Adel Khalfallah)

Course: **Math 533**
Title: **Complex Variables I**
Textbook: *Complex Analysis* by L. Ahlfors (Third Edition)
                 Functions of one complex variable, by J, Conway

Objective: This course aims to strengthen the introductory concepts of complex analysis taken in the undergraduate course. By the end of this course, the student should have well understood the concepts of Analyticity of functions, complex integration, and get an idea about the conformal mappings.

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.

Wk	Chapters	Material
1	Chapter 1,2	The Algebra of Complex Numbers. Concept of Analytic Functions: Limits – Continuity – Analyticity.
2	Chapter 2	The Cauchy-Riemann Equations, Harmonic functions
3		The Exponential, Trigonometric and Logarithmic Functions.
4	Chapter 4	Fundamental Theorems
5		Cauchy's Integral Formula
6		Local Properties of Analytical Functions
7		General Form of Cauchy's Theorem
8		Calculus of Residues
9		Harmonic Functions

10	Chapter 5	Power Series Expansions
11		Partial Fraction and Factorization
12-13	Chapter 6	Conformal Mapping. Dirichlet's Problem
14-15	Presentations	

<u>Evaluation Policy:</u> Presentation and Assignments: <mark>30%</mark>, Midterm Exam: <mark>30%</mark>, Final <mark>40%</mark>.

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