

King Fahd University of Petroleum and Minerals
 Department of Mathematics & Statistics
SYLLABUS
 Semester I, 2019-2020 (191)
 (Dr. Izhar Ahmed)

Course #: Math 533

Title: Complex Variables I

Textbook: Complex Analysis by Lars V. Ahlfors (Third Edition)

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	Date	Chapters	Material
1	Sept 01-05	Chapter 1,2	The Algebra of Complex Numbers. Concept of Analytic Functions: Limits Continuity-Analyticity
2	Sept 08-12	Chapter 2	The Cauchy-Riemann Equations, Harmonic functions
3	Sept 15-19		The Exponential, Trigonometric and Logarithmic Functions.
4	Sept 22 & 24-26 Sept 23 (National Day Holiday)	Chapter 4	Fundamental Theorems
5	Sept 29-30 & Oct. 01-03		Cauchy's Integral Formula
6	Oct 06-10		Local Properties of Analytical Functions
7	Oct 13- 17		General Form of Cauchy' Theorem
8	Oct 20-24		Calculus of Residues
9	Oct 27-31		Harmonic Functions
10	Nov 03-07	Chapter 5	Power Series Expansions
11	Nov 10-14		Partial Fraction and Factorization
12-13	Nov 17-28	Chapter 6	Conformal Mapping. Dirichlet's Problem
14-15	Dec 01- 12	Presentations	

Evaluation Policy: Presentation and Assignments: 15%, Midterm Exams: 40%, 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