King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
SYLLABUS
Semester I, 2016-2017 (161)
(Dr. Adel Khalfallah)

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	Sep. 18-21	Chapter 1,2	The Algebra of Complex Numbers. Concept of Analytic Functions: Limits – Continuity – Analyticity.
2	Sep. 25-Sep.29	Chapter 2	The Cauchy-Riemann Equations, Harmonic functions
3	Oct. 2-6		The Exponential, Trigonometric and Logarithmic Functions.
4	Oct. 9-13	Chapter 4	Fundamental Theorems
5	Oct. 16-20		Cauchy's Integral Formula
6	Oct. 23-27		Local Properties of Analytical Functions
7	Oct. 30-Nov 3		General Form of Cauchy's Theorem
8	Nov. 6-10		Calculus of Residues
9	Nov 20- 24		Harmonic Functions
10	Nov. 27-Dec. 1	Chapter 5	Power Series Expansions
11	Dec. 4-8		Partial Fraction and Factorization
12-13	Dec. 11- 22	Chapter 6	Conformal Mapping. Dirichlet's Problem
14-15	Dec. 25- Jan. 5	Presentations	
Final Exam: January 11, 2017 (45%)			

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