

King Fahd University of Petroleum and Minerals
 Department of Mathematics & Statistics
SYLLABUS
 Semester I, 2014-2015 (141)
 (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	Aug. 31-Sep 04	Chapter 1,2	The Algebra of Complex Numbers. Concept of Analytic Functions: Limits – Continuity – Analyticity.
2	Sep. 07-11	Chapter 2	The Cauchy-Riemann Equations, Harmonic functions
3	Sep. 14-18		The Exponential, Trigonometric and Logarithmic Functions.
4	Sep. 21-25	Chapter 4	Fundamental Theorems
5	Oct. 12-16		Cauchy's Integral Formula
6	Oct. 19-23		Local Properties of Analytical Functions
7	Oct. 26-30		General Form of Cauchy's Theorem
8	Nov. 2-6		Calculus of Residues
9	Nov. 9-13		Harmonic Functions
10	Nov. 16-20	Chapter 5	Power Series Expansions
11	Nov. 23-27		Partial Fraction and Factorization
12-13	Nov. 30- Dec 11	Chapter 6	Conformal Mapping. Dirichlet's Problem
14-15	Dec. 14-28	Presentations	
Final Exam: December 31, 2014 (40%)			

Evaluation Policy: Presentation and Assignments: 20%, Midterm Exam: 35%, Final 45%.

Important Dates

Sep. 11	Last day for dropping course(s) without permanent record
Oct. 23	Last day for dropping course(s) with grade of "W" thru http://regweb.kfupm.edu.sa
Nov. 20	Last day for withdrawal from all courses with grade of "W" thru the Univ. Registrar Office
Dec. 18	Last day for withdrawal from all courses with grade of "WP/WF" thru the University Registrar Office

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) T.W. Gamelin, *Complex Analysis*, Springer, 2001.
- 4) R.E. Greene, S.G. Krantz, *Function Theory of One Complex Variable*, AMS, 2001.
- 5) B.P. Palka, *An Introduction to Complex Function Theory*, Springer, 1991.
- 6) Elias M. Stein and R. Shakarchi, *Complex Analysis*, Princeton University Press, 2003