King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 430 – Syllabus
2013-2014 (132)
Coordinator: Dr. Adel Khalfallah

Title:	Introduction to Complex Variables
Credit:	3 – 0 – 3
Textbook:	E.B. Saff, A.D. Snider, *Fundamentals of Complex Analysis* (3rd ed.), Prentice Hall, 2003.
Prerequisites:	Familiarity with the concepts from Math 201 (Calculus III) is very helpful: ***convergence criteria*** for sequences and series, ***polar coordinates*** in R^2, ***directional derivatives*** of functions in two real variables. Students are ***strongly encouraged*** to review these notions.
Objectives:	Upon completing this course students are expected, ***at least***, to be able to: (1) Perform basic arithmetic with complex numbers. (2) Use CR equations to test for analyticity and compute a derivative. (3) Work with standard complex functions (mapping properties, derivatives). (4) Compute contour integrals using definition and Cauchy integral theorems. (5) Compute Taylor and Laurent series expansions of functions. (6) Apply the Residue Theorem, especially for evaluating real definite integrals.
Grading policy:	**Class-Work : 15% (HW +Project(s))** **Exam 1 : 25%** **Exam 2 : 25%** **Final Exam : 35%**
Homework:	The only way to *learn* mathematics is *to do* mathematics. The homework assignments ***will be collected*** once a week (on Sunday) ***in the class***.
Attendance:	A **DN *grade*** will be given according to the regulations written in the Undergraduate Bulletin (pp. 38)**.**

Timetable

Week	Date	Section	Topics	Exercises
1	Jan 26 - 30	1.1 1.2 1.3	The algebra of complex numbers Representation of complex numbers Vectors and Polar Forms	3, 4, 5ac, 16bd, 20ad, 21, 30 1, 5, 7cdfg, 11, 16 1b, 3, 5, 7b,d,h, 8, 10b, 13,19
2	Feb 2 - 6	1.4 1.5 1.6	The Complex Exponential Powers and Roots Planar Sets	4ac, 7, 11, 12b, 20ab, 23a 3, 4b, 6c, 7b, 10, 11, 16 2-8, 11, 15-17, 19, 20
3	Feb 9 - 13	1.7 2.1 2.2	The Riemann Sphere Functions of a Complex Variable Limits and Continuity	1bc, 2, 5a-c, 6, 9 4, 5, 7ab, 8ab, 10, 13 1, 2, 4, 5, 7, 11, 12
4	Feb 16 - 20	2.3 2.4 2.5	Analyticity The Cauchy-Riemann Equations Harmonic Functions	2, 3, 4c, 6, 7, 9ac, 11 2, 5, 6 3acef, 6, 9, 12 14, 17ab
5	Feb 23- 27	3.1 3.2	Polynomial & Rational Functions Exp. & Trig. Functions.	3ac, 5ab, 7, 11ac, 13b, 17 2, 3, 5bdf, 9acd, 11, 17, 18b
			Major Exam I (25%)	
6	March 2 - 6	3.3 3.5	The Logarithmic Function. Power and Inverse Trig. Functions	3, 4, 6, 7, 11, 14, 19 1ae, 3ab, 4, 5, 8, 12, 15ab, 16
7	March 9 - 13	4.1 4.2	Contours Contour Integrals	1bd, 3, 5, 8, 13abd 3abd, 5, 7, 11, 14ac
8	March 16 - 20	4.3 4.4	Independence of Path Cauchy's Integral Theorem	2, 4, 5, 7, 10 6, 7a, 9 all, 10c, 13, 17
	March 23-27		**Midterm Vacation**	
9	March 30 – Apr 3	4.5 4.6	Cauchy Formula & Consequences Bounds for Higher Derivatives	4, 5, 8, 11, 13, 16 2, 3, 4, 7, 8, 10, 16
10	Apr 6 – 10	5.1 5.4 5.2	Sequences and Series Convergence Taylor Sequences	1cdf, 4, 5, 9, 11b,c,d, 14 1, 3bef, 5acd, 9, 10 1, 3, 4, 5, 11, 13
			Major Exam II (25%)	
11	Apr 13 – 17	5.3 5.5	Power Sequences Laurent Series	1, 2, 3adfg, 6, 10, 12, 15 1, 2, 5, 9
12	Apr 20 – 24	5.6 5.7 6.1	Zeros and Singularities The Point at Infinity The Residue Theorem	1, 3ab, 4, 7, 12 1a,e,h, 3c, 5, 6, 7 1, 2, 3ceg
13	Apr 27– May 1	6.3 6.2 6.4	Improper Integrals over R Trig. integrals over $[0,2\pi]$ Improper Integrals with Trig. Fcts.	1, 2, 7, 9, 10 1, 4, 7, 11 1, 5, 6, 10
14	May 4 – 8	6.7	Rouche's Theorem	1c-e, 3, 7, 8, 10, 13, 18
15	May 11 – 15		Review of the material	
			Final Exam (35%)	