8701 (Complex Analysis) Syllabus Part I – Fall 2013

Rough Outline: Our goal is to complete the first 5 chapters of Ahlfors' book, following his outline rather faithfully. We will conclude with several additional digressions into applications of the Riemann zeta function (prime number theorem, generalization to Dirichlet L-functions, Riemann hypothesis, etc.) and come back to the Riemann Mapping Theorem (if time permits). This is probably too ambitious, as last year we made it through most of Chapter 5, but not back to the mapping theorem.

This syllabus covers the time up to the first midterm.

I. Fundamentals of Complex Differentiable Functions

1.	W	Sept. 4	Outline of course, algebra of complex numbers (A 1.1)
2.	F	Sept. 6	Geometry of complex numbers, roots of unity, stereographic projection (A 1.2)
	M	Sept. 9	No Class
3.	W	Sept. 11	Differentiable functions, Cauchy-Riemann equations (A 2.1, pp. 21–28)
4.	F	Sept. 13	Examples: polynomials, rational functions (A 2.1 pp. 28–33)
5.	M	Sept. 16	Power series, Convergence theorems (A 2.2, pp. 33–42)
6.	W	Sept. 18	Exponential and trig functions (A 2.3 pp. 42–45)
7.	F	Sept. 20	Logarithms, multivalued functions, intro to Riemann surfaces (A 2.3.4 pp. 46–47)
8.	M	Sept. 23	Fundamentals of metric spaces (A 3.1.1-3.1.4, pp 49–62)
9.	W	Sept. 25	Continuous functions, topological spaces (A 3.1.5, 3.1.6, pp. 63–67)

II. Complex Integration

10.	F	Sept. 27	Line integrals (A 4.1.1-4.1.3, pp. 101–108)
11.	M	Sept. 30	Cauchy's theorem on rectangles (A 4.1.4-4.1.4, pp. 109–112)
12.	W	Oct. 2	Cauchy's theorem on disks (A 4.1.5, pp. 112–114)
13.	F	Oct. 4	Cauchy's integral formula (A 4.2.1,4.2.2, pp. 114–120)
14.	M	Oct. 7	Higher derivatives, Liouville's theorem (A 4.2.3, pp. 120–123)
15.	W	Oct. 9	Taylor's theorem (A 4.3.1, pp. 124–126)
16.	F	Oct. 11	Applications of Taylor's theorem, Review for Midterm (A 4.3.2, 126–129)
	M	Oct. 14	Student Review for Exam I
	W	Oct. 16	MIDTERM EXAM I

A = Ahlfors' Complex Analysis (Another good source: Conway's "Functions of One Complex Variable I")