Syllabus

Textbook: Saff - Snider: Fundamentals of Complex Analysis with Applicaitons.

This is an approximate syllabus. Topics may be omitted or added. For details on what you are expected to be able to do on exams, see the exams page.

Part I. Complex numbers and analytic functions.

(11 lectures and 3 homework assignments)

- **1.1** The algebra of complex numbers
- **1.2** Point representation of complex numbers
- **1.3** Vectors and polar forms
- **1.4** The complex exponential
- **1.5** Powers and roots
- **1.6** Planar sets
- **1.7** The Riemann sphere
- **2.1** Functions of a complex variable
- **2.2** Limits and continuity
- **2.3** Analyticity
- **2.4** The Cauchy-Riemann equations
- **2.5** Harmonic functions

Part II. Elementary functions and complex integration.

(13 lectures and 4 homework assignments)

- **3.1** Polynomials and rational functions
- **3.2** Exponential, trigonometric and hyperbolic functions
- **3.3** The logarithm
- **3.5** Complex powers and inverse trigonometric functions
- **4.1** Contours
- **4.2** Contour integrals
- **4.3** Independence of path
- **4.4** Cauchy's integral theorem
- **4.5** Cauchy's integral formula
- **4.6** Bounds for analytic functions

Part III. Series expansions and residue theory.

(11 lectures and 3 homework assignments)

- **5.1** Sequences and series

5.2 Taylor series
5.3 Power series
5.4 Convergence
5.5 Laurent series
5.6 Zeros and singularities
5.7 The point at infinity
6.1 The residue theorem
6.2 Trigonometric integrals
6.3 Improper integrals
6.7 Argument principle
7.3 Moebius transformations
7.4 Moebius transformations, ctd.

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back