MATH 417 COMPLEX ANALYSIS WITH APPLICATIONS

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Welcome to Math 417! This course is an introduction to Complex Analysis. Complex Analysis is one of the great subjects of modern mathematics and an invaluable tool in physics and engineering. In this course we will explore the basic properties of complex analytic functions and conformal maps.

Course webpage: http://www.math.uic.edu/~coskun/nmath417.html

Venue: Douglas Hall 104

Office hours: M 11-12, W 9-10, 11-12 and by appointment.

Text: Complex variables and applications by J.W. Brown and R.V.Churchill, McGraw Hill, 2004, Seventh Edition. All page numbers below refer to this book.

Prerequisites: A solid background in basic analysis including the concepts of limits, continuity, differentiability, Riemann integrals and line integrals. I will assume that you are comfortable with writing proofs.

Requirements: There will be weekly homework, two mid-terms and a final. The midterms and the homework will count for 20 % of your grade each. The final exam will account for 40 % of your grade. In order to pass the course, you must pass the final exam. The homeworks will be due Wednesdays in the beginning of class. No late homework will be accepted. You may collaborate on the homework problems, but you must write your own solutions and properly acknowledge any help you receive from others.

Topics: The following is a tentative list of topics that will be covered in the course. Please read the suggested pages in the text book before class.

Aug 25	Complex Numbers	p. 1-14
Aug 27	Exponentials and roots	p. 14-25
Aug 29	Examples	p. 25-32
Sep 1	No class: Labor Day	
Sep 3	Functions of a complex variable	p. 33-42
Sep 5	Limits	p. 42-51
Sep 8	Continuity and derivatives	p. 52-60
Sep 10	Cauchy-Riemann Equations	p. 60-65
Sep 12	Analytic functions	p. 65-75
Sep 15	Harmonic functions	p. 75-85
Sep 17	The exponential and the logarithm	p. 87-97
Sep 19	Trigonometric functions	p. 97-108
Sep 22	Integrals	p. 111-116

Sep 24	Contour Integrals	p. 116-124
Sep 26	Contour Integrals	p. 124-134
Sep 29	Cauchy-Goursat Theorem	p. 138-149
Oct 1	Simply connected domains	p. 149-157
Oct 3	Cauchy Integral formula	p. 157-164
Oct 6	Liouville's Theorem and the Fundamental Theorem of Algebra	p. 165-167
Oct 8	Maximum Modulus Principle	p. 167-173
Oct 10	Take-home Midterm I	
Oct 13	Convergence of sequences	p. 175-182
Oct 15	Taylor Series	p. 182-190
Oct 17	Laurent Series	p. 190-200
Oct 20	Absolute and uniform convergence	p. 200-206
Oct 22	Power Series	p. 206-215
Oct 24	Power Series	p. 215-220
Oct 27	Residues and poles	p. 221-225
Oct 29	Cauchy's Residue Theorem	p. 225-230
Oct 31	Isolated Singularities	p. 231- 239
Nov 3	Zeros of analytic functions	p. 239-247
Nov 5	Singular points	p. 247-250
Nov 7	Residue calculus	p. 251-280
Nov 10	Residue calculus	p. 251-280
Nov 12	Residue calculus	p. 251-280
Nov 14	Take-home Midterm II	
Nov 17	Argument principle	p. 280-290
Nov 19	Linear Fractional Transformations	p. 299-318
Nov 21	Linear Fractional Transformations	p. 299-318
Nov 24	Linear Fractional Transformations	p. 299-318
Nov 26	Other elementary functions	p. 318-329
Nov 28	No class: Thanksgiving	
Dec 1	Conformal maps	p. 343-350
Dec 3	Conformal maps	p. 350-360
Dec 5	Review	