MATH 417 COMPLEX ANALYSIS WITH APPLICATIONS

İzzet Coşkun, MWF 11:00-11:50 a.m.

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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/math417f19.html

Venue: Lecture Center A 002

Office hours: MWF 9-10 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 takehome mid-terms and a takehome final. The midterms and the homework will each 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. In addition, you are welcome to write a 7-10 page paper on an application of complex analysis to your specialty. This can count as 20 % of your grade. 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 26	Complex Numbers	p. 1-14
Aug 28	Exponentials and roots	p. 14-25
Aug 30	Examples	p. 25-32
Sep 2	No class: Labor Day	
Sep 4	Functions of a complex variable	p. 33-42
Sep 6	Limits	p. 42-51
Sep 9	Continuity and derivatives	p. 52-60
Sep 11	Cauchy-Riemann Equations	p. 60-65
Sep 13	Analytic functions	p. 65-75
Sep 16	Harmonic functions	p. 75-85
Sep 18	The exponential and the logarithm	p. 87-97
Sep 20	Trigonometric functions	p. 97-108
Sep 23	Integrals	p. 111-116

Sep 25	Contour Integrals	p. 116-124
Sep 27	Contour Integrals	p. 124-134
Sep 30	Cauchy-Goursat Theorem	p. 138-149
Oct 2	Simply connected domains	p. 149-157
Oct 4	Cauchy Integral formula	p. 157-164
Oct 7	Liouville's Theorem and the Fundamental Theorem of Algebra	p. 165-167
Oct 9	Maximum Modulus Principle	p. 167-173
Oct 11	Midterm I	
Oct 14	Convergence of sequences	p. 175-182
Oct 16	Taylor Series	p. 182-190
Oct 18	Laurent Series	p. 190-200
Oct 21	Absolute and uniform convergence	p. 200-206
Oct 23	Power Series	p. 206-215
Oct 25	Power Series	p. 215-220
Oct 28	Residues and poles	p. 221-225
Oct 30	Cauchy's Residue Theorem	p. 225-230
Nov 1	Isolated Singularities	p. 231- 239
Nov 4	Zeros of analytic functions	p. 239-247
Nov 6	Singular points	p. 247-250
Nov 8	Residue calculus	p. 251-280
Nov 11	Residue calculus	p. 251-280
Nov 13	Residue calculus	p. 251-280
Nov 15	Midterm II	
Nov 18	Argument principle	p. 280-290
Nov 20	Linear Fractional Transformations	p. 299-318
Nov 22	Linear Fractional Transformations	p. 299-318
Nov 25	Linear Fractional Transformations	p. 299-318
Nov 27	Other elementary functions	p. 318-329
Nov 29	No class Thanksgiving	
Dec 2	Square roots	p. 329- 341
Dec 4	Conformal maps	p. 343-350
Dec 6	Conformal maps	p. 350-360