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/math417f21.html

Venue: Addams Hall 306

Drop-in hours: M 1-3

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 final will each count for 20% of your grade and the homework sets will count for 40% 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. No collaboration will be allowed on the midterms and final.

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 23	Complex Numbers	p. 1-14
Aug 25	Exponentials and roots	p. 14-25
Aug 27	Examples	p. 25-32
Aug 30	Functions of a complex variable	p. 33-42
Sep 1	Limits	p. 42-51
Sep 3	Continuity and derivatives	p. 52-60
Sep 6	Labor Day-NO CLASS	
Sep 8	Cauchy-Riemann Equations	p. 60-65
Sep 10	Analytic functions	p. 65-75
Sep 13	Harmonic functions	p. 75-85
Sep 15	The exponential and the logarithm	p. 87-97
Sep 17	Trigonometric functions	p. 97-108
Sep 20	Integrals	p. 111-116

Sep 22	Contour Integrals	p. 116-124
Sep 24	Contour Integrals	p. 124-134
Sep 27	Cauchy-Goursat Theorem	p. 138-149
Sep 29	Simply connected domains	p. 149-157
Oct 1	Cauchy Integral formula	p. 157-164
Oct 4	Liouville's Theorem and the Fundamental Theorem of Algebra	p. 165-167
Oct 6	Maximum Modulus Principle	p. 167-173
Oct 8	Convergence of sequences	p. 175-182
Oct 11	Taylor Series	p. 182-190
Oct 13	Midterm I	
Oct 15	Laurent Series	p. 190-200
Oct 18	Absolute and uniform convergence	p. 200-206
Oct 20	Power Series	p. 206-215
Oct 22	Power Series	p. 215-220
Oct 25	Residues and poles	p. 221-225
Oct 27	Cauchy's Residue Theorem	p. 225-230
Oct 29	Isolated Singularities	p. 231- 239
Nov 1	Zeros of analytic functions	p. 239-247
Nov 3	Singular points	p. 247-250
Nov 5	Residue calculus	p. 251-280
Nov 8	Residue calculus	p. 251-280
Nov 10	Residue calculus	p. 251-280
Nov 12	Argument principle	p. 280-290
Nov 15	Linear Fractional Transformations	p. 299-318
Nov 17	Second Midterm due	
Nov 19	Linear Fractional Transformations	p. 299-318
Nov 22	Other elementary functions	p. 318-329
Nov 24	Square roots	p. 329- 341
Nov 26	Thanksgiving–NO CLASS	
Nov 29	Conformal maps	p. 343-350
Dec 1	Final Exam due	
Dec 3	Conformal maps	p. 350-360

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