

Math 421, Theory of Functions of a Complex Variable I

Fall 2003

Instructor: David Wright
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Office Hours: MWF 1:00-2:00

Class Meetings: MWF 10:00-11:00 in Cupples I, Rm 216

Text: **Complex Analysis** (Third Edition), by Lars Ahlfors

Prerequisites: Mastery of undergraduate differential and integral calculus. The student should be completely comfortable with theorem and proof. We assume familiarity with the basic notions of set theory and topology. For the latter, the material covered in Math 417-418 is more than sufficient.

Content: This course is a study of the basic theorems and methods of modern complex analysis. It will present a systematic introduction to the fields of complex numbers, holomorphic and meromorphic functions, complex differentiation and integration, harmonic functions, linear fractional transformations, elementary functions such as the logarithm and exponential, power series and Laurent series, classification of zeros and singularities, residues, simply connected domains, and basic results such as Liouville's Theorem, Cauchy's Theorem, Runge's Theorem, the Residue Theorem, and Rouché's Theorem.

Goals:

1. Cover the concepts and theorems of complex analysis which every mathematician should know.
2. Prepare Ph.D. students for the Complex Analysis Qualifying Exam in May 2003.
3. Develop/enhance the students' skills in proof and problem solving.
4. Show how complex analysis relates to other areas of mathematics.

Exams: *Midterm Exam:* Friday, October 10 (in class)
Final Exam: Monday, December 15, 8:00am-10:00pm

Homework: Assignments will be given out approximately every ten days. The due dates of the assignments are: 9/5, 9/17, 9/26, 10/8, 10/17, 10/29, 11/7, 11/19, 12/1, 12/10.

Each assignment will have five exercises, which will be collected and graded. Students are encouraged to visit office hours to get help or hints toward solving the problems. The completed assignment should be placed in the mailbox of the grader Leonid Kovalev on the day it is due. No late homework will be accepted. When an assignment is made, solutions to the previous assignment will be distributed. The two lowest homework scores will be dropped in calculating the final homework total.

Homework Grader: Leonid Kovalev
Office: Room 209, Cupples I
E-mail: lkovalev@math.wustl.edu

Grading: The final grade will be based on homework and exam performance as follows. Each student's final average will be calculated two ways: (1) $1/4$ weighting on the homework, $1/4$ weighting on the Midterm, and $1/2$ weighting on the Final (2) $1/3$ weighting on the Midterm and $2/3$ weighting on the Final. The higher of the two will be taken.