

Math 300 - Section 201

Introduction to Complex Variables

INSTRUCTOR INFORMATION

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COURSE INFORMATION

Section: 201

Class times and location:

Day	Start Time	End Time	Building	Room
Tue-Th	14:00	15:30	Math Annex	1100

Course web page: <http://www.math.ubc.ca/~oyilmaz/courses/m300/m300.html> will be updated throughout the term.

Text: Saff and Snider, "Fundamentals of Complex Analysis with Applications"

Pre-requisite: One of Math 200, Math 217, Math 226, Math 253, Math 263.

Co-requisite: One of Math 217, Math 227, Math 263, Math 317.

COURSE OUTLINE

The UBC course description is as follows:

- Functions of a complex variable
- Cauchy-Riemann equations,
- Elementary functions,
- Cauchy's theorem and contour integration,
- Laurent series,
- Poles and residues.

The core topics of this course are contained in Chapters 1-6 of the textbook.

Approximate lecture schedule: The total number of lectures we have this term is 26 (each lecture is 80 minutes). This leaves us 24 lectures (plus 2 lectures for the midterms). Below is a rough plan showing what we will cover during the term.

Part I. Complex numbers and analytic functions (7 lectures, 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 (9 lectures, 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 (8 lectures, 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

If you need help, or would like to discuss any aspect of this course, please make an appointment to see me in my office.

Grades

Your grade for the course will be computed roughly as follows:

Homework: 10%
Midterm 1: 20%
Midterm 2: 20%
Final exam: 50%

There will be **two midterm** exams, on **Tuesday, February 10** and on **Tuesday, March 17**, both in the classroom. Note that the final exam date is currently unavailable, but will be released during the term. Do not make end-of-term travel plans until this date has been fixed.

Missing a homework or a midterm normally results in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor or a medical emergency. In the latter case, the instructor must be notified within 48 hours of the missed test, and presented with a doctor's note immediately upon the student's return to UBC. Failure to comply results in a 0 mark.

The worst two homework assignment grades will be dropped. If a midterm was missed for legitimate reasons, the weight of the missed midterm will be transferred to the final. Late homework assignments will not be accepted, and make-up midterms will, in general, not be provided.

In any circumstance, the grade will not be based on the homework and the final alone! There has to be at least one midterm grade.

Homework Assignments

There will be homework collected every Tuesday. Late homework will not be accepted. The lowest homework grade will be dropped.

- **Homework 1**, due at the beginning of class on Tuesday January 13 :
 - Section 1.1: 9, 16(d).
 - Section 1.2: 7(g).
 - Section 1.3: 7(h)
 - Section 1.4: 3(c).

Practice Problems

The following exercises are based on the lecture material for each week. You are not required to turn in the solutions to these problems, but it is recommended that you work through these in order to test your understanding of the material. Exam problems may be loosely based on these.

- Week 1 :
 - Section 1.1: 5-25.
 - Section 1.2: 1-19.
 - Section 1.3: 1-13, 22, 27.
 - Section 1.4: 1-11, 17, 18, 22, 23.

Calendar

Tuesday, Jan 6	First lecture
Tuesday, Feb 10	Midterm 1
Monday, Feb 16 - Fri Feb 20	Midterm break
Tuesday, Mar 17	Midterm 2
Thursday, Apr 9	Last lecture
Tue, Apr 14	Examinations begin...
TBA	Final exam