Introduction to Complex Variables
Math 300 Section 202 - Spring 2015

• Instructor: Malabika Pramanik

• Office: Mathematics Building, Room 214

• Phone: (604)822-2855

• Email: malabika@math.ubc.ca

• Lecture hours: Monday, Wednesday, Friday, 1-2pm in LSK 460.

• Office hours: To be announced.

• Course webpage: The course website is
  http://www.math.ubc.ca/~malabika/teaching/ubc/spring15/math300/index.html

Homework assignments and all relevant course information (such as changes to office hours if any, or solutions to homework problems if needed) will be posted here.

• Text: Fundamentals of Complex Analysis with Applications by Saff and Snider.

• 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 core topics of this course, listed as follows in the UBC course description, are contained in Chapters 1-6 of the textbook.
  ○ Functions of a complex variable,
  ○ Cauchy-Riemann equations,
  ○ Elementary functions,
  ○ Cauchy’s theorem and contour integration,
  ○ Laurent series
  ○ Poles and residues.
• **Grade components**: Weekly homework problems will be posted on the course website. In addition, there will be two midterms and a final exam. Your total score will be a weighted average of the scores you receive in homework, midterms and the final, with the breakdown as follows.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>20%</td>
</tr>
<tr>
<td>Final exam</td>
<td>50%</td>
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</tbody>
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• **Exam dates**:
  - Midterm 1 will be on **Wednesday February 11** in the classroom.
  - Midterm 2 will be on **Monday March 16** in the classroom.
  - 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.

• **Course Policies**: Late homework assignments will not be accepted. The worst two homework assignment grades will be dropped.

  Missing 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.

  If a midterm was missed for legitimate reasons, the weight of the missed midterm will be transferred to the final. 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.
Approximate lecture schedule

Part I. Complex numbers and analytic functions
(11 lectures and 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
(13 lectures and 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
(11 lectures and 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