Department of Mathematics—Philadelphia University

Course Syllabus

Course Title	Complex Analysis
Course Code	250312
Semester	Second/2022–2023
Lecturer	Amin Witno
Office Room	814 Faculty of Science
Office Hours	Sun/Tue: 09:30–11:00; Mon/Wed: 11:00–12:30
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Short Description

This module is an introduction to complex variables, covering basic topics in the algebraic and geometric aspects of complex numbers, analytic functions, continuity and differentiability, line integrals, contour integrals, simply connected domains, Cauchy integral formulas and applications to some real integrals, and the fundamental theorem of algebra.

Topics by the Week

1. Algebraic properties of complex numbers, geometry of the complex planes, the point at infinity.

2. Polar form and its properties, de Moivre's formula.

3. Complex functions: the exponential function and logarithms.

4. Trigonometric and hyperbolic functions.

5. Limits of complex functions, the neighborhood of infinity, continuity and differentiation.

6. Derivatives of complex functions, some common formulas, analytic functions.

7. The Cauchy-Riemann equations for differentiability.

8. The Cauchy-Riemann equations in polar form, harmonic functions.

9. Line integrals and contour integrals, independence of path.

10. Complex integration as anti-derivative.

11. Cauchy-Goursat theorem, Cauchy Integral formula and its general form.

12. Application to real integrals of rational functions of sin/cos, and improper integrals of rational functions.

13. Proof of the fundamental theorem of algebra.

14. Series for analytic functions, zeros and singularities, residue theorem.

Recommended Textbooks

(1) Brown and Churchill, Complex variables with applications, 9th edition (2013) McGraw Hill.

(2) Steven Krantz, A guide to complex variables (2008) MAA.

Supporting Material

Lecture slides and all hand-outs will be made available in the online platforms.

Online Resources

The following shortcut will take you to my web homepage at the University, where you find the course syllabus, exam dates, copies of old exams, links to the above materials, and any important announcement related to the current semester.

http://phi.witno.com

Grade Distribution

Homeworks	
Quizzes	30%
Class participation	
Midterm Exam	30%
Final Exam	40%

Exam Dates

Exam dates, once determined, will be posted online at the homepage as well as at the University student-portal page.

Homework Exercises

Homework exercises with check answers have been uploaded in the Moodle coursepage as well as at the MicroSoft Teams channel.

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