

# Department of Basic Sciences—Philadelphia University

## Course Syllabus

Course Title	Complex Analysis
Course Code	250312
Semester	Second/2021–2022
Lecturer	Amin Witno
Office Room	403 Nursing Faculty Building
Office Hours	Sun/Tue/Thu: 11–12; Mon/Wed: 11–12
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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, properties of entire functions, simply connected domains, isolated singularity, and the residue theorem.

## 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. D'Alembert's lemma, Liouville's theorem, and the fundamental theorem of algebra.
7. Derivatives of complex functions, some common formulas, analytic functions.
8. The Cauchy-Riemann equations for differentiability.
9. The Cauchy-Riemann equations in polar form, harmonic functions.
10. Contour integrals, independence of path.
11. Complex integration as anti-derivative.
12. Cauchy-Goursat theorem, Cauchy Integral formula and its generalization.
13. Application to real integrals of rational functions of sin and cos, and improper integrals of rational functions.
14. Series for analytic functions, Taylor and power series.
15. Laurent series, zeros and singularities, residue theorem.

## Recommended Textbook

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

## Supporting Material

The pdf file Complex Analysis contains lecture outlines as well as all the exercises and can be downloaded from the course webpage.

## 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 Sets

Homework problem sets with check answers can be downloaded also from the above homepage.