האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

COMPLEX VARIABLES AND APPLICATIONS - 80314

Last update 18-03-2025

HU Credits: *4*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dr. Miriam Bank*

Coordinator Email: *miriam,bank@mail.huji.ac.il*

Coordinator Office Hours: *N/A*

Teaching Staff:

Dr. Miriam Bank,
Mr. Dor Ziv

Course/Module description:
The course is an introduction to the theory of analytic functions of one complex variable. A basic knowledge of the calculus of real variables is assumed.

Course/Module aims:
The course is an introduction to the theory of complex valued functions of one complex variable.

Learning outcomes - On successful completion of this module, students should be able to:
On completion the course, students will know to map complex domains and compute integrals in complex plane. Students will get familiar with various applications of complex analysis to physics and engineering

Attendance requirements(%):
0

Teaching arrangement and method of instruction: Lectures + exercises

Course/Module Content:
Complex numbers, elementary complex functions and their properties.
Introduction to the concept of analytic function.
Cauchy-Riemann conditions.
Elementary conformal mappings and their geometric properties. Mobius transformations.
Complex integration. The Cauchy theorem. The Cauchy integral formula and its consequences. Power series. Cauchy-type integrals.
The uniqueness theorem for analytic functions. Analytic continuation.
The Liouville theorem. The Morera theorem and its applications.
Laurent series. Zeros and singularities of analytic functions.
The Residue Theorem and its applications to the evaluation of integrals. The argument principle. The Rouche theorem and its applications. The maximum principle.
Harminic functions.

Required Reading:

none

Additional Reading Material:

J.W. Brown, R.V. Churchill, Complex Variables and Applications (McGraw Hill, 2004).

H.F. Weinberger, A First Course in Partial Differential Equations : With Complex Variables and Transform Methods, Dover Books on Mathematics, 1995

Grading Scheme:

Written / Oral / Practical Exam 85 %

Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 15 %

Additional information:

An alternative exam if necessary. If also such exam will not be possible, the evaluation will be made on the basis of home assignments.