

# Complex Analysis (1MA022)

## Course literature

Theodore W. Gamelin, Complex Analysis, Springer, 2001.

## Course information

Course materials will be posted in Studium.

## Teaching

The course consists of 25 lectures and 15 problem solving sessions.

## Preliminary time plan for the lectures

Lecture	Section	Topic
1	I.1–6	Complex numbers. The complex exponential function and complex logarithms.
2	I.7–8	Complex powers, trigonometric and hyperbolic functions.
3	II.1–2	Limits and continuity. The derivative and analytic functions.
4	II.3–5	Cauchy-Riemann's equations, harmonic functions.
5	II.6–7	Conformal mappings, Möbius transformations.
6	II.7	More about Möbius transformations.
7		Dirichlet's problem.
8	IV.1–2	Complex line integrals.
9–10	IV.3, IV.7	Independence of path, Cauchy's integral theorem.
11	IV.4–6	Cauchy's integral formula and its applications.
12	III.4–5	Applications to harmonic functions.
13	V.1–2	Sequences and series of functions, uniform convergence.
14	V.3–4	Power series and Taylor series.
15	VI.1–2, V.7	Laurent series. Zeros and singularities.
16	VII.1	The residue theorem and residue calculus.
17–19	VII.2–7	Integral calculations using the residue calculus.
20	VIII.1–2	The argument principle, Rouché's theorem.
21	VIII.3–5	Mapping properties of analytic functions.
22–23	IX.1–2	Normal families of analytic functions.
	XI.1–2	The Riemann mapping theorem.
24–25		Repetition.

**Problem solving sessions**

As mentioned above the course has been assigned 15 problem solving sessions. Suggested problems for the first 13 problem solving sessions will be posted on Studium. The last two problem solving sessions will be devoted to repetition and to solving problems from old exams.

**Homework assignments**

There will be no mid-term exam. Instead I will hand out homework assignments. While these are not obligatory, by solving them one can earn up to four bonus points, that will be added to the score on the final exam at the end of the course.

**Examination**

The course ends on the 24th of May with a written examination. The exam will consist of 8 problems worth 5 points each. The bonus points from the homework assignments will be added to the score on the exam on the 24th of May 2022. For the grades 3, 4 respectively 5, one needs a total score of at least 18, 25 respectively 32 points.

Note: Bonus points from the homework assignments only count on the first exam.