

## Logic II (C004547)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 6.0**

**Study time 165 h**

**Course offerings in academic year 2024-2025**

A (semester 2)

English

Gent

**Lecturers in academic year 2024-2025**

Weiermann, Andreas

WE16

lecturer-in-charge

Pakhomov, Fedor

WE16

co-lecturer

**Offered in the following programmes in 2024-2025**

[Master of Science in Teaching in Science and Technology\(main subject Mathematics\)](#)

**crdts**

6

**offering**

A

[Master of Science in Mathematics](#)

6

A

[Exchange Programme in Mathematics \(master's level\)](#)

6

A

**Teaching languages**

English

**Keywords**

logic, set theory, ZFC-axioms, ordinals, cardinals, transfinite induction and recursion, closed unbounded sets, models of set theory, independence results.

**Position of the course**

This course naturally follows the course Mathematical Logic I from the third bachelor year. The students learn in the first part how to deal with the axioms of ZFC. In the second part metamathematical properties of ZFC like the independence of the continuum hypothesis are investigated.

**Contents**

Mathematical Logic II is an introduction to set theory.

We start with investigating the ZFC axioms and develop in this context ordinals, cardinals, transfinite induction, and recursion. We deal with advanced questions of cardinal arithmetic such as Silver's theorem.

We deal with filters of closed unbounded sets of ordinals.

In the second part we focus on models of set theory and construct ZF models in which AC and CH are valid. We also deal with models of the negation of CH and if time remains also with models of the negation of AC.

**Initial competences**

Basic knowledge of mathematical logic is recommended.

**Final competences**

- 1 Being able to use the ZFC-axioms in mathematical applications.
- 2 Being able to prove non trivial inequalities for cardinals.
- 3 Being able to prove and to apply properties of closed unbounded sets.
- 4 Being able to deal with models of ZFC and to use these to prove independence results.

**Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Seminar, Lecture

### Extra information on the teaching methods

Theory: lectures. Seminar: coached exercises. Due to COVID19, alternative didactic methods can be used when this is necessary.

Learning material: There will be a syllabus for free download from Ufora.

### Study material

Type: Syllabus

Name: set theory

Indicative price: Free or paid by faculty

Optional: no

Language : English

Number of Pages : 77

Available on Ufora : Yes

Online Available : Yes

Available in the Library : No

Available through Student Association : No

Type: Syllabus

Name: set theory

Indicative price: Free or paid by faculty

Optional: no

Language : English

Number of Pages : 77

Available on Ufora : Yes

Online Available : Yes

Available in the Library : No

Available through Student Association : No

### References

Jech, T. Set Theory. Springer 2003.

Kunen, K. Set Theory, North-Holland 1980.

Kunen, K. Set Theory, College Publications 2013.

### Course content-related study coaching

It is possible to consult the lecturers directly or via e-mail/Ufora.

### Assessment moments

end-of-term assessment

### Examination methods in case of periodic assessment during the first examination period

Written assessment

### Examination methods in case of periodic assessment during the second examination period

Written assessment

### Examination methods in case of permanent assessment

### Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

### Extra information on the examination methods

The final exam will consist of a closed-book theory section and an open-book exercise session if the exam is on campus. If the exam is online then both parts will be open book.

### Calculation of the examination mark

Theory portion of final exam: 50%

Exercise portion of final exam: 50%