Mathematical Logic II (C003011)

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

Credits 6.0	Study time	165 h	Contact hrs	45.0h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	Dutch, English	Gent	seminar: coached exercises	15.0h
			online seminar: coached exercises	0.0h
			lecture	30.0h
			online lecture	0.0h

Lecturers in academic year 2022-2023

Weiermann, Andreas	WE16	lecturer-in-charge
Pakhomov, Fedor	WE16	co-lecturer

Offered in the following programmes in 2022-2023	**crdts**	**offering**
Master of Science in Teaching in Science and Technology(main subject Mathematics)	6	A
Master of Science in Mathematics	6	A
Exchange Programme in Mathematics (master's level)	6	A

Teaching languages

English, Dutch

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 axioma's 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 aple 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

Online lecture, Lecture, Online seminar: coached exercises, Seminar: coached exercises

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 materials and price

There will be a syllabus for free download from Ufora.

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 and continuous assessment

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

Written examination

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

Written examination

Examination methods in case of permanent assessment

Assignment

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%