MATH-680 **Monstrous moonshine**

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Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	3
Session	
Exam	Oral presentation
Workload	90h
Hours	**50**
Courses	22
Project	28
Number of positions	

Frequency

Every year

Remark

Fall 2021

Summary

The monstrous moonshine is an unexpected connection between the Monster group and modular functions. In the course we will explain the statement of the conjecture and study the main ideas and concepts leading to its proof. Our final goal is to study Borcherd's proof of the Moonshine conjecture.

Content

In this course we will cover the following topics:
- Basic facts about Monster group
- Basic facts about modular forms
- Monstrous moonshine conjecture
- Frenkelâ##Lepowskyâ##Meurman's constructionÂ of the Moonshine Module
- Monster Lie algebra constructed by R. Borcherds
- Weyl denominator formula and infinite product expansions for modular forms
- Moonshine beyond the monster

Keywords

Monstrous moonshine, modular forms, Monster group, Leech lattice

Learning Prerequisites

Required courses

Recommended: Modular forms and applications

Assessment methods

Oral presentation

Resources

Bibliography

[1] R. Borcherds, "Introduction to the monster Lie algebra", (EXPOSITORY) ``Groups, combinatorics, and

geometry, Durham 1990", p. 99-107, L.M.S. lecture notes in mathematics 165, C.U.P. 1992
[2] R. Borcherds, Monstrous moonshine and monstrous Lie superalgebras, Invent. Math. 109, 405-444 (1992).
[3] J. H. Conway, S. Norton, Monstrous moonshine, Bull. London. Math. Soc. 11 (1979) 308-339.

Ressources en bibliothèque

- Introduction to the monster Lie algebra / Borcherds
- Monstrous moonshine and monstrous Lie superalgebras / Borcherds
- Monstrous moonshine / Conway