MATH-492

# Representation theory of semisimple lie algebras

| Cursus | Sem. | Type |
|---|---|---|
| Ing.-math | MA1, MA3 | Opt. |
| Mathématicien | MA1, MA3 | Opt. |

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|---|---|
| Language of teaching | English |
| Credits | 5 |
| Session | Winter |
| Semester | Fall |
| Exam | Written |
| Workload | 150h |
| Weeks | 14 |
| **Hours** | **4 weekly** |
| Courses | 2 weekly |
| Exercises | 2 weekly |
| **Number of positions** | |

## Remark

pas donné en 2019/20

## Summary

We will establish the major results in the representation theory of semisimple Lie algebras over the field of complex numbers, and that of the related algebraic groups.

## Content

Highest weight theory
Universal enveloping algebra
Construction of irreducible representations
Weyl's degree formula
Freudenthal's formula.

If time permits, construction of Chevalley groups and simple algebraic groups.

## Learning Prerequisites

### Required courses

Theorie des Groupes, Anneaux et corps, Algebres de Lie semisimples

### Important concepts to start the course

The classificaiton of complex semisimple Lie algebras. Root systems.

## Teaching methods

Lectures

## Expected student activities

Exercises, extra reading, presentation of exercises.

## Assessment methods

Final written exam
Dans le cas de l'art. 3 al. 5 du Règlement de section, l'enseignant décide de la forme de l'examen qu'il communique aux étudiants concernés.

## Supervision

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|---|---|
| Office hours | Yes |
| Assistants | Yes |

## Resources

### Bibliography

James Humphreys : Introduction to Lie algebras and Representation Theory.

Bourbaki, Lie algebras and Lie groups, Chapters 1 - 3.

### Ressources en bibliothèque

- Introduction to Lie algebras and Representation Theory / Humphreys
- Lie algebras and Lie groups / Bourbaki