

MATH-479

**Linear algebraic groups**

Cursus	Sem.	Type
Ing.-math	MA2, MA4	Opt.
Mathématicien	MA2	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Oral
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Remark**

pas donné en 2019-20

**Summary**

The aim of the course is to establish the main results on the structure of reductive linear algebraic groups defined over an algebraically closed field.

**Content**

first definitions and properties, morphisms, dimension, Jordan decomposition, tangent space  
 commutative connected groups, tori, connected solvable groups,  
 homogeneous spaces and quotients, Borel subgroups,  
 Lie algebra  
 root data and structure theorem

**Keywords**

reductive groups  
 semisimple  
 Lie algebra  
 root data

**Learning Prerequisites****Recommended courses**

Background in group theory, Lie theory and some algebraic geometry

**Learning Outcomes**

By the end of the course, the student must be able to:

- Formulate the classification theorem for simple linear algebraic groups
- Construct examples of simple linear algebraic groups
- Prove basic results in the theory

**Teaching methods**

Lectures

**Expected student activities**

exercises and presentations

### Assessment methods

Part of the grade will be based upon student presentation of some course material during the exercise sessions or corrected written homework assignments, or both.

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

Office hours                      Yes

### Resources

#### Bibliography

Linear Algebraic Groups, J. Humphreys, Springer

Linear Algebraic Groups, T. Springer, Birkhauser

Linear Algebraic Groups, A. Borel, Springer

Linear algebraic groups and finite groups of Lie type, G. Malle and D. Testerman, CUP

#### Références suggérées par la bibliothèque

- [Linear Algebraic Groups / Borel](#)
- [Linear algebraic groups and finite groups of Lie type / Malle & Testerman](#)
- [\(electronic version\)](#)
- [\(electronic version\)](#)
- [\(electronic version\)](#)
- [Linear Algebraic Groups / Humphreys](#)
- [Linear Algebraic Groups / Springer](#)
- [\(electronic version\)](#)