

MATH-482

**Algebraic number theory**

Michel Philippe

| Cursus      | Sem. | Type |
|-------------|------|------|
| Mathematics | BA6  | Opt. |

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

**Summary**

Algebraic number theory is the study of the properties of solutions of polynomial equations with integral coefficients; Starting with concrete problems, we then introduce more general notions like algebraic number fields, algebraic integers, units, ideal class groups...

**Learning Prerequisites****Required courses**

Rings and fields

**Recommended courses**

Galois Theory  
Introduction à la théorie analytique des nombres  
Rings and modules

**Learning Outcomes**

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

- Synthesize the main concepts of algebraic number theory
- Solve problems related to algebraic number theory

**Teaching methods**

cours ex-cathedra et exercices

**Expected student activities**

De part sa nature, la théorie algébrique des nombres combine des techniques provenant de plusieurs domaines (algèbre linéaire, algèbre commutative, analyse, géométrie). Il est indispensable d'avoir une bonne maîtrise de chacun d'eux. On attend une présence active aux séances de cours et surtout aux séances d'exercices. On demandera notamment aux étudiants de venir présenter leurs solutions au tableau.

**Assessment methods**

examen écrit

**Supervision**

|              |        |
|--------------|--------|
| Office hours | No     |
| Assistants   | Yes    |
| Forum        | No     |
| Others       | moodle |

## Resources

### Bibliography

Samuel, algebraic number theory

### Ressources en bibliothèque

- [Théorie algébrique des nombres / Samuel](#)

## Prerequisite for

Topics in number theory.

Applications of number theory: eg. cryptography

Solving the Birch-Swinnerton-Dyer conjecture and win one of the Millenium Prizes (1M USD) from the Clay Mathematics Institute.

Receiving the Fields medal