

PHYS-435

**Statistical physics III**

Wyart Matthieu

| Cursus    | Sem.     | Type |
|-----------|----------|------|
| Ing.-phys | MA1, MA3 | Opt. |
| Physicien | MA1, MA3 | Opt. |

|                            |                 |
|----------------------------|-----------------|
| Language of teaching       | English         |
| Credits                    | 6               |
| Session                    | Winter          |
| Semester                   | Fall            |
| Exam                       | Written         |
| Workload                   | 180h            |
| Weeks                      | 14              |
| <b>Hours</b>               | <b>4 weekly</b> |
| Lecture                    | 2 weekly        |
| Exercises                  | 2 weekly        |
| <b>Number of positions</b> |                 |

**Summary**

This course introduces statistical field theory, and uses concepts related to phase transitions to discuss a variety of complex systems (random walks and polymers, disordered systems, combinatorial optimisation, information theory and error correcting codes).

**Content**

1. Introduction to statistical field theory
2. Random walks and self-avoiding polymers
3. Percolation, Networks
4. Information theory and error correcting codes
5. Disordered systems (spin glasses) and combinatorial complexity

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

Statistical Physics II

**Learning Outcomes**

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

- Solve problems in complex systems

**Transversal skills**

- Assess one's own level of skill acquisition, and plan their on-going learning goals.

**Teaching methods**

Ex cathedra. Exercises in class

**Assessment methods**

written exam

**Resources****Moodle Link**

- <https://go.epfl.ch/PHYS-435>