

MATH-671

**Lattice Gauge Theories**

Aru Juhan

Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral presentation
Workload	60h
<b>Hours</b>	<b>34</b>
Courses	22
TP	12
<b>Number of positions</b>	

**Frequency**

Every year

**Summary**

The aim of this course is to learn about lattice gauge theories, but also a bit about their (potential) continuum limits.

**Content**

The aim of this course is to learn about lattice gauge theories, but also a bit about their (potential) continuum limits. In particular, we will be curious about understanding why construction of 4D Yang-Mills might be difficult and we will see that even more basic questions remain unanswered.

The first part will be in the lecture format and we will restrict ourselves to simple classical results. In the second half of the course we try to peak a bit into the contemporary research, possibly also via participative presentations.

We will most likely start off by a reminder of spin models on the lattice with global symmetries and then see what happens when we consider local symmetries instead.

The lecturer is no expert in the domain and is looking forward to exploring the topic with you!

**Keywords**

gauge theory, statistical physics, yang-mills, probability

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

Basic knowledge of probability theory and analysis is assumed

**Learning Outcomes**

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

- Recognize the Yang-Mills millenium problem and why it might be potentially hard

**Resources****Bibliography**

E. Seiler - Gauge theories as a problem of constructive quantum field theory and statistical mechanics

Lecture notes also in production

**Moodle Link**

- <https://go.epfl.ch/MATH-671>