

MATH-563

Student seminar in pure mathematics

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

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

In this seminar we will study the foundations of Knot theory, which studies entanglements of closed curves in three dimensional space. What seems like a simple subject in topology turns out to be a rich theory with applications to 3-manifolds, representation theory, physics and much more.

Content

- Basics of Knot theory: Link Diagrams, Reidemeister moves, Seifert surfaces
- Knot Invariants: Jones-, Alexander and HOMFLY-Polynomial
- 3-Manifold Invariants
- Connections with Representation theory

Learning Prerequisites**Recommended courses**

- Introduction to differentiable manifolds
- Algebraic topology
- Rings and Modules

Learning Outcomes

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

- Demonstrate their knowledge about knots and links.

Transversal skills

- Make an oral presentation.
- Write a scientific or technical report.
- Access and evaluate appropriate sources of information.

Teaching methods

Each participant will give a lecture on a subject in knot theory. The lecture is complemented by the professor and exercise sessions.

Expected student activities

Prepare a lecture, write lecture notes and solutions to exercises. Active participation during class and exercise sessions.

Assessment methods

The grade will depend on the participants oral presentation and written reports. There will be no final exam.

Resources**Bibliography**

An Introduction to Knot Theory by R. Lickorish.

Ressources en bibliothèque

- [An Introduction to Knot Theory / Lickorish](#)

Moodle Link

- <https://go.epfl.ch/MATH-563>