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

The goal of the seminar is to learn the main aspects of de Rham cohomology following the book of Bott-Tu 'Differential Forms in Algebraic Topology'. We will aim to understand the definition of Chern classes of a vector bundle, a fundamental concept in topology, differential and algebraic geometry.

Content

- Differential forms
- De Rham cohomology
- Poincaré duality
- Hopf Index Theorem
- Chern classes

Learning Prerequisites

Required courses

- Differential geometry II - Smooth manifolds

Recommended courses

- Topology III - Homology

Learning Outcomes

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

- Demonstrate their knowledge about de Rham cohomolgy and Chern classes

Transversal skills

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

Teaching methods

Each participant will lecture on a subject realted to de Rham cohomology and Chern classes. The lecture is complemented by the professor and exercise sessions.

Expected student activities

Prepare lectures, 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

- Differential Forms in Algebraic Topology, R. Bott and L.W. Tu
- Characteristic classes, J. W. Milnor and J. D. Stasheff

Ressources en bibliothèque

- [External resource] Class Field Theory / Milne
- Find the references at the Library

Moodle Link

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