EPFL

MATH-637   **Higher Categories: Theory and Practice**

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Cursus	Sem.	Type
Mathematics		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	**30**
Courses	16
TP	14
Number of positions	

Frequency

Only this year

Remark

from 1.3.-1.5.2020

Summary

The goal of this course is to familiarize students with the theory and application of $(\infty,1)$-categories. The theory includes introducing various models and the presenting the fibrational approach. Practice includes an application to the students primary interest.

Content

The content breaks down into two parts:

Theoretical Part:
Introducing various models of $(\infty,1)$-categories, concrete Kan enriched categories, quasi-categories and complete Segal spaces.
Discussing their respective model structures and how to translate between them.
Introducing fibrations of quasi-categories: Right fibrations and Cartesian fibrations.
Defining limits and colimits using fibrations. Proving standard results about limits using the language of fibrations

Practical Part:
This part is not predetermined and depends on the students who attend the first part.
We will cover some of application of higher category theory to parts of mathematics that is of the interest to the students that attended the first part.

Keywords

Models of $(\infty,1)$-categories, Cartesian fibrations, Applications of higher category theory

Learning Prerequisites

Required courses

Some familiarity with category theory and homotopy theory

Learning Outcomes

By the end of the course, the student must be able to:
- Identify the standard models of higher categories

- Be familiar with various notions of fibrations that arise in higher category theory
- Use fibrations define and prove classical topics, such as limits and adjunctions
- Discover an application of higher category theory to their primary field of interest

Resources

Notes/Handbook

There will be lecture notes for this course. We will partially rely on following material:
- Stuff about Quasicategories, Charles Rezk
- A Model for the Homotopy Theory of Homotopy Theory, Charles Rezk
- Quasi-categories vs Segal spaces, Andre Joyal, Myles Tierney
- Higher Topos Theory, Jacob Lurie