



MATH2391 Theory of categories (First part)

[22.5h] 2.5 credits

This course is taught in the 2nd semester

Teacher(s): Francis Borceux, Enrico Vitale (coord.)
Language: French
Level: Second cycle

Aims

In the courses of algebra, geometry and logic of the baccalaurean years we met different examples of universal constructions and adjoint functors.

At the beginning of the course, starting from these examples, we recognize a mathematical theory that will unify and express them in a clear and rigorous way: the theory of categories.

Then, we try to express and solve, using categorical methods, problems coming from algebra and geometry.

The last step is to push the solutions we found to their highest level of generality; in other words, we will try to recognize the categorical structure that comes into play in an essential way to solve the particular problems.

Main themes

1. Examples of universal constructions: kernel, quotient group, tensor product, vector space and free affine space, etc.
2. The language of categories: categories, functors, natural transformations, limits and co-limits, adjoint functors, equivalence of categories.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

References:

- H. Bass: Algebraic K-theory, Benjamin Inc. 1968;
- F. Borceux: Handbook of categorical algebra, Cambridge University Press 1994;
- Ch. Kassel: Quantum groups, Springer-Verlag 1995;
- S. Mac Lane: Categories for the working mathematician, Springer-Verlag 1972;
- S. Mac Lane, I. Moerdijk: Sheaves in geometry and logic, Springer-Verlag 1992;
- R. Piccinini: Lectures on Homotopy Theory, North-Holland 1992.

Prerequisites: none.

Organization mode: to be discussed with students.

Other credits in programs

MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(2.5 credits)
MATH21/G	Première licence en sciences mathématiques (Général)	(2.5 credits)
MATH22/G	Deuxième licence en sciences mathématiques	(2.5 credits)