



Faculty of Applied Sciences

FSAB1109 Mathematical structures for spaces

[30h+20h exercises] 4 credits

This course is taught in the 1st semester

Teacher(s): Yves Félix
Language: French
Level: First cycle

Aims

- 1) To describe a set of mathematical tools that enable the technical geometric calculations (lengths, areas, volumes, angles,...)
- 2) To help students to visualize, imagine and construct new spaces

Main themes

1. Euclidean geometry and its generalizations.
 In particular curves (curvature, torsion, special curves), surfaces (curvatures, ruled surfaces), 3D objects (regular polyhedra, convex geometry, intersection of 3D objects)
2. The projective extension of euclidean geometry (projective space, projective transformations, duality, ...)
3. Introduction to other geometries : non-euclidean geometry and the axiom of parallels, topological classification of surfaces (Klein bottle, Euler characteristic, orientation), hyperbolic geometry (Escher paintings), ...
4. Forms and numbers in nature : the golden ratio and the Fibonacci numbers (properties, geometrical interest), fractals objects (constructions, fractal dimension)

Content and teaching methods

The different chapters of the course are :

- euclidean geometry
- affin geometry
- projective geometry
- metric curve theory
- metric theory of surfaces
- topology and surfaces
- fractal geometry
- axiomatic geometry

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

FSAB 1101 or an equivalent course
 FSAB 1102 or an equivalent course

Other credits in programs

ARCH12BA	Deuxième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil architecte	(4 credits)	Mandatory
FSA3DA	Diplôme d'études approfondies en sciences appliquées	(4 credits)	