

MATH-121

**Geometry**

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Cursus	Sem.	Type
Mechanical engineering	BA2	Obl.

Language of teaching	English
Coefficient	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Exercises	1 weekly
<b>Number of positions</b>	

**Summary**

This is a standard introductory course in the geometry of curves and surfaces.

**Content**

Curves • Vector functions • Tangent vectors • Bézier curves • Lengths • Curvature • Vector fields and moving frames • Curves in  $\mathbb{R}^2$  • Isometries of  $\mathbb{R}^n$  • Settings of a surface • Tangent vectors of a surface • The metric tensor • Curvature • The second fundamental form

**Learning Prerequisites****Important concepts to start the course**

Vectors in  $\mathbb{R}^n$ , scalar products, cartesian coordinates, differentiation, integration of real functions.

**Learning Outcomes**

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

- Solve problems concerning curves
- Solve problems concerning surfaces
- Explain notions of curvature
- Describe examples in the geometry of surfaces
- Solve complex geometric problems
- Explain connections between symmetries and spaces

**Assessment methods**

Written exam.

**Supervision**

Office hours	No
Assistants	Yes
Forum	No

**Resources**

### **Bibliography**

The book of M. Troyanov (in French) : "Cours de géométrie", PPUR 2009.  
Differential Geometry of Curves and Surfaces by Manfredo P do Carmo.