



### GEOMETRY 2

<b>Enrollment year</b>	2015/2016
<b>Academic year</b>	2016/2017
<b>Regulations</b>	DM270
<b>Academic discipline</b>	MAT/03 (GEOMETRY)
<b>Department</b>	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
<b>Course</b>	MATHEMATICS
<b>Curriculum</b>	PERCORSO COMUNE
<b>Year of study</b>	2°
<b>Period</b>	2nd semester (01/03/2017 - 09/06/2017)
<b>ECTS</b>	9
<b>Lesson hours</b>	84 lesson hours
<b>Language</b>	ITALIAN
<b>Activity type</b>	ORAL TEST
<b>Teacher</b>	BONSANTE FRANCESCO (titolare) - 6 ECTS FREDIANI PAOLA - 3 ECTS
<b>Prerequisites</b>	Contents of the courses: Linear algebra, Geometry 1, Algebra 1, Calculus 1 and 2.
<b>Learning outcomes</b>	Basic knowledge of differential geometry, especially the geometry of curves and surfaces immersed in Euclidean space. Basic knowledge of algebraic topology (fundamental group).
<b>Course contents</b>	Differential geometry of immersed curves and surfaces. Differentiable manifolds. Fundamental group.  Extended summary  Curves  Regular curves. Arc length parameter. Frenet formulae. Curvature and

torsion.

## Surfaces

Regular surfaces. Diffeomorphisms of surfaces. Tangent plane. First fundamental form. The Gauss map of an orientable surfaces. Second fundamental form. Normal curvature. Gaussian and mean curvature. Isometries and the Theorema Egregium. Geodesics. The Gauss-Bonnet theorem.

## Differentiable manifolds

Basic notions and examples. Differentiable maps, tangent and cotangent spaces. The differential. Vector fields and forms.

## Fundamental group

Homotopy of paths. Concatenation product and fundamental group. Functorial properties. Deformation retracts. Contractible spaces. Examples and computations.

### Teaching methods

Lectures and exercise classes.

### Reccomended or required readings

M.P. Do Carmo: "Differential Geometry of curves and surfaces", Prentice-Hall.?

E. Sernesi: "Geometria 2", Bollati Boringhieri.

?C. Kosniowski: "Introduzione alla topologia algebrica", Zanichelli.

?M. Abate, F. Tovena: "Curve e superfici", Springer.

?M. Manetti: "Topologia", Springer.

### Assessment methods

Written and oral examination.

### Further information

Written and oral examination.

### Sustainable development goals - Agenda 2030

[\\$lbl legenda sviluppo sostenibile](#)