| Academic subject: : ELEMENTS OF ADVANCED GEOMETY n.1 | | | | |
|---|---|---|---|---|
| **Degree Class:** L-35-Scienze Matematiche | | **Degree Course:** Mathematics | **Academic Year:** 2018/2019 | |
| | | **Kind of class:** (inserire mandatory o optional) | **Year:** 3 | **Period:** |
| | | | **ECTS:** 7 divided into **ECTS lessons: 6** **ECTS exe/lab/tutor: 1** | |

| **Time management, hours, in–class study hours, out–of–class study hours** | | | |
|---|---|---|---|
| lesson: 48 | exe/lab/tutor: 24 | in–class study: 72 | out–of–class study: 103 |

| **Language:** Italian | **Compulsory Attendance:** no | | |
|---|---|---|---|
| **Subject Teacher:** Verroca Francesca | **Tel:**    085442694 **e-mail:** francesca.verroca@uniba.it | **Office:** Department of Mathematics Room  19, Floor III | **Office days and hours:** Wednesday 11-13, other days by appointment. |

**Prerequisites:** Basic knowledge of abstract algebra, linear algebra and topology. Differential calculus

**Educational objectives:** Knowledge of the basic notions of Differential Geometry. This is fundamental by the cultural point of view of a mathematical student, especially if he wants to deepen the studies.

| **Expected learning outcomes (according to Dublin Descriptors)** | **Knowledge and understanding:** Knowledge the basic geometrical objects for the Differential Geometry and acquisition of the most important results  **Applying knowledge and understanding:** Acquisition of the basic proof techniques for the Differential Geometry   **Making judgements:** Ability to prove autonomously some small theorems and to control the consistency of the mathematical arguments   **Communication:** Students should improve the mathematical language and should learn to read books regarding Differential Geometry  **Lifelong learning skills:** Improve learning methods through the practice of solving problems |
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**Course program**
Differentiable manifolds
Local charts. Atlas of a manifold. Submanifolds and properties. Product manifold. Differential maps and properties.
Tangent and cotangent space. Differential of a function.
Tensor Algebra of a vector space. Basic definitions. Contraction. Simmetrizzation and alternation. The Grassmann algebra.  Tensor algebra on a differential manifold.
Curves on on a differential manifold. Tensor fields. Tensor product. Differential vector fields and derivations.
Differential forms and external product. The Grassmann Algebra on a manifold.
Transformation groups. Integral curves and complete vector fields.
Lie groups. Left invariant  vector fields and their Lie Algebra. Adjoint representation.
Fibre Bundle. The principal fibre bundle.

**Teaching methods:**
Lectures and exercise sections

**Auxiliary teaching:**

**Assessment methods:** Oral exam

**Bibliography:**
Marco Abate - Francesca Tovena
Geometria Differenziale
**Springer-Verlag Italia 2011**