# Elementary Geometry (with Geometry Teaching Laboratory)

## Prof. Laura Montagnoli

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The course aims to provide the fundamental contents of plane and solid geometry and to offer teaching instruments for future teachers. On the basis of the competences acquired during this course, future teachers will hopefully be able to guide elementary school students towards a correct approach to geometry and propose effective lessons in this subject.

At the end of the course, students will be able to:

1. Identify the founding concepts of Euclidean geometry and grasp its meaning and role in the teaching and learning process.

2. Present the concepts learned in a clear, coherent and specific language.

3. Evaluate and identify effective teaching actions.

4. Critically analyse educational proposals to identify their strengths, weaknesses and errors.

5. Know the INVALSI national mathematics surveys and how to use them as a learning stimulus for future students.

***COURSE CONTENT***

In accordance with the “Indicazioni Nazionali per il curricolo della scuola dell’infanzia e del primo ciclo d’istruzione”, the course will examine the following topics:

– physical space (localisations, paths, reference systems);

– geometric space (Euclid's Elements, representation of entities);

– basic geometric entities;

– half-lines and segments;

– angles;

– perpendicularity and distances;

– plane transformations;

– polygons (general aspects: vertices, sides, diagonals and internal and external angles);

– particular polygons (triangles and quadrilaterals);

– perimeter, height and area;

– circles;

- regular polygons;

– geometry of space (straight lines, planes, dihedral angles, solid angles, polyhedra and solids of revolution).

***READING LIST***

The texts of reference are:

* “Indicazioni Nazionali per il curricolo della scuola dell’infanzia e del primo ciclo d’istruzione”, drafted by MIUR, published in the special volume of the Annals of public education in 2012 (“La conoscenza del mondo”, pp. 28-29, for pre-school; “Matematica”, pp. 60-63, for primary school);
* F. Baresi-L. Montagnoli, *Istituzioni di Matematica*, Studium Edizioni, Roma, 2019 (Capitoli: 11-22).
* S. Crespi-M. Dalfabbro-L. Montagnoli-C. Panzeri, *Poligoni a tutto tondo*, Morcelliana, Brescia, 2020.

We also suggest consulting the texts and guidelines for reading the INVALSI surveys, available on the website: www.invalsi.it and in the database www.gestinv.it. These materials will be discussed during lectures and will be included in the assessment, with reference to the student's critical ability to analyse the most frequent mistakes made by pupils.

***TEACHING METHOD***

The course will be held in the classroom

– with frontal or dialogue-based lectures supported by the projection of slides, videos and by the use of other applications;

– with the proposed test, quizzes, and group tutorials.

***ASSESSMENT METHOD AND CRITERIA***

All the contents presented in class (all materials uploaded to the Blackboard platform) and all the topics proposed in the reading list will be covered in the assessment.

Exam marks may only be recorded if students obtain a pass mark on the report related to the workshop. During the workshops, students will be shown the assessment criteria that lecturers will use for marking their reports.

The exam will be conducted via Blackboard. The test consists of close-ended questions (around 20) and open-ended questions (around 2). Students will be assessed on the course topics. Students pass the exam if they obtain at least 18 out of 30 points. Two points will be added to the final score if the evaluation of the workshop is A and 1 point if it is B.

***NOTES AND PREREQUISITES***

There are no prerequisites for attending the course, since the proposed contents concern basic geometry. However, a willingness to learn mathematical language and study systematically is required. Attendance at lectures is strongly recommended as they provide both mediation of the contents and various educational considerations. Students are advised to focus more on understanding than on memorisation when studying.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG html, or on the Faculty notice board.