# . – Elementary Geometry (with Geometry Teaching Workshop)

## Prof. Carla Alberti

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

Through the analysis of some key concepts of elementary mathematics, such as geometry, the course aims to help students develop subject-related and pedagogical-educational knowledge and tools that are essential for effective teaching and learning of geometry.

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

1. Identify the fundamental concepts of Euclidean geometry and appreciate its significance and role in teaching and learning processes

2. Present concepts learned during the course clearly and consistently with specific language

3. Critically analyse teaching ideas and identify their strengths and weaknesses as well as errors.

4. Identify effective teaching action.

***COURSE CONTENT***

Introduction

Overview of the historical origin of geometry and of the evolutionary construction of geometry concepts.

Spatial orientation

From the body as the first reference to the conventional reference systems.

From paths to lines; classification according to topological and projective properties.

Fundamental elements of Euclidean plane geometry

The line and its parts; inverse position in a plane.

The angle: some meanings.

Polygons: general features; remarkable families; the height.

Sizes and measures

The concepts of sizes and measures from a mathematical and experimental science standpoint.

Brief outline of the axiomatic theory.

Geometric sizes: length, area, width.

Brief outline of non-geometrical sizes.

The International System of Units.

The course is supplemented by didactic-workshop activities entrusted to expert conductors and characterised by specific themes and methodologies agreed upon with the course teacher. Each workshop edition will be aimed at the production of a project/artefact, the assessment of which will be entrusted to the above-indicated conductor/s on the basis of parameters shares with the course teacher, and based on criteria of: completeness, coherence, originality, didactic value.

***READING LIST***

Coursepack containing course material available to all students

For reference:

* List for the 2012Curriculum.
* Bartolini Bussi M. G., *Matematica. I numeri e lo spazio,* Junior, Azzano San Paolo (BG), 2008.
* Baruk S., *Dizionario di matematica elementare,* Zanichelli, BO, 1998.
* Colombo Bozzolo C. - Costa A. – Alberti C. (edited by), *Nel mondo della geometria. Vol. 1 L’orientamento spaziale: posizioni e spostamenti nel piano. Avvio allo studio delle linee; Vol. 2 I primi passi nel mondo delle figure geometriche: le rette nel piano. L’angolo; Vol. 3 Poligoni e non poligoni. Vol 5 La misura,* Erickson, TN.
* D’Amore B. et alii, *Infanzia e matematica. Didattica della matematica nella scuola dell’infanzia,* Pitagora, BO, 2004.
* Freudenthal H., *Ripensando l’educazione matematica,* Editrice La Scuola, BS, 1994.

***TEACHING METHOD***

Lectures will be supplemented by slides and presentations inherent in the topics covered, teaching examples and critical analysis of publications about geometric concepts discussed during the course. The course also includes a “Teaching Geometry Workshop” which aims to complete the course as well as give students the chance to test out some of the topics explored during the course.

***ASSESSMENT METHOD AND CRITERIA***

The course also includes a final oral examination on topics presented in the course pack.

Students should should prove their knowledge of the subject, and that they have fully understood the meaning and role of the processes of teaching and learning geomtery.

Assessment will be based on relevance and accuracy of students’ answers, structure of atudents’ arguments and consistency of argumentation, their mastery of specific language, their critical ability to analyse teaching ideas.

Students must successfully complete the workshop in order to pass the examination.

***NOTES AND PREREQUISITES***

* The course pack with the lecture notes includes extracts of didactic publications that will be critically analysed during the course and do not replace the lecture notes.
* The syllabus and course material are the same for all students.
* There are no prerequisites for attending the course. However, students should be interested in considering issues related to the teaching and learning of geometry, also beginning with students’ personal academic experience.

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