# . – Elementary Mathematics (with Mathematics Teaching Laboratory)

## Prof. Silvana Spinoni

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

Through an in-depth study of some rudiments of elementary mathematics, the course aims to help students develop knowledge and tools related to the subject and to pedagogical-educational aspects that are considered fundamental for effective teaching and learning mathematics.

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

1. Identify the fundamental concepts of the subject and understand their meaning and role in teaching and learning processes

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

3. Critically analyse teaching ideas so as to pinpoint strengths and weaknesses, as well as errors.

4. Identify effective teaching action.

***COURSE CONTENT***

***Elements of mathematical logic***

Logic of propositions: propositions and truth values – connectives.

Logic of predicates: propositional forms – quantifiers.

***Elements of the naïve set theory***

Sets: axiom definition - representation - subsets – new sets.

Binary relations between sets: definition and representation – properties – notable relations.

Classification based on one or more attributes.

***Arithmetic***

Natural numbers: meaning and writing in a positional number system.

Arithmetic operations: meanings, properties, calculation techniques.

Absolute rational numbers.

***Elements of probability and statistics***

Probability: axiomatic definition – some calculation approaches.

Descriptive statistics: statistical surveys – graphical representations – statistical indexes.

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***

A course pack containing the teaching material will be made available for all students.

In addition, they are invited to consult the following textbooks:

* Information on the 2012 Curriculum.
* 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. (edited by*),* *Nel mondo dei numeri e delle operazioni. Vol. 1 I numeri fino a 100; Vol. 2 Addizione e sottrazione; Vol. 3 I numeri oltre 100. Moltiplicazione e divisione, Vol. 5 Frazioni e numeri decimali*, 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 include visual material and presentations from the course pack, teaching examples and critical analysis of publications concerning mathematical concepts explored during the course. The course includes a “Teaching Mathematics Workshop” which as well as completing the course gives students the opportunity to experiment with some of the topics addressed during the course.

***ASSESSMENT METHOD AND CRITERIA***

The final oral examination will be on topics in the course pack.

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

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 includes some extracts of educational publications that will be subject to critical analysis in class (please note that the course pack does not replace lecture notes).

- Course programme and teaching material will be the same for all students.

- There are no prerequisites for attending the course. However, students should show a certain curiosity towards the teaching and learning of mathematics, also arising from their personal experience at school.

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.