Academic subject: Complementary Mathematics			
Degree Class: LM-40 Mathematics		**Degree Course:** Mathematics	**Academic Year:** 2020/2021
		Kind of class: Mandatory/Optional depending on the Curriculum	**Year:**	**Period: 1**
			ECTS: 7 divided into **ECTS lessons: 52** **ECTS** **exe/lab/tutor: 8**

Time management, hours, in–class study hours, out–of–class study hours

       lesson: 52   exe/lab/tutor: 8   in–class study: 60   out–of–class study: 115

Language: Italian	**Compulsory Attendance:** no		
Subject Teacher: Eleonora Faggiano	**Tel:** **e–mail:** eleonora.faggiano@uniba.it	**Office:** Department of Mathematics Room 27, Floor II	**Office days and hours:** By appointment (via e-mail)

Prerequisites: Knowledge that usually are acquired during the degree courses of a L-35 class.

Educational objectives:

The aim of the course is to give some mathematical basic knowledge, within its historical context of origin and development, as well as instruments for a critical reflection from an educational perspective. In particular it aims to tackle with some topics, coming from different mathematical fields, fundamental for the development of the mathematical thinking, chosen for their cultural interest and the possible links with school teaching topics.

Expected learning outcomes (according to Dublin Descriptors)	**Knowledge and understanding:** Increasing the basic knowledge acquired during the previous degree courses, developing skills of abstraction and mastery of the scientific methods. Acquiring theoretical, historical and cultural knowledge necessary to teach mathematics. **Applying knowledge and understanding:** Performing a critical vision of the contents. Reporting on specific subjects under study and on educational issues. Autonomously producing examples of teaching activities for secondary school students. Discussing point of views on educational applications of the course contents. **Making judgements:** Reflecting on methodological and instrumental changes during the historical development of the Mathematics. Starting a new research activity on specific topics and tackling with new problems, working in group or autonomously. **Communication:** Presenting mathematical arguments and the conclusions from them with clarity and accuracy and in forms that are suitable for the audiences being addressed. **Lifelong learning skills:** Developing a flexible and analytical attitude in order to autonomously identify knowledge to be deepened and acquired to manage with a problem in mathematics, in mathematic education and in other working fields.

Course program

1) Numerical sets and the introduction of real numbers. Parallelism between the extension of number system and the progression from arithmetic to algebra.
2) Diophantine equations.
3) Pythagorean triples.
4) Some algebraic resolution methods for cubic a quartic equations.
5) Lattices and Boolean Algebras.
6) Elements of graph theory.
7) The three classical geometric problems.

8)   The history of the V Euclide's Postulate and the non-Euclidean geometries.
9)   Dynamic Geometry.

Teaching methods:
Lectures, analysis, seminar and discussion of journal papers and other type of texts

Auxiliary teaching:
Individual notes taken attending the lessons. Journal papers and other texts selected and given by the teacher

Assessment methods:
Evaluation of the group and individual activities performed durign the course and final oral examination.

Bibliography:
- Courant R., Robbins H., Che cosa è la matematica?, Bollati Boringhieri
- Ore O., I grafi e le loro applicazioni, Zanichelli, Bologna.
- Agazzi E., Palladino, D., Le geometrie non euclidee e i fondamenti della geometria, ed. La Scuola.
- Villani V., Cominciamo da zero, Pitagora Editrice, Bologna.
- Villani V., Cominciamo dal punto, Pitagora Editrice, Bologna.
- Villani, Bernardi, Zoccante, Porcaro, Non solo calcoli, Springer Verlag Italia, Milano.