



FOUNDATIONS OF MATHEMATICS

Enrollment year	2015/2016
Academic year	2015/2016
Regulations	DM270
Academic discipline	MAT/04 (COMPLEMENTARY MATHEMATICS)
Department	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
Course	MATHEMATICS
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	2nd semester (01/03/2016 - 10/06/2016)
ECTS	6
Lesson hours	56 lesson hours
Language	ITALIAN
Activity type	ORAL TEST
Teacher	ANTONINI SAMUELE (titolare) - 6 ECTS
Prerequisites	Principal properties of: sequences, numerical series, limits, classical numerical sets (natural, integers, rational, real and complex numbers).
Learning outcomes	The course aims to offer an analysis on the mathematical method, on the classical and modern axiomatic systems, on the meta-theoretical issues arisen in the 20th century, and on the attempts to solving the problem of foundations of mathematics.
Course contents	<p>Axiomatic method and meta-theoretical issues. Examples of classical and modern axiomatic systems. Peano Arithmetic. Cantorian set theory. Paradoxes, crisis of foundations, foundational programmes. Zermelo-Fraenkel set theory. Construction of number sets (integer, rational and real numbers).</p> <p>Extended summary</p>

	<p>Axiomatic method: primitives and axioms. Meta-theoretical issues in modern axiomatic systems: consistency, independence, completeness. Euclidean Geometry and Hilbert Geometry.</p> <p>Peano Arithmetic: independence of axioms. Definition by induction. Addition, multiplication and order.</p> <p>Cantorian set theory: comparing of infinite sets, countable and uncountable sets. Cantor's Theorem.</p> <p>Paradoxes and crisis of foundations. Frege and the Russell's antinomy. Foundational programmes: logicism, intuitionism, formalism.</p> <p>Zermelo-Fraenkel set theory. Construction of number sets: integer, rational, real numbers through Dedekind's cuts and through Cauchy's sequences.</p>
Teaching methods	Lectures and discussions on the theoretical part and on the solution of problems and exercises.
Reccomended or required readings	<p>- Borga, M., Palladino, D. oltre il mito della crisi: fondamenti e filosofia della matematica nel 20 secolo. Brescia, La scuola, 1997.</p> <p>- Fiori, C., Invernizzi, S. Numeri reali. Pitagora, 1999.</p> <p>- Teacher's notes</p>
Assessment methods	Written and oral examination.
Further information	Written and oral examination.
Sustainable development goals - Agenda 2030	\$lbl legenda sviluppo sostenibile