

COURSE OF STUDY	MATHEMATICS (L-35)
ACADEMIC YEAR	2023-2024
ACADEMIC SUBJECT	METHODOLOGY AND TECHNOLOGY FOR MATHEMATICS EDUCATION 1

General information	
Term	Second semester
European Credit Transfer and Accumulation System credits (ECTS)	7
SSD	MAT/04 – Complementary Mathematics
Language	Italian
Mode of attendance	Not mandatory

Lecturer	
Name and surname	Antonella Montone
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Department and office	Department of Mathematics, room 1 third floor
Virtual meeting room	
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Office hours	

Work schedule				
	Total	Lectures	Hands-on learning	Self-study
Hours	175	56		119
ECTS credits	7	7		

Learning objectives	
	<p>The course aims, first of all, to build a new idea of mathematics, more alive and constructive, more linked to direct experience, richer in meanings and internal references, to overcome the widespread idea of an abstract discipline, rigid in its rules and formulations, attentive above all to the precision of the terms and the correctness of symbolic manipulations. Furthermore, by contributing to the cultural and professional preparation in mathematics of the teacher, it aims to orient the transition from the mentality of students to the mentality of teachers in the way of understanding and mastering the contents: from knowing to take an exam to knowledge to learning and to verify learning.</p>

Course prerequisites	

Syllabus	
Course contents	<p>The contributions of pedagogy on the evolution of Mathematics Education as a science. The foundations of constructivism. Teaching-learning models and their influence on the specific teaching of the discipline.</p>

	<p>Learning difficulties in Mathematics: analysis of affective and metacognitive aspects.</p> <p>The Conceptual Fields theory.</p> <p>The theory of situations (according to Brousseau).</p> <p>The Didactic Transposition according to Chevallard.</p> <p>Student / teacher interaction: the educational contract.</p> <p>Student / knowledge interaction: obstacles and errors.</p> <p>Cooperative Learning and Peer Tutoring. The Transalpine Mathematical Rally as a research tool in Didactics.</p> <p>The semiotic mediation theory. Use of digital artifacts and manipulative artifacts to mediate the construction of mathematical meanings.</p> <p>Educational planning of a classroom intervention with the use of artifacts.</p> <p>Software analysis of dynamic geometry: potentiality of the digital tool for argumentation and demonstration.</p> <p>Problem solving to teach: problem posing and problem solving as an educational strategy for overcoming and preventing difficulties; problem solving activity; the stereotypes of the standard school problem; the concrete / abstract contrast; the "good" problems and the level of the formulation.</p> <p>Evaluation of mathematical learning.</p> <p>Communication in mathematics: characteristic aspects of the mathematical discourse.</p>
Reference books	<p>The bibliography references are often the source used by the teacher to deepen the topics covered in class. Therefore the consultation is at the discretion of the student.</p> <p>Baccaglioni Frank et al, Didattica della Matematica, Mondadori Università</p> <p>M.G. Bartolini Bussi, i numeri e lo spazio, Edizioni Junior.</p> <p>Zan, R. (2007). Difficoltà in matematica. Osservare, interpretare, intervenire. Springer Verlag.</p> <p>Zan, R. (2016). I problemi di matematica. Difficoltà di comprensione e formulazione del testo. Carocci Faber.</p> <p>V. Villani, Cominciamo da Zero, Pitagora, 2003.</p> <p>V. Villani, Cominciamo dal punto, Pitagora, 2006.</p> <p>- U.M.I. Matematica 2001- Materiali per un nuovo curriculum di matematica con suggerimenti per attività e prove di verifica: http://umi.dm.unibo.it/old/italiano/Matematica2001/matematica2001.html</p>
Additional course materials	Notes, slide and materials from the teacher
Repository	

Expected learning outcomes	
Knowledge and understanding	Possession and critical knowledge of the methodologies, theoretical foundations and languages of mathematics.
Applying knowledge and understanding	<p>Planning learning paths in mathematical context.</p> <p>Knowing methodologies suitable for Mathematics teaching-learning paths</p> <p>Reading, interpreting, and analysing dissemination and research articles in mathematics teaching, demonstrating the ability to grasp, evaluate and use the results of empirical studies in order to build knowledge and improve interventions.</p> <p>Working in a group to design organization and verification of educational-didactic interventions</p>
Soft skills	<i>Making judgements:</i>

	<p>Recognizing arguments, and demonstrations correct procedures and reasoning to identify incorrect or incomplete, possibly by correcting or supplementing them; informative articles pertaining to interpret and possibly translate and comment mathematical texts from other languages</p>
	<p><i>Communication skills:</i> Communicating and arguing with clarity and relevance issues mathematical formulations consistent with the public they serve being able to draw conclusions with accuracy both in writing and oral</p>
	<p><i>Learning skills:</i> acquiring a flexible mindset and being able to fit in quickly in the workplace, adapting easily to new problems and quickly gaining the necessary skills</p>

Teaching methods	
	<p>Lecture, workshop Laboratory approach Working group Problem solving activity</p>

Assessment	
Assessment methods	<p>Through intermediate tests the possession and the critical knowledge of the theoretical foundations and of the mathematical languages and the didactic knowledge related to the basic didactic theories, with attention to interdisciplinary connections, will be verified. The final oral exam will serve to ascertain the communication skills and organization of the acquired knowledge, the ability to be able to work with a wide autonomy, even assuming scientific and organizational responsibilities.</p>
Evaluation criteria	<p>The learnings will be evaluated at various levels, through the final oral exam, and possibly exercises administered in itinere. The student will have to demonstrate mastery in the use of mathematical concepts, the relationships between the different structures studied, communicate and argue clearly.</p>
Grading policy	<p>Vote in thirtieths</p>

Further information	