



# I seminari del Centro Cesari



A.D. 1308  
**unipg**  
UNIVERSITÀ DEGLI STUDI  
DI PERUGIA

**29 novembre 2023**

ore 16:00 - Aula A3

Dipartimento di Matematica e Informatica



**Luca Dede'**

Dipartimento di Matematica  
Politecnico di Milano

## ***Models and Algorithms for the Computational Medicine of the Heart***

We delve into the vital concepts of mathematical modeling and scientific computing, elucidating their profound significance across various disciplines, applied sciences, and engineering. Through a series of illustrative examples, we unveil the key attributes of scientific computing, with a particular focus on accuracy, computer-based problem-solving, and computational costs. We show how models, equations, and algorithms are increasingly influencing healthcare, with a particular emphasis on computational and precision medicine. We showcase the application of scientific computing tools to simulate the human heart's physiology, improving the understanding of its function. We highlight several instances in personalized medicine where numerical simulations of the heart have greatly contributed to more accurate surgical interventions and improved clinical treatments for various cardiac pathologies. We also introduce the emerging discipline of Scientific Machine Learning, which combines physics-based and data-driven modeling for constructing digital twins. Finally, we present through examples the revolutionary impact of algorithms in Machine Learning and Deep Learning on the construction of heart digital twins.



Aula virtuale Teams  
<https://u.garr.it/ianCI>

DIPARTIMENTO DI MATEMATICA E INFORMATICA  
DIPARTIMENTO DI ECONOMIA  
DIPARTIMENTO DI INGEGNERIA  
DIPARTIMENTO DI FISICA E GEOLOGIA  
DIPARTIMENTO DI INGEGNERIA CIVILE ED AMBIENTALE  
DIPARTIMENTO DI SCIENZE AGRARIE, ALIMENTARI E AMBIENTALI

[www.dmi.unipg.it/ricerca/centro-cesari](http://www.dmi.unipg.it/ricerca/centro-cesari)