

Title of the doctoral program

Computer and Control Engineering

Title of the research activity

Methods and algorithms for multi-stage decision problems in finance

Short description of the research activity

A fundamental problem faced by financial institutions is that of making an investment allocation decision at time 0 with a target objective at time T, while having the possibility of adjusting their allocation at successive stages $k=1, \dots, T$. Due to uncertainty in the outcomes of the investments, this raises a dynamical stochastic decision problem, that has to take into account multiple objectives (e.g., maximize return, minimize exposure to risk) and constraints (e.g., budget conservation, drawdown limit, liabilities, etc.).

The candidate is expected to learn advanced methodologies for dynamic optimization under uncertainty, and develop effective tools for practical implementation of the methods, while working in contact with professionals in the field.

The objectives of this Ph.D. research program are twofold. First, the candidate will acquire the necessary theoretical competencies in various fields that are instrumental to this project, such as: stochastic systems, financial asset allocation, control of uncertain systems, and optimization theory and algorithms. Second, the research will focus on specific problems of dynamic asset allocation in finance, with the objective of developing both theoretical models and effective numerical algorithms, enabling an efficient solution of real-world problems of practical interest to financial institutions. Upon successful completion of this Ph.D. program, the candidate will be an expert in advanced optimization methods under uncertainty, and formed to enter as a professional worker in the area of quantitative finance.

Scientific responsible (name, surname, role, email)Giuseppe Calafiore, Full professor; giuseppe.calafiore@polito.it**Number of vacancies for XXXI cycle (3 years program)**

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Specific requirements (experiences, skills)

Basic knowledge of linear algebra, optimization, algorithms and computer programming (including matlab) is required.

Website of the research group (if any)

http://www.dauin.polito.it/research/research_groups/sds_systems_and_data_science

http://staff.polito.it/giuseppe.calafiore/Home_Page/Home.html