Luca Ratzinger

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LinkedIn | Portfolio

EDUCATION

Imperial College London: G103 Mathematics (MSci 4YFT) (October 2021-June 2025)

- First Year Total (2021/22): 84.40 / 100 (Dean's List : top 10%)
- Second Year Total (2022/23): 86.51 /100 (Dean's List)
- Third Year Total (2023/24): 89.79 / 100 (Expected Dean's List)

Liceo Ginnasio Luigi Galvani (September 2016-June 2021)

- Esame di Stato (Scientific Italian-English Highschool Diploma): 100 / 100 cum laude

EXPERIENCES & PROJECTS

IROP (International Research Opportunities Programme) - Tokyo Institute of Technology, Takayasu Research Laboratory (July-August 2023):

- Used Python to process large datasets of population GPS data, fit a discretised SIR activity model to the infectivity rate in Japan during the COVID-19 pandemic.
- Calculated infectivity rate depending on location (using fitted model parameters and 1km-grid used by the Japanese Statistics Bureau for spatial statistics).
- Analysed population travel behaviour during the pandemic to measure effectiveness of States of Emergency declared by the Japanese government.
- Wrote a report as a LaTeX document and presented my work to the Takayasu Research Laboratory team.

Time Series Analysis Project (Python) - IMPERIAL COLLEGE LONDON (December 2023):

- Fit an autoregressive (AR) model to time series data (sea level measurements) using Yule-Walker and Least Squares methods and used estimated parameters to forecast future values.
- Used periodogram and cosine tapers to estimate periodograms of given time series to discover periodic behaviour present in data.

Year 2 Research Project- IMPERIAL COLLEGE LONDON (June 2023):

- Worked in a team to discover original mathematical results regarding the decomposition of the Hilbert Scheme, with a linear algebraic approach.
- Produced a report as a LaTeX document and presented our work orally.

EEE (Extreme Energy Events) Project - Liceo Ginnasio Luigi Galvani (2018-2020):

- In a research program coordinated by INFN (National Institute for Nuclear Physics), helped record data on cosmic rays on a weekly basis using an MRPC (Multigap Resistive Plate Chamber) cosmic ray detector, built by former students of the school at CERN.

SELF-DIRECTED PROFESSIONAL DEVELOPMENT (Portfolio)

Financial Mathematics and Derivatives Pricing (July-September 2024):

- Hull, J.C. (2003). Options, Futures, and Other Derivatives (2nd ed.), Prentice-Hall: Studied a range of derivative instruments, hedging strategies, Ito processes, and Black-Scholes Analysis.
- Implemented numerical procedures for derivatives pricing and hedge parameter estimation, including Binomial Trees, Finite Difference methods, Monte Carlo simulations.

SKILLS

- Stochastic Processes, Statistical Modelling and Data Visualisation (Python, Numpy, Pandas, Matplotlib)
- Data Science and Machine Learning (Python, Scikit-learn): Supervised/Unsupervised Learning Methods, Preprocessing and Prediction Pipelines, Hyperparameter Tuning, Ensemble Models.

Languages: English (CEFR Level: C2), Italian (Native), French (DELF B2)

Programming & Software: Python, SQL, R, MATLAB, LaTeX, Microsoft Excel

Extracurricular: Imperial College Ultimate Frisbee (President/Club Captain 2024/25)