

Matthew Marsh

+44 7539 908500 | matthewmarsh2001@icloud.com | [linkedin.com/in/matthew-marsh](https://www.linkedin.com/in/matthew-marsh)

EDUCATION

Imperial College London - PhD Optimisation and Machine Learning for Chemical Engineering 2024-2028

- Project Title: Data-Driven Modelling, Optimisation and Control under Uncertainty for Chemical Processes
- Investigating uncertainty quantification and enforcing constraint satisfaction within data-driven models.
- Supervised by Dr. Antonio Del Rio Chanona and Prof. Benoit Chachuat, in Optimisation and Machine Learning PSE Group (OptiML), funded by departmental scholarship

Imperial College London - MEng Chemical Engineering 2020 - 2024

- Achieved a first class grade in each of the 4 years of the course; overall average **73%**
- Specialised in Process Systems Engineering, choosing the following Elective Modules: Advanced Process Optimisation, Advanced Process Operations, Dynamic Behaviour of Process Systems, Practical Process Engineering in Oil and Gas Industry, Machine Learning for Chemical Engineering, Carbon Capture and Clean Fossil Fuels, Sustainable Energy Technologies.
- Final Year Research Project: Use of Artificial Intelligence in Process Control of Separation Systems, supervised by Dr. Maria Papathanasiou

Merchant Taylors' Boys School, Crosby 2013 - 2020

- A-Levels – Mathematics – **A***, Further Mathematics – **A***, Physics – **A***, Chemistry – **A***, best in school cohort.
- GCSEs – six grade 9s, iGCSEs – three A* grades, best in school cohort.

WORK EXPERIENCE

HSBC - Global Markets Trading Summer Analyst June 2023 - September 2023

- Rotation through Prime Securities Financing, self taught and used Python to analyse large data-sets of client positions, attempting to optimise inventory and minimise balance sheet use with axes sent to other clients.
- Second rotation through equity cash trading, learning dynamics of financial markets and execution strategy.
- Final Project Trade Idea: Used a Monte Carlo simulation to stock pick to find equities in the S&P500 that outperformed during market downturns, maximising return but minimising variance. Achieved top mark out of intern cohort.
- Accepted PhD offer instead of returning for full-time Analyst role.

PROJECTS

Using LSTM Networks for Stock Prediction

- Built an LSTM Network using PyTorch to predict the probability the close price of the S&P500 index will be higher than the current price from a midpoint of trading day, with uncertainty estimation
- Utilised PCA and feature engineering of different covariates to update probability estimates using a Bayesian framework, optimised the network architecture and hyperparameters using Bayesian Optimisation

Statistical Techniques for Football Match Prediction

- Utilised different statistical methods for prediction of outcomes of football matches, including utilisation of metrics such as Expected Goals (xG) for Monte Carlo simulation to probability of match outcomes
- Improved knowledge of different methods, such as Kernel Density Estimation to utilise previous xG performance to reconstruct future prediction distributions and assess win probabilities for future matches

LEADERSHIP & EXTRA-CURRICULAR

Imperial College Hockey Club Club Captain June 2024 - Present

- Lead the Executive Committee for the biggest sports society at the University, responsible for the day-to-day running, direction and strategy for both elite-performing and beginner level teams.
- Represent the Club's interests at the various Union Committees.

Treasurer June 2023 - June 2024

- Turned around spending deficit to ensure the club remained viable and implemented a sustainable spending strategy.
- Completed the Annual Budget for the forthcoming year, which I successfully argued to achieve the maximum amount of Union funding.

Men's 1XI Captain June 2022 - June 2023

- Improved leadership and team-working expertise leading a Performance Squad, one of the premier teams in the University.
- Developing a more elite and growth mindset whilst improving team culture and cohesion by leading an objective driven approach.

Other Roles: Sponsorship Secretary (22-23), M1s Social Secretary (21-22)

MISCELLANEOUS

Relevant Prizes / Courses

- Python for Financial Analysis and Algorithmic Trading (Udemy)
- Intro to Machine Learning & Intermediate ML - Kaggle
- Control Bootcamp, Data-Driven Control, Probability Bootcamp, Introduction to Statistics and Data Analysis - Steve Brunton
- Information Theory, Pattern Recognition, and Neural Networks - University of Cambridge, David JC Mackay
- RSC Olympiad & Cambridge Chemistry Challenge - Gold Award
- Great Crosby Exhibition Scholar & Harrison Scholar - Merchant Taylors' School, Crosby

University Societies: Data Science Society, Investment Society, Finance Society, Algorithmic Trading.

Additional Interests: Hockey - previously played National League level at Preston HC, currently Regional Premier Division at London Academicals HC, additionally captained regional and county age group squads (U18).

Others include: Cricket, Football, Cycling, Cooking, Travelling, Poker.