

# Claudio Vestini

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## EDUCATION

### Princeton University, Mechanical & Aerospace Engineering, Princeton (NJ), US

Aug 2025 – May 2026

- Selected as 1 of 2 from ~30 applicants for competitive final-year exchange program (degree awarded from Oxford)

Relevant courses (current grade/A):

- MAE546-Optimal Control: Calculus of Variations, Hamiltonian Systems, Pontryagin's Maximum Principle (A)
- ORF522-Linear and Nonlinear Optimisation: The Simplex Method, KKT Conditions and Duality, First-Order and Proximal Methods, Operator Theory, Operator Splitting and ADMM, Data-Driven and Robust Optimisation (A)
- MAE341-Space Flight: Attitude Dynamics, Orbital Mechanics, Space Mission Analysis, Ansys STK (A)
- PHY321-General Relativity: Special Relativity, Field Equations, Nonrotating Black Holes, Gravitational Waves (A)

### University of Oxford, MEng Engineering Science, Oxford, UK

Oct 2022 – Jun 2026

- Ranked 8<sup>th</sup> among all engineering students at the university (top 4%)
- Achieved First Class Honours (maximum UK grade) in all first-, second-, and third-year exams
- Keble College Scholar with three consecutive academic college scholarships endorsed by Governing Body
- Awarded several academic grants, including KCSR118 (second year), EUROP and EPSRC (third year)

Relevant courses (final grade/100):

- P1-Mathematics: Linear Algebra, Calculus, Differential Equations, Fourier Analysis, Probability (90)
- A4-Energy Systems: Thermodynamics, Combustion and Cycles, Incompressible Fluid-Mechanics (88)
- B5-Solid Mechanics: Elasticity and Plasticity, Statics and Structures, Kinematics and Dynamics, Materials (72)
- B14-Systems & Information Engineering: Estimation, Inference, Signal and Image Processing, Decision Theory (92)
- B15-Control Theory: Dynamical Systems, Optimal (LTI) Control, Kalman Filters, Robust Control (73)
- B19-Fluids: Turbulence and Boundary Layers, Compressible Fluid Mechanics, Supersonic and Hypersonic Flow, Turbomachinery and Chemical Propulsion Devices, Heat Exchangers, Computational Fluid Dynamics (CFD) (88)
- B20-Machine Learning: Discriminative ML including Support Vector Machines, Perceptrons and Neural Networks, Generative ML including Bayesian Models, Variational Inference, Sampling Methods, Markov Chain Models (69)

### Ferndown Upper School, Sixth Form, Ferndown, UK

Sep 2020 – Jun 2022

- Advanced Level (A-Level): Mathematics (A\*), Further Mathematics (A\*), Physics (A\*)
- Advanced Subsidiary Level (AS-Level): Mathematics (A), Further Mathematics (A), Physics (A), Computer Science (A)
- Gold Award for best academic performance in both year 12 and year 13 for Maths, Further Maths and Physics
- Led school team to first place in the Exeter Mathematics School KS5 Physics Challenge, in a competition of 16 schools

### Liceo Scientifico (High School) Albert Einstein, Rimini, Italy

Sep 2017 – Jun 2020

- Terza Liceo*: Twelve 9s/10s, including 9 in Italian and Philosophy, 10 in History, Latin, Maths, Physics, Chemistry

## TECHNOLOGY

**Proficient:** Linux, Git, Docker, LaTeX (Overleaf), Python (JAX, PyTorch, TensorFlow), MATLAB & Simulink, CAD and FEA3 (SolidWorks), CFD and STK (Ansys), Microsoft Excel, Word, PowerPoint, Google Sheets and Docs

**Familiar:** C++, C

## RESEARCH EXPERIENCE

### Senior Thesis, Princeton University, Princeton, NJ, US

Sep 2025 – Present

(Supervised by Operations Research and Financial Engineering professor Bartolomeo Stellato)

“Probabilistic Performance Guarantees for Parametric Optimisation Problems via Conformal Prediction”

- Applying calibration-conditional conformal prediction tools to analyse the performance of first-order methods for linear MPC and image deblurring problems, implementing the solutions in a Python JAX [codebase](#)

### Academic Researcher, EPSRC Vacation Internship, Oxford, UK

Jun 2025 – Sep 2025

(Supervised by Oxford Control group professor Kostas Margellos)

“A Priori Guarantees for Data-Driven Certificate Synthesis”

- Enhanced a newly developed compression learning algorithm to synthesise certificate functions (barrier, Lyapunov, reach-while-avoid) for nonconvex control problems. Reformulated the algorithm to provide probabilistic guarantees
- Deployed scenario approach theory bounds, successfully providing a priori risk guarantees for all certificate classes
- Devised numerical experiments to evaluate the new algorithm on the synthesis and verification of neural certificates using data-driven techniques, implementing the solution within the established FOSSIL framework. The experiments were simulated and validated using Python in a PyTorch environment at the following [codebase](#)

### Third-year project (3YP), University of Oxford, Oxford, UK

Oct 2024 – May 2025

(Supervised by Oxford Thermofluids Institute professors Tobias Hermann and Luke Doherty)

“Heatshield Materials Testing during CubeSat Re-Entry with Passive Demise”

- Designed the Model Predictive Attitude Determination and Control (MPC-ADC) system, integrating the logic in MATLAB Simulink using the Model Predictive Control Toolbox
- Developed a custom-made Finite Difference, Forward-Time Centred-Space (FTCS) Thermal Solver in MATLAB to test and analyse the performance of the proposed ablative heat shield
- Created a SolidWorks CAD model for the CubeSat, incorporating the design of the Thermite for Demise (T4D) system
- Executed reacting, compressible, hypersonic CFD simulations in Ansys Fluent to analyse the flow regimes encountered during atmospheric re-entry, using Adaptive Mesh Refinement schemes to capture shockwaves and expansions

### Research Internship, Diamond Light Source, Oxfordshire, UK

Aug 2024 – Oct 2024

(Supervised by Oxford Control Group senior research associate Idris Kempf)

“Fast-Forwarding Stalling in Dykstra’s Algorithm”

- Authored my first [publication](#) ([available as preprint on arXiv](#)), with pending submission to the 23<sup>rd</sup> International Federation of Automatic Control (IFAC) World Congress in Busan, South Korea
- Refined the theoretical formulation of Dykstra’s algorithm for projecting onto the intersection of convex sets
- For polyhedral sets, solved an associated stalling problem by formalising the stalling conditions, precomputing the length of the stalling period once the conditions are met, and fast-forwarding the algorithm beyond the stalling phase
- Established a modular Python [implementation](#) to implement the proposed algorithm and benchmark against the interior-point solver quadprog, demonstrating linear convergence while guaranteeing reliable projections

## TEACHING EXPERIENCE

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### Lead Tutor, Hilltop Academy, Oxford, UK

Oct 2024 – Aug 2025

- Demonstrated advanced pedagogical skills over 500+ hours of instruction for 70+ students, specialising in STEM subjects including GCSE and IB/A-level Physics, Maths, Further Maths, and Chemistry
- Mentored high-achieving candidates through highly competitive admissions processes, providing targeted preparation for Oxbridge entrance exams (PAT/MAT) and comprehensive interview training
- Incorporated versatile teaching strategies, delivering lessons both online (Zoom, Teams, Meet) and in person, including small-group classes of up to 10 students

### Independent Tutor, UK, Italy

Sep 2020 – Aug 2025

- Provided specialised mentorship to students from top UK prep schools (e.g., Eton, Winchester, Westminster), focusing on deep conceptual understanding and problem-solving strategies
- Successfully guided students to achieve high-stakes academic goals, including 90%+ test grades for most students
- Prepared students for elite mathematics and physics competitions, including the British Mathematical Olympiad (Rounds 1 and 2) and the British Physics Olympiad (Rounds 1 and 2)

## FURTHER EXPERIENCE

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### Founder and Chief Engineer, Oxford University Rocketry Society, Oxford, UK

Oct 2024 – Aug 2025

(National Mach25 High-Power Rocketry competition, first participation by University of Oxford students)

- Founded the student project, facilitating the accreditation of the MEng course with the Royal Aeronautical Society; secured sponsorship and over £12k in funding from the Department of Engineering Science, RS Components, Ansys
- Administered a team of 15, promoting collaborative technical development and tight version control standards

### Embedded Systems Micro Intern, OxVent, Oxford, UK

Jul 2023 – Aug 2023

(University startup, funded by the UK government, designing easy-to-use ventilators for COVID-19 patients)

- Developed C++ software for a high-grade, low-cost mechanical ventilator, enhancing the user interface; standardised system schematics in a comprehensive Simulink model, resulting in significant efficiency improvements
- Analysed biomedical data trends to inform commercial strategies, supporting a projected 25% profitability increase

### President, Oxford University Gliding Club, Oxfordshire, UK

Jun 2024 – Jun 2025

- Organised several club flying days and social events, resulting in over £4,500 in sales for 150+ introductory flights
- Managed and administered club assets, including inspections, maintenance and insurance for the club’s 2 fibreglass gliders (each worth £120,000), ensuring safe and efficient use of the club’s resources for all members

## SKILLS & INTERESTS

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**Languages & Immigration Status:** Bilingual English and Italian, fluent Spanish. Pre-Settled Status (UK), F1 visa (US)

**Interests:** Aviation (pre-solo glider pilot), skiing (Kemble College ski Representative), downhill mountain biking, digital photography (Sony A-7iii, DJI drones), visual art (Royal Academy young member, Courtauld friend, explored 120+ galleries worldwide), music and vinyl records, literature (favourite author: F.M. Dostoevsky), travel (visited 32 countries)