

# James Chen

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## Education

### Imperial College London

2021-2025

#### MSci Mathematics

- Expected First Class Hons
  - Year 2 total: 93.07%, Top 5% + Dean's list
  - Year 1 total: 86.97%, Top 5% + Dean's list
- Relevant modules: *Computational Linear Algebra, Function Spaces and Applications, Applied Complex Analysis, Probability Theory, Finite Elements: Numerical Analysis and Implementation, Advanced Topics in PDES, Computational PDES, Stochastic Differential Equations in Finance.*
- Extra-curricular Horizons/I-Explore course: *Mandarin (Level 1, 2, 3), Business Economics*
- Awards:
  - G-Research Prize, awarded for academic excellence 2022
  - Mathematics Department Second Year book Prize, for Excellence 2023

### Research experiences/Projects

UROP: Undergraduate Researcher (Supervisor: Dr Sheehan Olver) June 2023 – November 2023

- Investigated the eigenvalue statistics of sums of independent random matrices and their relation to the field of free probability, which has applications in signal processing.
- Developed algorithms to numerically evaluate eigenvalue distributions using methods from computational complex analysis. New results on the behaviour of the Stieltjes transform allow for rigorous justification of the methods.
- Programmed algorithms using the Julia programming language, in the open-source package NumericalFreeProbability.jl, which taught me the importance of efficiently implementing algorithms from theory into practice.
- Results presented at the Imperial-UCL Numerics seminar on 29/11/2023. Paper to be submitted for publication pending.

2<sup>nd</sup> Year Group project – Imperial College London

May 2023 – June 2023

- Worked in a team of 5 to investigate the evolution of periodic solutions in the Lorenz system over variation of a key parameter.
- Applied computational linear algebra techniques such as Arnoldi iteration and GMRES to numerically find both stable and unstable solutions, justified with mathematical rigour. Investigations into stability of results were achieved by Floquet analysis.
- Implemented core mathematical algorithms in MATLAB to locate and plot solutions, which were used to illuminate the behaviour of bifurcations within the system. Figures were incorporated into a 40-page report, which was produced in LaTeX.
- Presented as a group on the 21/6/2023 with overall mark of 86.50%.

### Chetham's School of Music

2014 – 2021

- 5A\* (Mathematics, Further Mathematics, Physics, Chemistry, Music)

### Technical Skills

- Python, Julia, LaTeX, MATLAB, R, C++, Mathematica
- English (Native), Mandarin (HSK L3)

## **Work Experience**

Problem Solving Matters: Mentor

June 2023 – September 2023

- Mentored a group of 8 Year 12 students through sets of questions designed for university admission test preparation, including STEP and MAT tests for Cambridge and Imperial.
- Communicated and explained mathematical ideas, tips and tricks in an accessible way.

Peer Tutor

November 2023 – April 2024

- Provide academic support for 6 first year mathematics students by conducting organised weekly tutorials.
- Motivated mathematical ideas by presenting applications in other fields such as computer science and physics.

Freelance Piano Teacher

2021 – present

- Organised lessons for 4 pupils on a weekly basis both in-person and online, in an efficient manner.
- Recent students achieved distinction in ABRSM Graded Exams in-person exams.

## **Extracurricular activities and other interests**

- Semi-professional pianist: DipABRSM Distinction, LRSM and FTCL diplomas in piano performance.
- Member of Imperial College Chamber Music society.
- Recipient of the Ede and Ravenscroft Music Bursary, awarded to students who contribute to musical life at Imperial significantly.