Ruiyao Zhou

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Profile & Interests

Third-year mathematics student on an MSci program at Imperial College London, with primary interests in analysis and geometry. Currently on exchange year at MIT, taking Differential Analysis I (18.155), Geometry of Manifolds (18.965), Differential Geometry (18.950) and Theory of Probability (18.675). Interested in geometric analysis, inverse problems, and PDEs. My current goal is to develop analytical and geometric tools for my interests while exploring different flavors of mathematics such as topology and algebra to identify directions for doctoral research.

Education

2023 – 2027 **Imperial College London**, MSci in Mathematics
Exchanging in Year 3 at Massachusetts Institute of Technology
Year 1 Marks: 88.74%; Year 2 Marks: 90.00% (Top 5% of cohort)
Awarded First-Year Project Prize on semidirect products and group classifications (Supervisor: Prof. Corti, Mark: 100%)
Summer 2024: Studied Riemann surfaces and algebraic curves at Institute of Science, Tokyo under Prof. Masaharu Tanabe via the International Research Opportunities Programme (IROP).

2020 – 2023 **KCISEC, Kunshan, China**
Advanced Placements: 5s in AP Research, Calculus BC, Physics C, and Computer Science A (Java).

Experience

International Research Opportunities Programme, Science Tokyo Jul - Aug, 2025

- Selected as one of two students from Imperial's Mathematics Department for research exchange.
- Focusing on Miranda's *Algebraic Curves and Riemann Surfaces*, exploring holomorphic maps, differential forms, and divisors.
- Gained experience in geometric reasoning and delivered biweekly seminar presentations that improved mathematical delivery greatly.

Curricular Projects, Imperial College London 2024 – 2025

- **Year 1 Research Project (Groups and Symmetries, Prof. Corti):** explored the construction of semidirect products and use them to classify groups of order 30; presented poster.
- **Year 2 Group Project (Homogeneous Spaces, Dr. Lawn):** Collaborated on report covering manifolds, Lie groups, and homogeneous spaces.
- Completed probability/statistics coursework using R for data analysis, simulation, and report generation.

Imperial & Optiver Trading Academy, On Campus Nov 7 – Nov 29, 2023

- Developed a functional trading algorithm using the Optibook coding interface.
- Acquired practical exposure to derivatives and mathematical finance.
- Enhanced collaborative coding practices with a computer science senior.

AP Research – Using Markov Chains to Model the Pandemic Sept 2022 – April 2023

– Earned the highest score (5) for the AP Research paper.

– Modeled infection dynamics using ODEs and Markov chains.

– Produced and presented a detailed research report demonstrating strong analytical skills.

Coursework (Fall 2025)

18.155 Differential Analysis I : Distribution Theory, Sobolev Spaces, Fourier and Complex Analysis methods in Partial Differential Equations.

18.950 Differential Geometry: prerequisite of 18.965, similar to Geometry of Curves and Surfaces at Imperial

18.965 Geometry of Manifolds: intro to Riemannian geometry together with the fundamentals of geometric analysis: Laplacian comparison, Gradient estimates and Liouville theorems, Mean curvature flow, Analysis on submanifolds, and the Bochner technique.

18.675 Theory of Probability: measure theoretic treatment of probability, central limit phenomena, infinitely divisible laws, Levy processes, Brownian motion, conditioning, and martingales.

Skills

Programming	Python, R, Java, LaTeX
Communication	Seminar presentation, collaborative writing, academic reporting