

# Thomas Chaplin

[@tomrchaplin](#) | [tomchaplin.xyz](#) | [github.com/tomchaplin](#)

## EDUCATION

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### DPhil Student - Mathematics

October 2020 - present

*The University of Oxford*

- Thesis Topic: Path homology and directed flag complex homology - behaviour on random directed graphs, and applications to biological and financial networks.
- Developed an interpretable, topological descriptor for weighted digraphs, which is provably stable to typical numerical and structural noise. See first pre-print.
- Exploring applications, including distinguishing between healthy and unhealthy vascular networks and inferring parameters of directed network models via approximate Bayesian computation.
- Invited to present the new descriptor to the Applied CATS seminar at KTH.
- Collaborating with a post-doc to develop efficient software in Rust for computing the descriptor.
- Studied the typical behaviour of a homology theory for directed graphs on a random model, using techniques from probabilistic combinatorics and a computer-aided proof. See second pre-print.
- Notable Courses: 'MPI for High Performance Computing'; 'Introduction to Machine Learning in Production' (using scikit-learn and BentoML); 'Probability and Statistics of Network Analysis'; 'Manifold Learning Reading Group'; 'Geometric Deep Learning Reading Group'.

### MMath - Mathematics (First Class Honours)

October 2016 - July 2020

*The University of Warwick*

- Thesis: Dynamical models for the transition to turbulence in channel flow
- Notable modules include Maths of Machine Learning and Stochastic Processes.

### Secondary Education

September 2009 - August 2016

*Sir Joseph Williamson's Mathematical School*

- A/(AS)-Levels: Mathematics A\*, Further Mathematics A\*, Physics A\*, (French A)
- GCSEs: 11 GCSEs grades A\*-A, Further Maths AQA Level 2 Certificate (A\* with Distinction)

## PROFESSIONAL EXPERIENCE

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### College Tutor/Teaching Assistant/MATLAB demonstrator

October 2020 - present

*The University of Oxford*

- Delivered teaching and marked assignments for classes in computational mathematics, topology, group theory, multidimensional analysis and algebraic geometry.

### Full-stack Web Developer

June 2019 - October 2020

*Imperium Risk*

- Developed an operational risk management web app for financial institutions, which was used to successfully pitch to the company's initial 'Fortune 500' client.
- Tech stack: React, D3.js, Tableau, Express.js, MySQL.
- Provisioned cloud hosting on AWS for demo, staging and production environments.
- Responsible for on-boarding two new developers.
- Conducted performance tests; improved under-performing query times by order of magnitude.
- Gained practical experience with development tools such as webpack, npm, gulp.js, bash and git.

### Undergraduate Supervisor

October 2019 - March 2020

*The University of Warwick*

- Supported 10 first-year undergraduates through their core mathematics modules, marking weekly assignments and providing personalised lessons in small groups.

## PRE-PRINTS

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- Thomas Chaplin, Heather A. Harrington and Ulrike Tillmann. "Grounded persistent path homology: a stable, topological descriptor for weighted digraphs". arXiv: 2210.11274 [math.AT]. [\[Twitter\]](#)
- Thomas Chaplin. "First Betti number of the path homology of random directed graphs". Accepted subject to final editing. In: *Journal of Applied and Computational Topology*. arXiv: 2111.13493 [math.AT].