Frankie Gillis

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Education

University of St Andrews | MMath (Hons) Mathematics — Sept 2024 – May 2028

- Sub-honours average: $19.75/20$
- Grades: Linear Mathematics (20), Analysis (20), Multivariate Calculus (19), Combinatorics and Probability (20), Abstract Algebra (20), Vector Calculus (20), Mathematical Modelling (20), Statistical Inference (20).

Research Experience

Undergraduate Researcher — Summer 2025

- Summer research internship under the supervision of Dr Thomas Coleman in the School of Mathematics and Statistics researching partial graph automorphisms and their application to studying pseudo-similar vertices in graphs.

Relevant Awards

Highly Commended | Taylor and Francis Group — 2025

- Summer 2025 research poster was rated 'Highly Commended' by a commissioning editor at Taylor and Francis Group, and shortlisted for potential publication on F1000Research.

Tullis Medal and Prize — 2025

- Awarded for achieving the best grades in 2000-level Pure Mathematics.

Laidlaw Leadership and Research Scholarship | Laidlaw Foundation — 2025

- Awarded a stipend of $£6,000$ and travel fund of $£2,000$ to support undergraduate research, leadership development and ethical training.

Writings

"Understanding Pseudo-Similarity in Graphs: a Path to Proving the Reconstruction Conjecture", Research Essay, Published on the Laidlaw Scholars Network.

"Understanding Pseudo-similarity in Graphs: a Path to Proving the Reconstruction Conjecture", Poster, Presented at the Laidlaw Scholars Conference, Durham University, October 2025.

Additional Experience

Software Contributor — Feb 2025 – Present

- Contributed to the development of the Digraphs package for the GAP computer algebra system, for computing with directed graphs. Part of the vertically-integrated project in computational mathematics supervised by Prof James Mitchell.
- Designed and implemented an algorithm to determine if a digraph is 2-edge transitive. Reduced the time complexity of enumerating the 2-edges from $\mathcal{O}(n^3)$ to $\mathcal{O}(n^2 + m)$ for a digraph with n vertices and m edges. Utilised the Orbit-Stabiliser theorem in computing the final step. A note on how `Is2EdgeTransitive` works in available on my github.
- Implemented the method `DigraphMinimumCutSet` to find the minimal cut of a network using the max-flow min-cut theorem from combinatorial optimisation, utilising the existing method `DigraphMaximumFlow`.

Skills and Interests

Software: Python, LaTeX, GAP.