Desmond Coles

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SUMMARY

Mathematician and recent PhD graduate from the University of Texas at Austin. Through my dedicated teamwork mentality and passion for solving mathematical problems I help organizations tackle difficult and opened ended problems.

EDUCATION

The University of Texas at Austin, PhD in Mathematics	3.94 GPA	**2025**
The Ohio State University, BS in Mathematics	3.98 GPA	**2019**

SKILLS & CERTIFICATIONS

- Expert in mathematics including linear algebra, graph theory/discrete mathematics, mathematical statistics, machine learning, topology, category theory, abstract algebra, algebraic & tropical geometry, group theory, number theory.
- Experienced with Python, Rust, Lean and Bash.
- Other: Microsoft office, graphic design using Adobe CC, Adobe Premier, LaTeX, familiarity with Linux operating systems. Public speaking, technical writing, and meeting facilitation. Familiarity with Git and version control.
- Data Science Boot Camp Certification, The Erdős Institute. (2025 Certificate)

EXPERIENCES

Assistant Professor of Instruction   **2025-Present**
The University of Texas at Austin, Austin, TX
- Course design, lecturing, and mentoring students. Teaching advanced calculus to roughly 350 students per semester.

Graduate Researcher & Teaching Assistant   **2019-2025**
The University of Texas at Austin, Austin, TX
- Conducted independent research in algebraic geometry. Planned and executed a multi-part five year research program. Travelled internationally to meet collaborators and present research. Organized 8 semesters of graduate student learning seminars and a summer long multi-university educational program for PhD students and Postdocs. Designed syllabi, gave lectures, mentored younger seminar participants, organized course schedules, and maintained websites.
- Designed and taught classes with an average of 40 students for 10 semesters on material that ranged between first year undergraduate courses to advanced mathematics courses.

Teaching Assistant & Tutor   **2015-2019**
The Ohio State University, Columbus, OH
- Designed and taught classes of undergraduates with an average of 30 students for 6 semesters.
- Individually tutored students for over a dozen mathematics courses.

PROJECTS

Dissertation Research in Algebraic Geometry   **2019-2025**
The University of Texas at Austin, Austin, TX
- Developed novel techniques in tropical geometry for simplifying geometric objects arising from polynomials, for the purpose of computations. Research made use of tools from topology, number theory, algebraic geometry, representation theory, combinatorics, graph theory, and linear algebra. Resolved multiple open questions in the field during 5 multi-year projects.
- Research was presented at 6 international conferences and 5 invited talks at university seminars. Research results were disseminated in 5 articles three of which are still in review.

Contributions to open-source software verification libraries   **2025**
- Contributed to Arklib, an open-source library written in Lean, maintained by the Ethereum Foundation for formally verifying the security and correctness of implementations of different cryptographic protocols, ensuring security and high-performance when used in practice. Resolved multiple open issues in collaboration with the main developers.

Windpower Forecasting in Quebec   **2025**
The Erdős Institute
- Collected four years of wind power generation data from Hydro-Québec as well as weather data and designed machine learning models to forecast power generation using weather data one day in advance, succeeding with over 80% accuracy. Results are available on github.

LEADERSHIP

Graduate Representative Committee   **2020-2022**
- Founded the Graduate Representative Committee for UT Austin math department. Advocated for 100+ PhD students regarding university policy. Designed administrative processes and met regularly with university administration

COVID-19 Outreach   **2020-2022**
- Organized an outreach program with UTeach to support 100+ students in public schools during the COVID-19 pandemic. Designed educational materials, coordinated with the school, and acquired funding for outreach programs.

EXTRA

- Hobbies include, weightlifting, cycling, and salsa dancing.