

Kyle Hansen

Curriculum Vitae

UCSB Department of Mathematics
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Education

- Expected June 2025 **Ph.D. in Mathematics**, *UC Santa Barbara (UCSB)*, Santa Barbara, CA
Advisor: Fedya Manin
Certificate in College and University Teaching (CCUT), *UCSB*, Santa Barbara, CA
June 2021 **M.A. in Mathematics**, *UCSB*, Santa Barbara, CA
May 2019 **B.S. in Mathematics**, *Westmont College*, Santa Barbara, CA
B.A. in Computer Science, *Westmont College*, Santa Barbara, CA

Employment

- 2021-2023 **Adjunct Professor**, *Mathematics*, Westmont College, Santa Barbara, CA
2023 **Adjunct Professor**, *Computer Science*, UCSB, Santa Barbara, CA
2022 **Lead Teaching Assistant**, *Mathematics*, UCSB, Santa Barbara, CA
2019-Present **Teaching Assistant**, *Mathematics*, UCSB, Santa Barbara, CA

Teaching Experience

Adjunct Instructor

Discrete Mathematics, *Westmont College*
F 2023, F 2022, F 2021

Foundations of Computer Science, *UCSB*
Sp 2023

Upper Division Teaching Assistant

Linear Algebra, UCSB
Sp 2024, F 2023, W 2022*

Numerical Methods, UCSB
W 2024

Methods of Analysis, *UCSB*
F 2021, Su 2021*

Lower Division Teaching Assistant

Transition to Higher Mathematics, *UCSB*
Su 2024, Su 2023, W 2021*, Su 2020*, Sp 2020*

Linear Algebra with Applications, *UCSB*
F 2022, Su 2022, F 2020*

Differential Equations, *UCSB*
Sp 2021*

Calculus for the Social and Life Sciences I, *UCSB*
W 2020

Calculus with Applications I, *UCSB*
F 2019

* this term was conducted remotely

Course Grader

Discrete Mathematics, *Westmont College*

F 2018, F 2017, F 2016

MA-020 Linear Algebra, *Westmont College*

Sp 2018

Fundamentals of Mathematics II, *Westmont College*

Sp 2019, Sp 2017

Publications

Under Review

- [1] Kyle Hansen. Simple tilings of nilpotent lie groups. *arXiv preprint arXiv:2402.10194*, 2024.

Published

- [2] David Hansen and Kyle Hansen. Clues about bluffing in Clue: Is conventional wisdom wise? *IEEE Transactions on Games*, 13(3):310–314, 2019.
- [3] Yury Ionin and Kyle Hansen. A special instance of rock–paper–scissors. *The American Mathematical Monthly*, 125(8):757–758, 2018.

Selected Presentations

- 2024 **Tiling Spaces Which are Fiber Bundles over Nilmanifolds**, *41st Workshop in Geometric Topology*, Calvin University, Grand Rapids, MI
- 2022 **The Hull of a Manifold with Bounded Geometry**, *Topology Seminar*, UCSB, Santa Barbara, CA
- 2019 **When the Fundamental Theorem of Algebra Goes Awry**, *Contributed Paper Session on Revitalizing Complex Analysis*, JMM, Baltimore, MD
Joint with Mike Brilleslyper (Florida Poly) and Russ Howell (Westmont College)

Research Interests

Graduate Research

- 2022-Present **Quantitative Topology**, *UCSB*, Santa Barbara, CA
Quantify the volumes of nullhomotopies in nilpotent spaces
Advisor: Fedya Manin
- Tiling Spaces**, *UCSB*, Santa Barbara, CA
Determine topological properties of tiling spaces generated by tilings of nilpotent Lie groups
Advisor: Fedya Manin
- Nilpotent-Elliptic Manifolds**, *UCSB*, Santa Barbara, CA
Detect nilpotent-ellipticity (in the sense of Gromov) of a manifold from its algebraic data
Advisor: Fedya Manin

Undergraduate Research

- 2018-2019 **Complex Analysis**, *Westmont College*, Santa Barbara, CA
Count and locate the roots of complex harmonic polynomials
Advisor: Russell Howell
- 2017 **Computational Graph Theory**, *National Security Internship Program at the Pacific Northwest National Lab*, Richland, WA
Detect scale-invariant properties of large social networks
Advisor: Jennifer Webster

Mentorship, Volunteer, and Community Service

- 2024 **JMM Chaperone**, *Westmont College*, Santa Barbara, CA
Drive college students to the Joint Mathematics Meeting, and debrief conference talks
- 2024-Present **Graduate Christian Encouragement (GraCE) Coordinator**, *Unaffiliated*, Santa Barbara, CA
Organize a weekly informal gathering of Christian graduate students at UCSB
- 2023-2024 **Directed Reading Program Mentor**, *UCSB*, Santa Barbara, CA
Mentor undergraduates in elective topics: tiling spaces, cryptography, quantum computing
- 2022-2024 **Math Field Day Volunteer**, *Westmont College*, Santa Barbara, CA
Guide undergraduate volunteers in judging high school “chalk talks” in annual competition
- 2022-Present **Community Group Discussion Leader**, *Christ Presbyterian Church*, Santa Barbara, CA
Lead adults in church community group discussions
- 2022-Present **Youth Group Volunteer**, *Christ Presbyterian Church*, Santa Barbara, CA
Mentor high school students in small groups and individually
- 2022-Present **Quire of Voyces**, *Santa Barbara City College*, Santa Barbara, CA
Sing in a local classical a capella choir
- 2020-Present **Church Setup and Security**, *Christ Presbyterian Church*, Santa Barbara, CA
Prepare church building for Sunday worship, and ensure safety of attendees
- 2020-2021 **Elementary School Virtual Tutor**, *Partners in Education*, Santa Barbara, CA
Assist elementary school teachers in overseeing remote math class activities

Conferences & Workshops Attended

- 2024 **41st Workshop in Geometric Topology**, *Calvin University*, Grand Rapids, MI
Quantitative Topology and Beyond, *Simons Foundation*, New York City, NY
Joint Mathematics Meeting, San Francisco, CA
- 2023 **Geometry and Analysis of Groups and Manifolds**, *Centro De Giorgi*, Pisa, Italy
Sub-Riemannian Geometry and Beyond III, *Centro De Giorgi*, Pisa, Italy
- 2022 **Graduate Student Concentration Week on Metric Geometry**, *Texas A & M Workshop in Analysis and Probability*, College Station, TX
- 2019 **Joint Mathematics Meeting**, Baltimore, MD

Honors & Awards

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| 2024 | Department of Mathematics Outstanding Teaching Assistant Award | <i>UCSB</i> |
| 2019 | Outstanding Graduate Award in Mathematics | <i>Westmont College</i> |
| 2019 | Kenneth Monroe Award | <i>Westmont College</i> |

Technical Skills

Programming

LaTeX, Python, R, SQL, Java, Ruby, C, Racket (Scheme)

Teaching Tools

Canvas, Gradescope, WeBWork, Piazza, iClicker