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

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* 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 activites

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

2024   Department of Mathematics Outstanding Teaching Assistant Award   *UCSB*

2019   Outstanding Graduate Award in Mathematics   *Westmont College*

2019   Kenneth Monroe Award   *Westmont College*

Technical Skills

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

Teaching Tools
Canvas, Gradescope, WeBWork, Piazza, iClicker