

CURRICULUM VITAE
Lucas Sabalka

PERSONAL

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EDUCATION

Doctor of Philosophy: **Mathematics**
University of Illinois at Urbana-Champaign, **May 2006**
Dissertation: **Braid groups on graphs**
Advisor: Ilya Kapovich

Bachelor of Science: **Mathematics, Computer Science, History; minors in Physics, Psychology**
With Honors, With Highest Distinction
University of Nebraska-Lincoln, **August 2002**
Thesis: **Geodesics in the braid group on three strands**
Advisors: Susan Hermiller and John Meakin

POSITIONS

Jan 2009-present: **Riley Assistant Professor**
Binghamton University

Aug 2006-Dec 2008: **Krener Assistant Professor**
University of California, Davis

INTERESTS

Geometric and combinatorial group theory, low-dimensional topology, combinatorics, geometry, applications of topology; more specifically: free groups, $Out(F_n)$, graph braid groups, braid groups and Artin groups, boundaries of spaces, configuration spaces, robot motion, persistent homology

PUBLICATIONS

(Publications available online: see [webpage](#), the [ArXiv](#), or use hyperlinks to journals below)

- (11) **On restricting subsets of bases in relatively free groups**, with Dmytro Savchuk
Accepted, *International Journal of Algebra and Computation*
- (10) **On the geometry of a proposed curve complex analogue for $Out(F_n)$** , with Dmytro Savchuk
Submitted

- (9) **Face vectors of subdivided simplicial complexes**, with Emanuele Delucchi and Aaron Pixton
Published online, *Discrete Mathematics*, 2011. To appear in print.
- (8) **Projection-forcing multisets of weight changes**, with Joshua Brown Kramer
Journal of Combinatorial Theory, Series A, 117(8):1136-1142, 2010
- (7) **Multidimensional online motion planning for a spherical robot**, with Joshua Brown Kramer
International Journal of Computational Geometry and Applications, 20(6):653-684, 2010
- (6) **Presentations of graph braid groups**, with Daniel Farley
Published online, *Forum Mathematicum* (2010). To appear in print.
- (5) **On rigidity and the isomorphism problem for tree braid groups**
Groups, Geometry, and Dynamics, 3(3):469-523, 2009
- (4) **On the cohomology rings of tree braid groups**, with Daniel Farley
Journal of Pure and Applied Algebra, 212(1):53-71, 2007
- (3) **Embeddings of right-angled Artin groups into graph braid groups**
Geometriae Dedicata, 124:191-198, 2007
- (2) **Discrete Morse theory and graph braid groups**, with Daniel Farley
Algebraic and Geometric Topology, 5:1075-1109, 2005
- (1) **Geodesics in the braid group on three strands**
In *Group theory, statistics, and cryptography*, v.360 of *Contemporary Mathematics*, 133-150, 2004

IN PREPARATION

- (14) **Classifying spaces for braided Thompson's group**, with Keith Jones
- (13) **Generalized expander graphs**, with Jerry Kaminker
- (12) **Submanifold projection for $Out(F_n)$** , with Matt Clay and Dmytro Savchuk

COURSE NOTES

- (1) **A First Course in Complex Analysis**, with Matthias Beck, Gerald Marchesi, and Dennis Pixton

SELECTED HONORS

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|---------------------|--|
| 2006 | Recipient of the UIUC Mathematics Department Irving Reiner Memorial Award for outstanding graduate scholastic achievement in the field of algebra |
| 2002-06 | National Science Foundation Graduate Research Fellowship |
| 2002-06 | VIGRE Graduate Fellowship from the UIUC Mathematics Department |
| 2002-Present | Member of Phi Beta Kappa national undergraduate honorary society |
| Aug 2002 | Graduated from University of Nebraska-Lincoln with a Bachelor of Science in Mathematics, Computer Science, and History , with minors in Physics and Psychology , both With Honors and With Highest Distinction |
| 2001-02 | Recipient of the Barry M. Goldwater Scholarship for American undergraduate students with outstanding potential in science and mathematics |

- 2001 Nebraska nominee for the **Rhodes Scholarship**
2001 Semi-finalist for the Winston **Churchill Scholarship**
Summer 2000 Chosen to attend the **Park City Mathematics Institute's summer program** in Computational Complexity Theory
Fall 1999 Chosen to attend the **Mathematics Advanced Study Semester** at Pennsylvania State University; **graduated with distinction**
1991, 2001 Advanced to final round of **International Collegiate Programming Contest**; team received **Honorable Mention** both times

TALKS GIVEN

(Italics indicates invited address; Hyperlinks indicate slides available online)

- Jan 2011 ***Special Session on Groups, Algorithms, Complexity Theory and Security***
Joint Meetings, Boston, MA (planned)
- Oct 2011 ***Special Session on Geometric, Combinatorial, and Computational Group Theory***
University of Utah
- Oct 2011 ***Special Session on Algorithmic and Geometric Properties of Groups***
University of Nebraska-Lincoln
- Sep 2011 ***Special Session on Geometry of Arithmetic Groups***
Cornell University
- Apr 2011 ***Special Session on Computational Algebra, Groups, and Applications***
University of Nevada, Las Vegas
- Mar 2011 ***Spring Topology and Dynamics Conference***
University of Texas at Tyler
- Dec 2010 ***Wasatch Topology Conference***
University of Utah
- Oct 2010 ***Workshop on the Geometry of the Outer Automorphism Group of a Free Group***
American Institute of Mathematics
- Oct 2010 ***Approaches to Group Theory*** (Ken Brown Conference)
Cornell University
- Sep 2010 ***Colloquium***
University of Nebraska-Lincoln
- Mar 2010 ***Spring Topology and Dynamics Conference***
Mississippi State University, Starkville
- Oct 2009 ***Binghamton University Graduate Conference in Algebra and Topology***
Binghamton University
- May 2009 ***Geometric and Combinatorial Methods in Group and Semigroup Theory***
(Meakinfest)
University of Nebraska-Lincoln
- Mar 2009 ***Special Session on Geometric Group Theory***
University of Illinois at Urbana-Champaign
- Mar 2009 ***Colloquium***
Lafayette College
- Mar 2009 ***Colloquium***
San Jose State University
- Mar 2008 ***Special Session on Geometric Group Theory***
Louisiana State University, Baton Rouge
- Mar 2008 ***Spring Topology and Dynamics Conference***
University of Wisconsin, Milwaukee

- Oct 2007 **Colloquium**
Miami University of Ohio
- Oct 2007 **Postdoctoral Research Seminar**
MSRI Program in Geometric Group Theory
- Mar 2007 **Special Session on Combinatorial and Geometric Group Theory**
Miami University of Ohio
- Jul 2006 **Conference on Topology and Robotics, 2006**
Eidgenössische Technische Hochschule Zürich
- May 2006 **Conference on Combinatorial and Geometric Group Theory**
(A. Yu. Olshanskii conference)
Vanderbilt University
- Mar 2006 **Spring Topology and Dynamics Conference**
University of North Carolina-Greensboro
- Mar 2006 **Geometric Groups on the Gulf Coast Conference**
University of Southern Alabama
- Nov 2005 **Geometric and Probabilistic Methods in Group Theory & Dynamical Systems**
Texas A&M University
- Oct 2005 **Special Session on Geometric Methods in Group and Semigroup Theory**
University of Nebraska-Lincoln
- Jun 2005 **Asymptotic and Probabilistic Methods in Geometric Group Theory**
University of Geneva
- Apr 2005 **Special Session on Curvature in Group Theory and Combinatorics**
University of California-Santa Barbara
- Oct 2004 **Special Session on Braids and Knots**
University of New Mexico-Albuquerque
- Oct 2004 **Albany Group Theory Conference**
Albany, New York
- Oct 2003 **Special Session on Combinatorial and Statistical Group Theory**
Courant Institute
- Apr 2002 **Hudson River Undergraduate Mathematics Conference**
Hamilton College, New York
- Mar 2002 **Spring Topology and Dynamics Conference**
University of Texas at Austin

WORKSHOPS ATTENDED

- Jun 2012 **Geometric Group Theory Summer Program**
Park City Mathematics Institute (planned)
- Oct 2010 **Geometry of the Outer Automorphism Group of a Free Group**
American Institute of Mathematics
- Aug 2010 **Geometric, Combinatorial, and Computational Group Theory**
Centre de Recherches Mathématiques
- Fall 2007 **Geometric Group Theory; Teichmüller Theory and Kleinian Groups**
Mathematical Sciences Research Institute

SEMINAR TALKS

- Nov 2011 **CUNY Geometry and Topology Seminar**, City University of New York (planned)
Feb 2011 **Collective Dynamics of Complex Systems**, Binghamton University
Jan 2011 **Geometry and Topology Seminar**, The Ohio State University
Nov 2010 **Geometry and Topology Seminar**, Binghamton University
Sep 2010 **Groups, Semigroups, and Topology Seminar**, University of Nebraska-Lincoln
Sep 2010 **Geometry and Topology Seminar**, Cornell University
May 2010 **Combinatorics Seminar**, Kansas University
Apr 2010 **Geometry and Topology Seminar**, Binghamton University
Nov 2009 **Baumslag Seminar**, City University of New York
Nov 2009 **Geometry and Topology Seminar**, Binghamton University
Oct 2009 **Geometry and Topology Seminar**, Binghamton University
Aug 2009 **Geometry and Topology Seminar**, University of Pennsylvania
Feb 2009 **Toeholds in Topology Graduate Seminar**, Binghamton University
Nov 2008 **Geometry/Topology Seminar**, University of California, Davis (3 talks)
Nov 2008 **Student-Run Geometry/Topology Seminar**, University of California, Davis
Sep 2008 **Geometry and Topology Seminar**, Cornell University
Sep 2008 **Geometry and Topology Seminar**, Binghamton University
May 2008 **Geometry and Topology Seminar**, University of California, Davis
Oct 2007 **Topology Seminar**, Miami University of Ohio
Apr 2007 **Algebra, Geometry, and Combinatorics seminar**, San Francisco State University
Jan 2007 **Geometry and Topology Seminar**, University of California, Davis
Nov 2006 **Group Theory Seminar**, The Ohio State University
Nov 2006 **Geometry and Topology Seminar**, University of California, Davis
Apr 2006 **Group Theory Seminar**, The Ohio State University
Apr 2006 **Dissertation Defense**, University of Illinois at Urbana-Champaign
Apr 2006 **Group Theory Seminar**, University of Illinois at Urbana-Champaign
Sep 2005 **Group Theory Seminar**, University of Illinois at Urbana-Champaign
Feb 2005 **Group Theory Seminar**, University of Illinois at Urbana-Champaign
Jun 2004 **Groups, Semigroups, and Topology**, University of Nebraska-Lincoln (3 talks)
Apr 2002 **Groups, Semigroups, and Topology**, University of Nebraska-Lincoln

TALKS FOR STUDENTS

- Mar 2011 **Toeholds in Topology Graduate Seminar**, Binghamton University, on *Knots*
Dec 2010 **Undergraduate Math Club**, Binghamton University, on *Graph Braid Groups*
Nov 2010 **Toeholds in Topology**, Binghamton University, *informal*
Apr 2010 **Toeholds in Topology**, Binghamton University, on *Discrete Morse Theory*
Mar 2010 **Undergraduate Math Club**, Binghamton University, on *Graduate Schools*
Oct 2009 **Toeholds in Topology**, Binghamton University (3 talks)
Basic Introduction to Outer Space; Outer Space & Stallings Foldings; Stallings Foldings
Feb 2009 **Toeholds in Topology**, Binghamton University, on *CAT(0) Spaces*
Mar 2008 **Research Focus Group Graduate Seminar**, University of California, Davis, on the *Haagerup Property*
May 2008 **UC Davis Math Circle Junior High Seminar**, University of California, Davis, on *Expander Graphs*
2006-07 **Research Focus Group Graduate Seminar**, University of California, Davis (multiple talks given)

SERVICE

- Referee for:** Algebraic and Geometric Topology; Bulletin of the Malaysian Mathematical Sciences Society; Geometriae Dedicata; Homology, Homotopy, and Applications; London Mathematical Society Journal of Computation and Mathematics; National Security Agency; Topology and its Applications; Topology Proceedings; Transactions of the American Mathematical Society; Fonds de Recherche du Québec
- Aug 2011** Panelist, Binghamton Harpur College panel on Life and Work as a New Faculty Member
- 2011-present** Mathematical consultant for Dr. Paul Hanson for ecosystem variability project
- 2010-present** Contributing author, Binghamton Press & [Sun Bulletin Ask-a-Scientist](#) column
- 2009-present** Mathematical consultant for the Wayne Jones Flexible Solar Cell group
- 2009-present** Participant in Collective Dynamics of Complex Systems group ([talk listed](#))
- 2009-present** Mathematical consultant for Hiroki Sayama, assistant professor of bioengineering, head of [Collective Dynamics of Complex Systems](#) group
- 2009-present** Organizer, Binghamton Toeholds in Topology graduate seminar ([talks listed](#))
- 2009-present** Speaker, Binghamton Undergraduate Math Club ([talks listed](#))
- Apr 2009** Invited speaker at New Approaches to Scholarly Communications and Publishing Symposium, an interdisciplinary workshop by the Binghamton University Library
- Jan-May 2008** Principle organizer of Davis Geometric Group Theory Research Focus Group, including graduate seminar series ([talk listed](#))
- Aug 2007** Co-organizer of the week-long Davis Algebra Preliminary Exam Review Workshop
- 2006-2007** Co-organizer, Davis Geometric Group Theory Research Focus Group, including graduate seminar series; presented multiple times (individual talks not listed)
- 2006-2007** Committee member for the AMS Initiative on the Doctorate, a follow-up of the Carnegie Initiative on the Doctorate
- 2003-2005** Graduate representative for University of Illinois at Urbana-Champaign Mathematics to Carnegie Initiative on the Doctorate; attended national convening
- 2004-2005** Graduate Student Representative on University of Illinois at Urbana-Champaign Mathematics Department Graduate Affairs Committee
- 2000-2001** President, Pi Mu Epsilon Honorary National Mathematics Society, University of Nebraska-Lincoln Nebraska Alpha chapter

RESEARCH MENTORSHIP

- Summer 2008-
Dec 2010** Two undergraduate students in a Research Experience at University of California, Davis, researching open questions on graph braid groups on graphs, resulting in two research papers submitted for publication to date
- Jan-May 2008** Two students, one graduate and one undergraduate, in extended mentorship for Research Focus Group at University of California, Davis
- Summer 2007** One undergraduate student in Research Experience in online mobile robot navigation at University of California, Davis, resulting in a simulated motion algorithm
- Mar-Aug 2007** Two undergraduate students in Research Experience on the symmetric groups at University of California, Davis, with reading course and research components

TEACHING

BINGHAMTON UNIVERSITY (Riley Assistant Professor)

Semester	Course	Book	Students
FALL 2011	Math 330 Number Systems (proofwriting)	Beck & Geoghegan	26
FALL 2011	Math 323 Calculus III	Stewart	37
SPRING 2011	Math 375 Complex variables	Authored Course Notes	38
FALL 2010	Math 461 Topology I	Bloch	25
FALL 2010	Math 130 Mathematics in Action	Course Notes	280
SPRING 2010	Math 130 Mathematics in Action	Course Notes	162
FALL 2009	Math 222 Calculus II	Stewart	44
FALL 2009	Math 222 Calculus II	Stewart	45
SPRING 2009	Math 222 Calculus II	Stewart	35
SPRING 2009	Math 375 Complex variables	Authored Course Notes	18

UNIVERSITY OF CALIFORNIA, DAVIS (Krener Assistant Professor)

Quarter	Course	Book	Students
FALL 2008	295 Graduate Reading Course	Burago, Burago, & Ivanov A course on metric geometry	5
FALL 2008	16A Basic Calculus I	Larson & Edwards	262
SPRING 2008	147 Basic Topology	Munkres	30
WINTER 2008	16A Basic Calculus I	Larson & Edwards	203
SPRING 2007	141 Euclidean and non-Euclidean geometry	Greenberg; Lecture Notes	30
SPRING 2007	147 Basic Topology	Munkres	30
WINTER 2007	295 Graduate Reading Course	(topic: braid groups)	6
WINTER 2007	16B Basic Calculus II	Larson & Edwards	90
FALL 2006	210A Graduate Topics Course	(topic: geometric group theory)	12

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN (Graduate Teaching Assistant)

Semester	Course
2006	(Received Graduate Teaching Certificate)
SPRING 2006	221 Introductory Matrix theory stand-alone course; Ranked as Excellent Teacher
FALL 2005	221 Introductory Matrix theory stand-alone course; Ranked as Excellent Teacher

UNIVERSITY OF NEBRASKA-LINCOLN (Undergraduate Teaching Assistant)

Semester	Course
SPRING 2002	208H Honors Calculus III
FALL 2001	107H Honors Calculus II
SPRING 2001	208H Honors Calculus III
FALL 2000	107H Honors Calculus II