THOMAS KINDRED

Wake Forest University

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PROFESSIONAL EXPERIENCE

Wake Forest University	Teacher-Scholar Postdoctoral Fellow	July 2021-Present
University of Nebraska-Lincoln	Postdoctoral Faculty Fellow	August 2018-May 2021

EDUCATION

University of Iowa, Iowa City, IA   Ph.D. May 2018
Major: Mathematics: geometric topology   M.S. December 2014
Advisor: Dr. Charlie Frohman

Williams College, Williamstown, MA   B.A. June 2007
Major: Mathematics   Highest Honors
Advisor: Dr. Colin Adams

RESEARCH INTERESTS

Classical & virtual knot theory via spanning surfaces; quantum topology; knotted surfaces in 4-space; plumbing constructions in 3 and 4 dimensions; trisections of 4-manifolds; multisections of n-manifolds

Postdoctoral advisors: Dr. Mark Brittenham, Dr. Hugh Howards, Dr. Alex Zupan,

PUBLICATIONS AND PREPRINTS

- *The essence of a spanning surface*, in preparation, 43 pp. slides
- *The virtual flyping theorem,* submitted to Geom. Topol., 37 pp. pdf
- *Primeness of alternating virtual links,* submitted to Alg. Geom. Topology, 21 pp. pdf
- *End-essential spanning surfaces for links in thickened surfaces,* submitted to Pac. J. Math, 10 pp. pdf
- *A simple proof of the Crowell-Murasugi theorem,* submitted to Alg. Geom. Topology, 6 pp. pdf slides
- *A geometric proof of the flyping theorem,* submitted to Adv. Math., 37 pp. pdf slides video
- *Efficient multisections of odd-dimensional tori,* to appear in Alg. Geom. Topology, 65 pp. pdf
- *Nonorientable spanning surfaces for knots,* Chapter 23 of the Concise Encyclopedia of Knot Theory (2021), 197-203.
- *Crosscap numbers of alternating knots via unknotting splices,* Internat. J. Math. 31 (2020), no. 7, 2050057, 30 pp. pdf video
- *Alternating links have representativity 2*. Alg. Geom. Topology 18 (2018), no. 6, 3339-3362. pdf
- *Plumbing essential states in Khovanov homology,* New York J. Math. 24 (2018), 588-610. pdf
- *Heegaard diagrams corresponding to Turaev surfaces* (with Cody Armond and Nathan Druivenga), J. Knot Theory Ramifications 24 (2015), no. 4, 1550026, 14 pp. pdf
- *A classification of spanning surfaces for alternating links* (with Colin Adams), Alg. Geom. Topology 13 (2013), no. 5, 2967-3007. pdf

<div align="center">**TEACHING & ADVISING EXPERIENCE**</div>

Teacher-Scholar Postdoctoral Fellow, Wake Forest University   July 2021-present

Winston-Salem, NC
- Master's Thesis on Khovanov homology (co-advisor F21-present)
- Discrete Mathematics: logic, sets, functions, graphs; introduction to proofs (F22)
- Topology: continuity, connectedness, compactness; graduate course (F22)
- Calculus with Analytic Geometry I (F21, S22)

Postdoctoral Faculty Fellow, University of Nebraska-Lincoln   August 2018-May 2021

Lincoln, NE
- Topics in Topology: knot theory via spanning surfaces; flipped classroom (S21)
- Linear Algebra (F18, F19, F20)
- Discrete & Finite Math: graphs & combinatorics, proofs; inquiry-based (F20)
- Topology II: fundamental groups, covering spaces, homology; qual course (S20)
- Introduction to Modern Algebra: a "rings first" proofs course (S19, F19)

Instructor, Teaching Assistant, and Tutor, University of Iowa   Fall 2012-May 2018

Iowa City, IA
- Topics in Topology: substitute professor for six weeks post-defense (S18)
- Engineering Math 2: vector calculus with Mathematica (F13, S14, S15, S18)
- Calculus 2 (F17)
- Elementary Functions: precalculus with trig (S17, instructor of record)
- College Algebra (F16, instructor of record)
- Grad topology: general topology, homotopy theory, smooth manifolds (F15-S16)
- Summer prep course for qualifying exam in topology (2015, 2016)
- Engineering Math 1: single-variable calculus (F14)
- Introduction to Undergraduate Research (S13)
- Mathematics for the Biological Sciences (F12)
- Math Tutorial Lab: college algebra through linear algebra (F12-S18)

Math and Physics Teacher, Potts Camp High School   August 2009-May 2012

Potts Camp, MS
- Taught geometry, algebra 2, and trigonometry/precalculus each year
- Also taught calculus first year, physics second year, and both third year
- Volunteered as assistant baseball coach each spring
- Certified through the Mississippi Teacher Corps

Math Teacher, The Charles School   November 2008-May 2009

Columbus, OH
- Taught remedial pre-algebra and fundamentals of math to 9th-graders

Teaching Assistant and Grader, Williams College   September 2004-May 2007

Williamstown, MA
- Graded homework and held office hours for discrete math and real analysis

SELECTED HONORS & AWARDS

MAA Project NExT Fellow	2019
Parents' Recognition Award for Contribution to Students	2019
Bor-Luh Lin Thesis Award	2018
University of Iowa Thank-A-Teacher letter recipient	2016
Catherine Wegner Outstanding Teaching Assistant Award Winner	2015

INVITED TALKS

The flyping theorem and geography problem for alternating links in thickened surfaces
University of Nebraska-Lincoln Seminar on Groups, Semigroups, & Topology

Virtual
November 2021

A simple proof of the Crowell-Murasugi Theorem
AMS Sectional Meeting, Special Session

Virtual
October 2021

Definite surfaces, plumbing, and Tait's conjectures
Caltech Geometry and Topology Seminar

Virtual
May 2021

Definite surfaces and Murasugi sums: new geometric proofs of two classical theorems
UC Davis Geometry/Topology Seminar

Virtual
May 2021

Replumbing definite surfaces: the geometric content of the flyping theorem
MIT Geometry and Topology Seminar

Virtual
April 2021

The future is a 4-manifold.
Wake Forest University Department of Mathematics and Statistics Colloquium

Virtual
April 2021

Flyping, plumbing, and symmetries of alternating links
McMaster University Geometry and Topology Seminar

Virtual
January 2021

Symmetries of alternating link exteriors, spatial graphs, and branched surfaces
Joint Math Meetings

Virtual
January 2021

The geometric content of Tait's conjectures
Ohio State CKVK* Seminar

Virtual
November 2020

Spanning surfaces: essence, plumbing, and flypes
University of Virginia Geometry Seminar

Virtual
October 2020

A geometric proof of the flyping theorem
Oklahoma State Topology Seminar

Virtual
September 2020

Symmetric, efficient multisections of odd-dimensional tori
Virtual Trisectors Seminar

Virtual
August 2020

Splice-unknotting and crosscap numbers
Nearly Carbon Neutral Geometry and Topology Conference

Virtual
June 2020

Efficient multisections of odd-dimensional tori
University of Iowa Topology Seminar

Virtual
April 2020

Checkerboards & crosscaps		Lincoln, NE
University of Nebraska-Lincoln Seminar on Groups, Semigroups, & Topology		March 2018
Checkerboards & crosscaps		Boston, MA
Boston College Geometry-Topology Seminar		March 2018
Checkerboard plumbings		Williamstown, MA
Williams College Faculty Seminar		October 2017
Plumbings of checkerboards		Buffalo, NY
AMS Sectional Meetings		September 2017
Plumbing is a natural operation		Stanford, CA
GEAR Junior Retreat		August 2017
Alternating links have representativity 2		New York, NY
AMS Sectional Meetings		May 2017
Plumbing in Khovanov homology		Minneapolis, MN
AMS Sectional Meetings		October 2016
Khovanov homology detects adequate homogeneous states		Columbus, OH
MAA Mathfest		August 2016
What is an alternating link?		Iowa City, IA
Advances in Quantum Topology		April 2016

SELECTED SEMINAR TALKS AT THE UNIVERSITY OF NEBRASKA-LINCOLN

Stallings' fibration theorem	GST seminar	April 2021
The future is a 4-manifold.	Landscapes seminar	March 2021
Essence of a spanning surface	GST seminar	October 2020
A geometric proof of the flyping theorem	GST seminar	October 2020
Orderability, surgery, and double-branched covers	GST seminar	October 2019
Orderability of knot groups of fibered knots	GST seminar	October 2019
Heegaard-Kirby diagrams	4-manifolds reading seminar	October 2019
Heegaard splittings and trisections	4-manifolds reading seminar	September 2019
Diagrams of knotted surfaces in 4-space	4-manifolds reading seminar	June 2019
Crosscap numbers of alternating knots via unknotting splices	GST seminar	April 2019
Plumbings of 4-manifolds (2-part talk)	4-manifolds reading seminar	March 2019
Carving, framing, and canceling	4-manifolds reading seminar	January 2019
Essential slopes of a knot (2-part talk)	GST seminar	September 2018

SELECTED SEMINAR TALKS AT THE UNIVERSITY OF IOWA

Checkerboard plumbings	Three minute thesis competition	October 2017
Checkerboard plumbings	GAUSS	October 2017
Quadratic differentials & measured foliations	Topology reading seminar	March 2017
The metric on Teichmuller space	Topology reading seminar	March 2017
Alternating links have representativity 2	Topology seminar	February 2017
Inscribed rectangles & rhombi via Mobius bands	GAUSS	February 2017
Introduction to Teichmuller space	Topology reading seminar	January 2017
Why study hyperbolic geometry?	Student topology seminar	November 2016
Thin triangles imply exponential explosion.	Student topology seminar	November 2016
Surface bundles & the Meyer signature cocycle	Topology reading seminar	October 2016
Plumbing in Khovanov homology	Graduate student seminar	September 2016
Origins and rudiments of hyperbolic geometry	Student topology seminar	September 2016
Geometric structures via gluing of Platonic solids	Topology reading seminar	April 2016
Geometry and topology of 3-manifolds	Topology reading seminar	January 2016
Rational surgery coefficients & the slam dunk move	Topology reading seminar	December 2015
Examples of Dehn surgery on knots	Topology reading seminar	November 2015
Classification of torus bundles and semi-bundles	Topology reading seminar	October 2015
Prime decompositions of 3-manifolds	Topology reading seminar	September 2015
Geometry of alternating links	Topology seminar	March 2015
Invitation to Spivak's <u>Calculus on Manifolds</u>,	Student topology seminar	January 2015
State surfaces in Khovanov homology	Topology seminar	October 2014
The Temperley-Lieb algebra & Jones polynomials	Student topology seminar	April 2014
Geometric & algebraic caps for spanning surfaces	Topology seminar	March 2014
Gromov hyperbolicity	Topology reading seminar	October 2013
Introduction to spanning surfaces	Student topology seminar	September 2012

SERVICE

- **Referee or reviewer** for Algebraic & Geometric Topology, Illinois Mathematics Journal, International Journal of Mathematics, Journal of Knot Theory and its Ramifications, New York Journal of Mathematics, Osaka Journal of Mathematics, Proceedings A of the Royal Society of Edinburgh, Topology and its Applications.

- **Putnam exam co-coordinator** (F18, F19, F20)

- **Great Plains Alliance co-coordinator,** arranging regional talks by UNL grad students (F18-S21)

- **Evaluator** of UNL undergraduate research proposals (S19, S20)

- **Organizer** or co-chair for the following seminars and events:

  - AMS Special Session on Developments in Knot Theory and Low-Dimensional Topology (F21)

  - Nebraska GST seminar: Groups, Semigroups and Topology (F19)

  - Nebraska 4-manifold reading seminar (F19)

  - Iowa GAUSS: Graduate And Undergraduate Student Seminar (S17-S18)

  - Iowa student topology seminar (S15, F16)

  - Iowa topology reading seminar (F15-S16)

- **Mentor** for younger students and the surrounding community:

  - Volunteered for Math Day at Lucas Elementary School (2017, 2018)

  - Volunteered for Sonia Kovalevsky Day, to encourage high school girls interested in math (2016)

  - Welcomed incoming graduate students in the University of Iowa's Buddy Program (2014-2016)

  - Served as a Williams College Junior Advisor (F05-S06)

- **Advocate** for students, teachers, and colleagues:

  - Member of the Wake Forest Mathematics Curriculum Committee (2022)

  - Alternate math delegate to the University of Iowa Graduate Student Senate (2016-2018)

  - Member of the University of Iowa Affordable Housing Task Force (2016)

  - Williams College Olmsted Prize Committee to recognize excellent high school teaching (S06)

  - Student representative on the Williams College Committee on Priorities and Resources (S05-F06)

References available upon request