THOMAS KINDRED

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PROFESSIONAL EXPERIENCE

University of Nebraska-Lincoln Postdoctoral Faculty Fellow August 2018-Present

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 knot theory, especially spanning surfaces; multisections of n-manifolds, especially trisections of 4- and 5-manifolds; knotted surfaces in four dimensions; quantum topology

Postdoctoral advisors: Dr. Mark Brittenham and Dr. Alex Zupan

PUBLICATIONS AND PREPRINTS

- *The essence of a spanning surface*, in preparation, slides
- *Smooth multisections of odd-dimensional tori and other manifolds,* submitted to Alg. Geom. Topology, pdf
- *A geometric proof of the flyping theorem,* submitted to Advances in Mathematics, pdf slides video
- *Nonorientable spanning surfaces for knots,* to appear in the Concise Encyclopedia of Knot Theory
- *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

TEACHING EXPERIENCE

Postdoctoral Faculty Fellow, University of Nebraska-Lincoln — August 2018-Present

Lincoln, NE

- 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

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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

Flyping, plumbing, and symmetries of alternating links — Virtual
McMaster University — January 2021

Symmetries of alternating link exteriors, spatial graphs, and branched surfaces — Virtual
Joint math meetings — January 2021

The geometric content of Tait's conjectures — Virtual
Ohio State CKVK* seminar — November 2020

Spanning surfaces: essence, plumbing, and flypes — Virtual
University of Virginia Geometry Seminar — October 2020

A geometric proof of the flyping theorem — Virtual
Oklahoma State Topology Seminar — September 2020

Symmetric, efficient multisections of odd-dimensional tori — Virtual
Virtual Trisectors Seminar — August 2020

Splice-unknotting and crosscap numbers — Virtual
Nearly Carbon Neutral Geometry and Topology Conference — June 2020

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

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 Calculus on Manifolds,	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 Alg. Geom. Topology, Illinois Math. J., Internat. J. Math., J. Knot Theory Ramifications, New York J. Math., Osaka J. Math.
- **Putnam exam co-coordinator** (F18, F19, present)
- **Great Plains Alliance co-coordinator,** arranging regional talks by UNL grad students (F18-present)
- **Evaluator** of UNL undergraduate research proposals (S19, S20)
- **Organizer** or co-chair for the following seminars:
  - 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:
  - 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